Ms volume of text of lectures on anatomy and surgery, given at Edinburgh Medical School by Dr Alexander Monro (secundus). Written by John Pennington. Vol. 2

Publication/Creation

1778

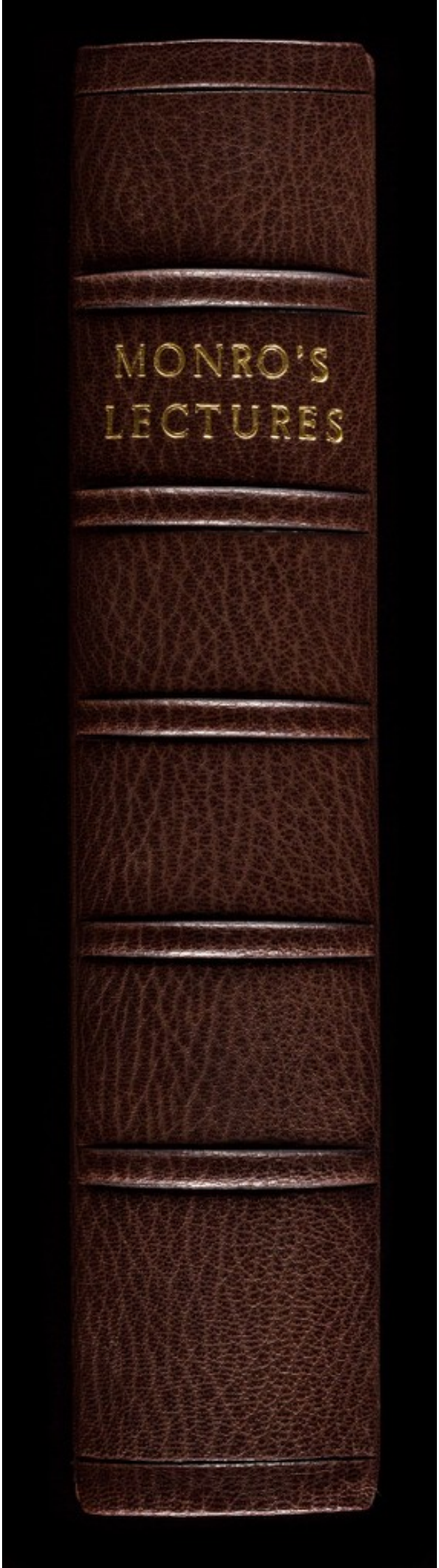
Persistent URL

https://wellcomecollection.org/works/etxfg48b

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

MONRO'S
LECTURES


MONRO'S
LECTURES

Lectures

by

Dr. Alexander Monro

on

Anatomy and Surgery.

Edinburgh
January 31. 1776

Scribtum sp. Dr. Pennington.

you all know is understood, an opacity in y^e Chrystaline Lens.
If we were nearly to reason concerning y^e Cataract from y^e structure
we wd. be much apt to place it in the Capsule, y^t is in y^e body of the
Lens; for in viewing subjects we demonstrate y^e defects of y^e former
while at no Time of Life we are able to do so in y^e latter: But ex-
perience proves, y^t in 99. cases of 100. the body of y^e Lens is affected
& examin'd in y^e suspicion of Baron Wenzel &c. of 100. Lenses in a
diseased state: y^e reason y^e Capsule is sometimes y^e seat of the
disease is wd^d., from y^e appearance w^ch y^e Eye has: & after the
body of y^e Lens has been attacked, in some time after, perhaps in
y^e space of a month, a new darkness sometimes forms at y^e pupil
& probably y^e defects of y^e Capsule have been imitated by the
Operation, & embraced this opacity: In some few cases y^e Cataract
is occasion'd by an external violence; but for y^e most part it comes
on in y^e decline of Life in a very gradual manner, & gen^ly when in the
appearance of it in both Eyes at y^e same Time, y^e whole body of y^e
Lens is not always uniformly chang'd, but it lying in points
that gradually enlarge; in these we find a whole cloud increas'd in
y^e most irregular manner: Attempts have been made to cure this
disease by internal medicines, & when it is from external violence
Time assisted by medicines sometimes have an effect beyond our
expectations: I saw a remarkable example of y^e sort; where from
a violent blow y^e Capsule had been burst: it hung into the
Aqueous humour, & the body of y^e Lens was of a milky whiteness
w^ch continued for some Time: but in 2. M^os it was entirely gone
& the person did not desire no defect in y^e Eye: But where y^e disease comes
in a gradual manner I am inclin'd to conclude, either from Experience
or from a practic^l view of y^e disorder, y^t we shall fail in succeed
that alledges y^t he perform'd Cures, w^th y^e Cataract, regain, w^ch is
found to affect the Eyes of a person in health: But in all of

animals y^e Lens becomes more & more opaque: and when the Cataract happens it begins in both Eyes at y^e same Time: for y^t we may consider y^e disease, as an early change in y^e Constitution of y^e person therefore we can totally alter y^e Thing is no room to hope for a Cure: w^th out adding y^t it is seated in y^e most distant Extremities of our circulating System: By what I say I am far from meaning to dissuade y^e an attempt to cure: but to put you on your guard in Comm^n a prognosis, for as y^e disease is not dangerous to Life: & there is no necessity for having an immediate recourse to an operation, I wo^d make a trial, taking care not to go so far as to hurt y^e Constit^n of y^e Patient. Suppose y^n That medicines have failed in their effect: before y^e Surg^n undertakes y^e operat^n there are very^d circumstances to be attended to. 1^st That y^e bottom of y^e Eye, y^e Retina be not affected likewise: y^t y^e Patient has only a Cataract And not combined w^th it: the Gutta Serena or Amaurosis: & in order to judge here you must recollect a circumstance: viz. That y^e Choroid Coat is joined to y^e whole circumference of y^e Lens, & That there are no spaces: according to Sharp Letters between these processes giving a passage to the Light: for you see a plain consequence y^t if y^e Cataract is very opaque, we might suspect to y^e communication, being to judge y^e Eye insensible, while perhaps y^e bottom of y^e Eye preserv'd its full degree of sensibility: & thus for if we obs. y^t y^e Patient has had no complaint till a darkness was seen all y^e pupil: y^t he has not formerly been subject to headach, w^ch generally precedes the Gutta Serena: 2^dly. There is any tolerable degree of motion in y^e Iris: By exposing the Eye to very strong light: we might take it for granted y^t y^e bottom of the Eye is not diseased: as you'll obs. in two persons laboring under y^e Cataract: y^t y^e motions in y^e pupils of y^e one may be much more wide y^n in the other: & yet y^e bottom of the Eye in both

be equally round: we are to attend to y^e^ color & opacity of y^e^ Cataract in forming our judgement: & Gen^ly^ speak^g^ y^e^ milky or white colord Cataracts are y^e^ most opaque: but y^e^ same time we find whilst these w^ch^ appear to burnish'd Steel: but w^ch^ are rather of a yellowish or brown Color, resembling y^e^ Amber in y^e^ Snuff: these are less opaque but much harder: y^e^ Light passes easier thro^h^ 'em, but they have a m^ch^ greater firmness. — The next Circumstance you'll attend to is y^e^ y^e^ Crystal Lens, have no adhesion with the neighbouring parts & Particularly y^e^ Iris: w^ch^ must play upon y^e^ Lens w^th^ a Violable freedom: & I have seldom seen an adhesion of this kind w^th^ out an alter^n^ in y^e^ figure of the Pupil: it becoming Angular: this y^e^ is by no means a certain proof of it, only in y^e^ Cases let us be more careful in our observ^ns^. — I'd mention a caut^n^ w^ch^ is generally neglected by Eminent Operators i.e. Not to perform y^e^ oper^n^ unless both Eyes are diseas'd: for if one Eye is tolerably good, we endanger it by doing so: y^e^ inflam^n^ that is occasion'd by any operation is in danger of produc^g^ y^e^ Cataract & suppose we cou'd remove it by a wish w^th^ out any operation; the Deformity of y^e^ Eye w^d^ be somewhat lessen'd: but they cou'd not be well fitted to the same Object: y^e^ one had^g^ y^e^ other wanting the Lens: by means of Glasses we might bring 'em to be nearly eq^l^ but y^e^ advantage to y^e^ pat^t^ w^d^ be inconsid^le^ These points being consid^d^ we proceed to determine y^e^ oper^n^ or what is proper^d^ to be done. — The General view is to remove y^e^ opaque Lens from y^e^ pupil or axis of y^e^ Eye: & it is plain y^t^ there may be 2 methods of doing so. — 1^st^ The most Ancient & still y^e^ most common is to take advantage of y^e^ viscidity of y^e^ vitreous humor: to endeav^r^ to push the Lens down to y^e^ bottom of y^e^ Eye: & to entangle it in the vitreous humor: & y^e^ Surg^ns^ call couching the Lens. — A more effectual operat^n^ is when we extract it, or

make a hole in y.e Coats of y.e Eye & take it out, Surgeons
have been led to y.e last method of late years only: in y.e Launch
manner abt y.e beginn.g of y.e pres.t Century we find y.e Monro. B.
in couching a Cat.t happen.d to push y.e Lens betw.t y.e Iris & Cornea
& was under y.e necessity of open.g y.e Cornea to get it out: probably
from y.e Monro. Daniel proposes y.t in all cases where make an
open.g in y.e Cornea: This method was proposed 20. Years ago, & it
has been imitated by sev.l eminent Surgeons since: I shall first
endeavor to explain it, & after.d y.e Couching because we can
imitate it after y.e other, y.t open.g being in a manner done in y.e dark
whereas y.e steps of y.e other are seen very distinctly: y.e Instrum.ts of
Monro. Daniel, are 1.st a Lancet fix'd in a handle, w.th y.e
purpose y.t a puncture shall be made in y.e lower pt. of y.e Cornea
near to its join.g w.th y.e Sclerotic Coat: next he introduces a double
Edg'd blunt pointed Knife at y.e open.g & enlarges it by cutting
side ways: after having made sufficient room in y.e way he introduces
Scissors adapted to y.e Shape of the Cornea: & separates
y.e inferior pt. of y.e Cornea, making nearly a half circle: He
lifts up y.e w.th a pin then takes a needle, passes it thro' y.e pupil
& cuts y.e Capsule of the Lens: & after he has done y.t lays mak.
pressure w.th two fingers on y.e Ball of y.e Eye: he forces out the
Lens thro' y.e pupil & thro' y.e Incision in y.e Cornea. Soon after
y.e method was published by Daniel: some ingenious Surgeons
attempted to render it more simple: & advis'd y.t y.e same kind of
Incision w.th a knife w.ch was contrived by M.r Sharp: & some other
Surg.ns abt y.e same Time proposed y.t it wd be better to extend y.e outside
of y.e Cornea, pass'd across y.e Eye betw.n y.e Iris & Cornea & bro.t out
at y.e opposite Side then by cutting downwards y.e half of the Cornea
is detached from y.e Tunica Sclerotica: & w.th y.e Instrum.t
the open.g made: & afterwards by pressure on y.e Eye y.e Lens

is to be pricked out according to some with the cutting its capsule while others advise the capsule to be cut a sunder, but some purpose is made upon the Eye — Now this later, with very slight variation. Baron Wenzel has performed the operation. Instead of the Knife he uses a Lancet that is small & extremely sharp on both sides, with which he makes the Incision: across the Eye: Without using any Instrument to keep the Eye fixed in the time of the operation Upon the whole he has done it more frequently & successfully, because with more dexterity, than any other person: But it remains to shew you a still further Improvement for which I know it to be beyond all doubt made by Mr Millar of this Town, & it is this. — An Instrument was long ago in use for fixing the Eye in couching, what is called Speculum Oculi, we introduce it when before the Eye is to be opened it we separate from: 2. of it: which I shall shew you are generally necessary, but it is possible by taking of these 2 horns to make the same Speculum fit both Eyes. I used to mention that it might be done, but without describing any particular method of doing it; Dr Innes a Physician in this Town has made the improvement of putting the upper end underneath so as conveniently to adapt the Speculum to both Eyes, others have used one of spring with a spring but that is not so convenient as when the Surgeon has the management quite in his own power, as the Spring acts with too much force in one person & too little in another. Now Mr Millar has invented a sort of Speculum I shew you, which is pierced at the top, for receiving the upper Eye Lid, so that it has a full effect of pressing upon the ball at the same time suspending the upper Eye lid without hurting it: I have them of different Sizes suited to the patient, suspending the Knife or Lancet next to be used, after it has passed thro the Cornea: I have it put in my power to withdraw the Speculum while the Knife is withdrawn. A Gentleman who attended

Lastly I have upon my mention'd proposd bending the Ring: & have caused one to be made with y^e outside quite open, so y^t after y^e Incision is past we can remove y^e Speculum & leave y^e Incision how y^t securing y^e Eye is a great Improvem^t. & there is a Circumstance occurs here y^t was not expect; If the Eye is slightly injur'd it walks, notwithstand^g of y^e Effort of y^e Patient to keep it steady: but my making a stranger perform upon it settles it, when we hurt it more it stands still, whether it is y^t all y^e muscles are thrown into action I will not say, but there is not y^e same motion produc'd: just as a violent sneezing is occasion'd by y^e tickling y^e Nose with a Feather: while y^e hunting it in an operat^n has not this effect: Oft have a Scarat imitat^g Baun Winsel, but he makes it smaller y^n his, as too large Instrum^ts have been gen^ly employ'd: Instead of making it sharp on both sides it ought only sharp on both sides near y^e point, otherwise the Surg^n is in danger of cutting y^e Iris w^th y^e back of y^e Instrum^t. on withdrawing y^e Instrum^t. So with one 2. Instrum^ts. The Oper^n can be done better y^n by any method y^t I have described if it is necessary to do it in a living person as in a dead body, for as soon as y^e Speculum is applyd to y^e Eye it is fixd to one with So he shall shew y^e Oper^n & notice it more particularly y^e Steps to be attended to in doing it —— Me apply y^e Speculum w^th no small force y^t is necessary to keep y^e Eye from rolling & y^e pressure required is not very considerable then next before y^e Surg^n attempts to puncture y^e Eye w^th y^e Lancet, let him be carefull to have the Head of y^e patient sound: & to rest his one knee: I constantly shewd y^e Baun Winsel was particularly careful in raising his knee upon a Stool to such a height y^t y^e Elbow might be firmly supported, & y^e hand was perfectly in a Line w^th the Eye of the

Patient: & y^e^ Assistant was very careful to fix y^e^ Patients head. Next before he enters y^e^ Lancet, I'd think it right to touch the Eye with a probe, or y^e^ end of one finger & then to make the Puncture: the Sides of y^e^ Lancet are to be kept parallel w^th^ y^e^ Iris as soon as you perceive it to be at y^e^ immersion of y^e^ Iris you must lessen y^e^ pressure, may I have observ'd y^t^ tho' it is taken away y^e^ Iris does not recede, but remains fixed: In pass^g^ y^e^ Lancet there is one Circumstance a very nice one w^ch^ is y^t^ we are neither to do it so quickly as to be in danger of wounding y^e^ Iris, or too slowly as to allow y^e^ Aqueous humor to get out, but to keep the hole constantly filled w^th^ y^e^ Knife: we I have kept made it rise in y^e^ shape of a wedge: when you are ab^t^ to make y^e^ Cut downwards, there is no occasion to support y^e^ Cornea in any shape. Selo. y^t^ B^r^ Wenzel did sometimes press up against it w^th^ y^e^ nail & cut upon it, but in the Operations there was a very great resistance: But before we make y^e^ opening downwards it is proper to take off y^e^ Speculum, as by continuing y^e^ pressure y^e^ humors are push'd forwards & a great portion of y^e^ Vitreous forc'd out, so we take off our pressure & then make our Incision: & one step more w^ch^ is generally needed tho' not always, B. Wenzel introduced this y^e^ point a bit of Gold Probe, cut w^th^ a Knife across in a slanting way, so as to be short but not very much so, & w^th^ y^e^ he scratch'd down y^e^ membranes of y^e^ Chrystaline Lens, w^ch^ is a real improvem^t^ & when this is neglected we are in danger of bursting y^e^ posterior as well as y^e^ Anterior part of y^e^ Capsule, whereby y^e^ vitreous humour is push'd out along w^th^ y^e^ Lens: whereas upon tearing y^e^ membrane it comes out with y^e^ slightest pressure, & y^t^ accid^t^ does not happen. If y^e^ Capsule was very thick or he was puzzled & knew not how to have found it, & did not engage, he was provided w^th^ a small kind Lancet, w^ch^ he introduced kind, & pushing it down

out the adhering parts but y.e ought to be avoided if possible
now it is needless to detain you in putting y.e body in y.e most con-
venient posture while I do y.e Operation: We set y.e pat.t upon
a low, but firm seat: y.e Surg.n is placed on a higher seat above
before, in order to raise his hand on a level w.th y.e patients Eye
then lay a total recision his foot, his head to his elbow on
his Knee: or the patients chair may be set at y.e side of the
Table & the Surg.n may rest his arm upon it. Now if we are to
Operate upon y.e left Eye we use y.e right hand placing our-
selves before y.e patient, y.n we shall also what may be nec-
-essary in y.e other Eye: when y.e eye is prevented y.e Incision from
being done in y.e same direction: I first apply y.e Speculum
y.n enter y.e Knife, further resting my hand upon y.e patients
Cheek: & using y.e point of y.e Lancet very nearly to y.e middle
of y.e Eye: filling up y.e Incision w.th y.e Instrum.t till I am
fairly thro' upon the opposite side, & now I slacken the
Speculum & may remove it if I please, but it is not in y.e
way of making y.e after incision, w.ch is done downw.d do cutting
thro' one half of y.e Cornea & imm.ly y.e Aqueous humour runs out
& next do. being out y.e Lens if I made m.ch pressure but it
is better to introduce y.e probe & first tear y.e Capsule. ——
There is one further precaution necessary may be taken, as
Light causes y.e Contraction of y.e Iris, let y.e patient be
turn'd away from y.e light after making y.e Incision other-
-wise y.e Iris may be injured; we use no more light than for
y.n what is necessary to distinguish y.e pupil, when we intro-
-duce y.e probe to scratch & tear y.e Capsule of y.e Lens, and
keeping y.e pat.t in y.e same obscure light, we raise y.e Capsule
by making a very slight pressure w.th one or both fingers
upon y.e under part of y.e Eye. —— Now we shall suppose

what in fact happens, where y^e Lens has not acquired y^t degree of consistency w^ch it gets in y^e milky Cataract; y^t y^e whole does not come away: y^t when we break y^e Capsule, y^e extremities of y^e Lens are very soft & some little portion remains. By a slight pressure, a lay using a spoon we can dislodge it; & I have seen y^e portions of y^e Lens brought out at 5. or 6. repititions, with^t any material Injury: Suppose we are then to operate upon y^e right Eye, if we are to use y^e same Instrument we must either use y^e left hand, if y^e Surg^n is not used to dissections & Instruments to can perform w^th both hands: but we shall find it better to turn y^e Speculum & stand behind y^e pat^t to use y^e right hand: But I happen to have an Instrument y^e Invention of M^r Miller y^t renders it equally easy to do y^e operat^n upon the right Eye: y^e pat^t is directed to turn y^e eye ball outward: & y^e blade of y^e Instrum^t is bent in such a manner as gives me ready access in y^e Eye: I can perform alone with^t tearing y^e Capsule: but I find y^t if I puncture not only y^e Lens but a portion of y^e vitreous humor will come out: & we can give no reason why we sh^d not burst y^e back p^t of y^e Capsule as well as y^e fore part: — Next we sh^d explain y^e manner of Touching. — The common needle used is of the Shape of a Lancet point but y^e out of it is round, & is to be struck into y^e Eye ^1/10 of an Inch behind y^e junct^n of y^e Cornea w^th y^e Selerotis, & not fully y^t for y^e least difference renders us to avoid y^e anterior edge of y^e Retina w^ch does not come forw^d to y^e Chrystal Lens accord^g to D^r Haller but terminates behind it, we attend^d to y^e circumstance y^t Retina may be avoided. Once they get into the Eye the dispose y^e Cataract: but if you question them, they scarcely in their own mind are determined whether they put y^e Lancet over y^e Lens & push it down, or

strike the needle into the Cornea, some however have determined to view in operating beyond all doubt: here is one Instrument a Lancet pointed needle, now, joined to this, you also, a blunt needle with the Lancet conducts into the Eye, they touch the spring the Lancet is thrown back: & the blunt probe only remains, so the Operator had a mind to lay the needle over the Cornea he does press it only: on the contrary, a very successful & dexterous Operator used a round needle like a common sewing needle: Duncan Wilmot after he had entered the Eye stuck the needle awkwardly into the Cornea pulled it as it were, & pressed it down towards the bottom of the Eye, & drawd the needle straight out, left it entangled in the vitreous humor. — Dr Taylor sometimes practised the one method sometimes the other: in public he first punctured the Eye with a Needle, & then withdrawing it introduced a round Gold probe: but in private he used the needle only, perhaps he meant to put it out of the power of others to follow him, as it is difficult to find the Cataract in order to introduce the probe. — But Wilmots method is the best: to strike the needle into the Cornea, for from the obstinate edges it may slip the pressure Dr Simes: & any stake in the hands of the most dexterous Operator is attended with the utmost danger: for the Cornea is joined to the Choroid Coat in its whole circumference, it is close upon this, there is little water between them in a sound Eye: the moment the needle disengages the Choroid Coat the Cornea is beat in contact with the back of the Iris: by the shortening the no. of strokes is of the utmost advantage there we scarcely need a Speculum for common use: for the stroke is so sudden the Eye is fixed by the needle: But if the Surgeon is timorous & diffident he may use it & apply it gently. — The Surgeon pulls down the under Eye lid & plunges in the needle at once: the pressure occasions a little of the vitreous humor

to turn out, tho' very little of it: the next purpose it cautiously so as to disengage y.d Sheath'd coat & to bring y.e Cataract joint by y.e pupil so as to visit w.ch from y.e facility of y.e Cataract he may readily do: & how soon it be time y.e point back towards y.e Lens & pursuing y.e like it into it, by w.ch means you shall y.e point of y.e needle & making a turn you bring it to y.e bottom of y.e Eye & making a 2.d turn you push it back wards in y.e vitreous humor & by a little tile the humor settle before you draw out y.e Instrum.t Surgeons are gen.ly so much overjoy'd y.t they have got it depress'd y.t the withdraw y.e Instrum.t immediately but it is better to wait till y.e vitreous humor entangle y.e Lens & then we withdraw y.e needle straight to us. — I shall allege two things upon y.e operations, 1.st y.t the extraction of y.e Lens has upon y.e whole succeeded oftener y.n y.e Couching. Daviel practis'd upon 200. patients & of them 180. were tolerably well cured. — B. Wenzel practis'd upon double & triple that No. & upon the whole w.th great success: not but y.t some failed were where every circumstance was favorable, for in some cases in a few months, an opacity formed all.n y.e pupil: the Iris changed its shape seemed to contract adhesions. — Now y.e last circumstance may frequently owing to the Operators not having been sufficiently attentive to excluding Air, but on y.e contrary perpetually tearing y.e Eye with unnecessary applications, for from Analogy we might expect y.t y.e free access of y.e Air to y.e Iris & Interior parts of the Eye must produce Inflammations in it: & I have seen violent Inflam.ns produced in a short Time upon the Iris so y.t Operator ought to cover y.e Eye, & to avoid y.e habit of irritating evacuants, as strong solutions of Camphor: Spirit of Wine &c. and to apply a bit of wet rag, folded so many times as a

wd take the Air: & this to be kept wet without removing it
Next I wd allege y.t y.e extraction is an ease in operation y.n y.e
Couching. In Couching indeed as lng.t we can see arround
ye Ball, because y.t ley standers do not see what he is about, so
bad operator is nearly on a level w.th a good one: but y.e operation
is in reality more difficult: I cd engage to extract y.e Lens
from 20. patients without missing a single Time: y.t most
critical part, is just at y.e Time y.e Lens gets out: but y.e Incision
may be made with perfect safety, whereas in couching we
are in danger every time of hurting ye communicating Organ: so
I wd prefer y.e extraction to y.e Couching. — And Gilman who
has been perhaps more successfull y.n any other Operator
is so well satisfy'd of its being preferable y.t he has taken to
y.e new method; & he has now more success y.n he had formerly

Lecture 81.st

Yesterday I explained y.e method of operating in consequence of
Cataract. I need surely not add y.t we can, besides covering y.e
Eye & keeping it from Light: to endeavour to prevent inflam.n
by V. S. freely: & in very suspect pursuing y.e Antiphlogistic
Power during y.e Cure, & if we succeed it will be necessary
to supply y.e want of y.e Chrystaline Lens by y.e use of Glasses.
The next proposition I shall make is, y.t whether on acc.t of y.e
Operation done for y.e Cataract: or for any other Cause, the
Light is prevented from reaching y.e bottom of y.e Eye, by an
Opacity forming in y.e pupil; whether it is occasioned by y.e
Thickening of y.e remaining Coat of y.e Lens, of y.e back h.d
w.ch I suppose shd be left quite entire: or y.t y.e sides of y.e
Iris shall be found to join, to grow together: & fill the
pupil. In such a Case it was long ago proposed by Cheselden

that we sh. form an artificial pupil, & there is y.e encouragement, y.t sh. we fail, we have y.e patient, in no worse state y.n he was. But I wo. propose y.t y.e operation sh. be done in a diff.t way from y.t recommended by Cheselden. He from y.e manner of touching the Lens would be led to advise y.t y.e needle sh. be entered behind the pupil & brot. forwards. Now instead of y.t let us make a puncture in y.e Cornea, keeping lower y.n y.r axis but y.e Sca. sh. make a concussion in y.e rays of Light: & instead of y.e Knife of Cheselden w.ch is described by sharp, it is better to take y.e largest sized couching needle or y.e Lancet of Daviel, & suppose y.t opacity is from y.e remains of y.e Crystaline Lens, we see the length we can go with.t wounding y.e other parts: & if y.e opacity is in y.e Iris, we avoid displacing or wounding y.e Lens: I need not say y.t we cannot form here a very promising prognosis if we succeed in one Case of 6: it is a great deal. Because the matter produced y.e opacity in y.e Lens at first will probably form it again & if y.e Iris is so much disfigured, we can hardly expect with Cheselden y.t it will fly open upon making y.e Incision; it has no such Elasticity. — Next to suppose y.e Eye becomes dropsical, w.ch is no unfrequent occurrence, y.t there is an enlargem.t of it from a lymphatic growth of the humours, whether of y.e vitreous or Aqueous, besides y.e deformity of y.e Eye, & y.t y.e disease scarcely yields to internal remedies, y.e Eye presses against y.e Lens & even comes to assist there. — If we suspect y.t y.e growth is owing to too great a supply of y.e Aqueous humour w.ch we know from y.t Cornea chiefly yielding, we say y.e effect of letting it out by a puncture of y.e Cornea w.th y.e sharp pointed Instrument of Mons.r Daviel: & if it is desired to collect again, it only remains to make a larger opening y.t will not easily close. — If y.e whole Ball be affected we make a large

Incision in y^e^ anterior part of y^e^ Selerotic Coat: keeping remote to y^e^ Cornea on to avoid y^e^ anterior part of y^e^ Retina: after y^e^ same time taking care not to wound y^e^ Cord of y^e^ Vein: after such an operat^n^ y^e^ humours are discharg'd in great abundance & y^e^ Pupil is, but it is seldom y^t^ y^e^ divided returns again. But we are not to take it for granted y^t^ every enlargem^t^ is owing to a wound in ye^e^ humours. I have ventured on 8. Cases where y^e^ cavity of y^e^ Coat was filled up with a reddish flesh, & y^e^ whole in a cancerous state So in cutting into y^e^ Coat we must proceed with caution, because every irritation in such a case as y^s^ is attended with bad effects: & y^e^ Surg^n^ comes to be blam'd: In such Cases it has been proposed to extirpate y^e^ Eye, & y^s^ has been done in y^e^ place twice within this 12. years, & y^e^ operat^n^ is found to be easier in doing it: Tin stopping of y^e^ blood y^t^ might be expected, & is only a Case of dispect: & y^e^ Salivic stick by y^e^ applic^n^ of dry Lint, no does any such effects follow from never cut at y^e^ bottom of y^e^ Eye as might have been expected: And when y^e^ Lachrymal Gland is affected pushing y^e^ ball forward it is impossible to extirpate y^e^ Gland with^t^ taking y^e^ Eye along with it: Next it frequently happens, to prevent especially y^e^ work in metals, y^e^ particles of y^e^ metal stick in y^e^ Eye, & particularly in the Cornea: & y^s^ most minute substance sticking I know beyond all doubt is y^e^ cause of a high degree of Inflam^n^ wh^ch^ at last effects y^e^ whole Ball of y^e^ Eye. we are not to believe with Walter of y^e^ Cornea possesses very little sensibility, let any one make y^e^ experim^t^ of touching his own Eye with y^e^ head of a pin, & this sensibility is much increased if y^e^ Eye at y^e^ same time is in an Inflamed state, Dr. Argyle of y^e^ master of y^e^ riding school had a most violent Inflam^n^ of his Eye for the space of 6. Mo. it was treated by several physicians & Surgeons in this with^t^ any effect, till it was discovered by Mr. Millar

who was y^t. at Newcastle: y^t. y^e. inflam^n. was owing to an extreeding minute particle of Iron sticking in the Cornea. — If the substance is near y^e. surface a common writing pen is by no means a bad instrum^t. for remov^g. it, But suppose y^t. y^e. Substance is struck deeper: & it comes by a degree of thickening in y^e. Cornea to be round within it, then is a necessity of making an incision, as was done in y^e. case of M^r. Angelo in order to remove it. —

Now in making y^e. Incision y^e. operator gen^y. blunders, of late they have been in use to extract y^e. chrystal Lens w^h. a Lancet y^e. side of w^ch. is turn'd to the Eye; as they do y^e. same here by w^t. means a larger wound y^n. is at all necessary is made, cutting y^e. humours two places, whereas we do it by holding y^e. Lancet in y^e. common way, making an Incision as when we let blood, whereby we act upon y^e. substance itself, & if possible we avoid cutting thro' the Cornea altogether, but if we must penetrate it: it heals very soon, & y^e. liquous humour will collect in the space of one Day. We are next led to y^e. operations y^t. may be necessary upon y^e. Lachrymal passages of or for y^e. Tears N. B. Against The Fistula Lachrymalis I begin with it y^t. I may have y^e. use of finishing it at y^e. meeting: — By y^e. Term Surgeons mean any ulcer w^h. affects y^e. Lachrymal passages, whether it is fistulous or not. — Now it is necessary to put you in mind of y^e. passage of y^e. Tears y^t. they are secreted by a Gland above y^e. ball of y^e. Eye, are pour'd out under y^e. upper Eye Lid, & are conducted by y^e. edge of y^e. under Eye Lid to y^e. internal Canthus of y^e. Eye: & there are sucked in by two open orifices: the puncta Lachrymalia: from w^ch. ducts laid to abeack, w^ch. is placed under the Edge of y^e. Palpebraris palpebrarum: & w^ch. is before membranous, but behind the Sack, & y^e. duct leading downwards from it, are supported by bones, & when y^e. duct reaches y^e. superior maxillary bone, it is quite surrounded by y^e. bone & enters the

y.e nose under y.e anterior Os Spongiosum between it and the Septum w.ch separates y.e mouth from the nose. — Now it is evid.t y.t y.e passage for the Tears will be more y.n the haste of y.e body subject to disease: Because y.e tears want y.e vis a tergo: & it requires a nice operat.n & a sound state of parts, to suck 'em in and convey 'em into y.e nose. — next we must imagine y.t y.e acrid nature of y.e Tears dispose to inflam.n It is in vain to suppose y.t natural liquors cannot be supposed to possess any such bad qualities so we find y.t y.e passage is carefully defended by clime: there are numerous orifices in convid.le number in y.e sack: & y.e end of the Duct terminates in y.e membrane of y.e nose w.ch is subject to thicken ing & swelling, & y.e way mechanically affect y.e end of y.e Lachrym.l duct, by pressing upon it with.t suppressing y.t y.e thickening extends into y.e duct, lod in y.e common cold a Coryza, y.e Eyes water: not from y.e Tears being increas'd in q.ty but from their not going thro' y.e natural duct, but falling over y.e face: y.e Cause y.t opposes y.e part to disease, makes y.e disease difficult of cure, after it has advanced to a certain degree, especially y.t y.e membranes are confin'd within bone, so y.t y.e irritation is not easily taken off by allowing y.e part to swell & expand by applying Emollients, as in other cases. — The common assurances where a Fistula Lachrymalis forms are these. — 1.st y.e part is sensible of the Tears passing over y.e face: y.e inner corner of y.e Eye comes to be exalted, is of a red color: soon after y.e tumor a degree of in = = flam.n at y.e inner corner where the Eyelids meet: & if he is attentive he discovers a small degree of swelling there: Viz. y.e ex = = act point of y.e top of y.e Lachrymal duct, if the pressure on the swelling y.e tears will fill y.e sack instead of going into y.e nose run back into y.e Eye: & when examin'd we also a quantity of mucous ashy matter mix'd with 'em w.ch by degrees comes to be more and

mon discuss'd, till after a certain space according to the Constitution, because of y^e^ complaint, we find purulent matter mix'd with y^e^ mucous & y^e^ Tears: & now y^e^ Injunct^n^ come to be effected, & gain'd, at length a hole is made, y^t^ have a discharge from y^e^ Pasticc, & y^e^ disease is neglected & y^e^ Inflam^n^ does not subside, y^n^ bones come to be bar'd. Sometimes tho' early spongy flesh grows out, w^ch^ bleeds very readily upon y^e^ slightest touch. But we are not to imagine y^t^ a swelling does not happen at y^e^ inner Canthus without affecting y^e^ Lachrym^l^ passages. — On one or Two Occasions I have seen y^e^ Inflam^n^ quite external Sparing in carneal Cases, after y^e^ Throat has passed, swellings & Inflam^ns^ are apt to form here. & y^e^ Back of y^e^ body, some way or other is dispersed by cancer: w^ch^ I have seen begin 2. or 3. times ab^t^ y^e^ external Canthus, higher y^n^ y^e^ Lachrymal passages. — Now in what manner are we to treat y^e^ compl^t^ in it's diff^t^ Stages. To do y^e^ whole thus in a genr^l^ way y^e^ methods y^t^ have been contriv'd by Surgeons Call of w^ch^ are at present in practice. 1^st^ The common discussing applic^ns^ do not answer, it has been advis'd y^t^ w^th^ inject healing Liquors, watery & Balsamic of diff^t^ kinds in at y^e^ puncta: for it seldom happens y^t^ y^e^ puncta are obstructed, It is a possible Case. 2^dly^ it occurs we may make an artificial duct, by means of a needle drawn thro' a thread, & keeping it in till y^e^ passage grows callous, But so far as y^e^ acc^t^ go y^e^ obstruction does not form, between y^e^ puncta Lachrym. & the Lachrym^l^ sack, so injections are to be known in by y^e^ puncta, by means of a very minute Tube, y^e^ point to be enter'd at y^e^ puncta, some instead of common watery Liquors have proposed y^t^ the w^ch^ injected smoke of diff^t^ plants: suppose myrrh &c. y^e^ Injections fail: we have been advis'd to make use of probes made so small y^t^ they may be introduced at y^e^ puncta & pass into y^e^ Lachrym^l^ Sack: &

with them y^e obstructing matter is to be broke down y^e little
clots of mucous & other matter preventing y^e passage of y^e Tears
from y^e sack into y^e nose. Either there very few cases in which
mercurial, or oppressive impressions upon y^e method is practised, a probe
with an Eye like a needle is to be introduced at y^e superior punctum
into y^e nose, & a piece of thread by way of seton is to be passed thro
the Eye of the probe & pulled upwards: & this is allowed to remain
till y^e Inflam^n & obstruct^n are dissolv'd, others again practise y^e w^h
the introduction probes from y^e nose, or hollow tubes for throwing in
Injections & shewed you y^e possibility of doing this: But suppose
all these methods insufficient in y^e further progress of y^e disease;
what next are we to do? It remains to lay open y^e sack by incision
w^h a common Knife or Lancet, y^n we endeavour to pass a probe down
into y^e nose, bent properly, But if y^e shall be found impractical y^e
we can't enter it into y^e nose or introduce a Tent, we are advis'd imm^y
to have recourse to an artificial opening, they endeavour to give a
discharge from y^e Lachrymal sack into y^e nose perforating the
back part of y^e sack & breaking y^e bone upon w^h it is supported
& an Instrum^t for y^e purpose is painted by M^r Sharp. It is not
necessary to mention the actual Cautery y^t was practised formerly
but is rejected on good grounds by M^r Sharp. why use a Cautery
when we can make an Opening in a mechanical way. — This a
practice w^ch has been imitated from y^e Ancients who were not acq^u
ainted w^th y^e Anatomy of the part. — Now let us see how far these
processes may be necessary. — The Injections are an universal
practice, And I find no where any objections made to em. But
they are unpleasant: & are not to be executed, we can't introduce
a small probe into y^e puncta with^t a good deal of Trouble to our-
selves & pain to y^e patient: & every time we do so we render the
puncta unfit for y^e office of absorption, may we overlook y^e very

action of punctà we still continue to abound in. tears, so may
abound any proper injection, therefore if we have any faith in them
as in a weak solution of Sacch. Saturn. we need only drop it into the
Eye, after emptying y.e sack of its Tears y.e last layd him all on
his back Gut.a a Tear-worm, or Quill filld w.th y.e liquor, it is found
into y.e Eye w.ch causes very frequent & painfull Injections in a more gentle
manner. Suppressing y.e unavailing way we not in some few
cases attempt to exclude y.e Tears, prevent their entring into y.e
Sack, at y.e same time assisting w.th medicines y.e detumifying
y.e membrane of y.e duct, y.e y.e Inflam.n & Thicken.g may subside
w.ch is to be consid.d as y.e common cause of y.e Stoppage. In 2 or 3.
persons I made some little attempt of y.e kind, but it was not con-
ducted properly, however I know some persons who have had a
Stoppage for three 10 or 12 Years, the Tears running backwards
w.th out y.e disease coming forwards to its last stage: & they
have found relief by Injections drop't in in y.e manner I men-
tion'd. — But next let us suppose y.t y.e Plaintiff continues, &
y.t y.e disorder seems to increase, are we to introduce Probes
what are we to expect? Surely y.e first probe proceed'd from a wrong
Idea of y.e nature of y.e Complaint. How do we know that
there is more than? by squeezing it out from y.e puncta;
Why y.t being y.e matter down w.th probes? & no caution to be expec-
ted from it, y.e ducts & membranes must become inflated &
y.e disease increas'd. There are beyond all doubt to be laid aside
& we next to attempt to introduce a Syringe. Wh.t y.e Lachrym.l
passages? In a dead body with.t any considerable pain, y.t is a most
difficult Operation. I believe scarcely possible in many Subjects
to execute: consid.ring y.e Curve y.e passage forms: & I take
it for granted y.t y.e passage from y.e sack into y.e nose will
allow y.e probe to pass. But I have known several instances

where after y^r sack has been spun, y^e Surg^n had it not in
his power to make y^e probe pass down into y^e nose: y^e disease
under this reduction wo be impracticable; by hinting y^e probe
passing wo we run in danger of tearing y^e end of y^e duct, & after all y^e
removal of y^e substance lodg'd within y^e ducts wo not give the
wished relief, this therefore wo certainly lay aside, nor do I
find any reason to imagine y^t smoke can have more effect
y^n other Injections, nor have we any Analogy to suppose it
we can only have y^e Idea of a thickened wet membrane w^ch we
want to dry: but y^e names of y^e Asafoetida will do y^e more effectu-
ally, I need say little of y^e Injection from beneath upwards
for it takes it for granted y^t y^e ducts are free: but what ad-
vantage to we find from it: can't we file y^e Lachrym^l duct as
well by pressing y^e Liquor into y^e Eye: & suppressing y^e Eide of
an artificial wo close to one another by y^e well y^t y^e Tears are
not able to force their way, I can file y^e Lachrym^l sack w^th an
Injection y^n press upon y^e duct w^th y^e forefinger of one hand
whilst w^th y^e forefinger of y^e other I press upon y^e sack, wo y^t
if any passage is to be gained by forcible means: I can
do it in y^e manner with y^e trouble than of introducing Tubes
If therefore we find y^e inf^n common Antiphlogistic course made use
against y^e disease, simple Liquors forced into y^e duct, &
gentle compression upon y^e sack, we are to hinder y^e Tears
from lodging in it: a keeping 'em for getting into it for some
days, if no relief can be obtained from these measures, at
length a suppuration forms, y^e next step is to make an open-
ing into it, & if y^e natural duct cannot be made pervious
to form an artificial Duct. — This is one thing only y^t
I wo mention, y^e Lachrym^l sack is gradually distended &
comes to enlarge, but on pressure y^e tears & mucus appear pretty
much of y^e natural, with^t any marks of confirmed ulceration, & y^t we

cannot lay sufficient force of Dilgent down into ye nose;
perhaps to save ye patient, ye inconvenience of a Scar from the
Incision, we might enter a very small trocar into ye sack & ye
w.th it perforating ye back of ye sack, make a passage into ye nose
to give a vent to the Matter: & ye may be found sufficient for a cure,
& perhaps ye flow of ye Matter will prevent ye Orifice from closing,
or for ye purpose we can introduce a leaden probe. — But if
there is any necessity for making an incision we are to make a sufficient
opening w.th a small Knife, & we may be provided w.th another
Knife with a concave edge, & w.th ye we are to open the
sack into full length. — The next step is to take a common
probe & to pass it down into ye nose, & if ye Surgeon fails
in ye it is usual immediately to ye perforation — But we are
not to think of this with.t giving further time: I have seen
several instances where no passage could be found w.th a probe; &
where it was impossible to cause any Injection to go
down freely & yet in ye space of 8. or 10. days. when ye inflam.n
of ye parts had subsided ye probe entered & Injections passed
very well: we have said ye sack open we may make the
trial w.th ye probe: And if it enters we are guilty even of cru.
ye patient, but let us not hurt ye membrane by neglect of ye
trial: we may bring on a Caries of it with.t ye might not
have happened: So in.t after 2 days. put in a Dossil of Lint
to fill ye sack to prevent the Ligaments heating with a
thread abt it, & confine w.th a slip of sticking Plaister, w.ch
Dossil may be altered, once a day at ye dressing even when
no wet, softly w.th ye matter, & softly w.th ye Tears, when ye
Inflam.n has subsided we are to make an attempt to introduce
ye probe: & we attend to the turns w.ch ye dent makes
downwards, outwds & backwds making a gentle turn in its
passage into ye nose, In one or two instances where I

attended & when y^r Surgeon declard y^t There was no passage, upon holding y^e parts sack & allowing it to fall down by its own weight it entred readily. — But suppose we fail in gaining a passage, we are to make an artificial one but y^t is not to be done according to Sharps method, not only perforating buttum. the Instrument sideways to break y^e bones wherby a much larger hole is made, y^n y^t made by pressure natura, & after all There are no pains taken to preserve y^e opening he has made. — Instead of y^t a small opening is to be made w^th a perforating Instrum^t such as y^t prepared by my father in y^e medical Essays Viz. a Trocar made for y^e purpose, nearly adapted to y^e size of y^e part in a healthy state, but we cannot with^t some difficulty be passed down, And having made y^e perforation we may preserve it w^th a bit of leaden pipe, Catgut, a Bougie, but y^e leaden pipe answers best for rendering y^e passage callous, some propose to take out now & then & to throw in an Injection to harden y^e passage but y^t is scarcely necessary, I know an Case where y^e Surg^n by neglecting y^e directions y^t were given, allow'd y^e parts to remain 9 Months & the passage was perfectly callous w^th out any inconvenience follow^g. — I shall now shew y^e operation & endeavour to bring it to very great simplicity: & tho' we are making upon minute parts, we shall not find y^e y^e is so difficult an operation: as at first sight we might apprehend: & it is much easier to operate when the disease is found y^n in a wasted Subject, because y^e Sack is so much enlarged y^t we can't readily miss it, & we may take Pains to prevent y^e Urine from running out in y^e time of y^e Operation, by pressure upon y^e ductus y^t lead from y^e parts: y^n we make an Incision over y^e Sack, y^e Incision in y^e Tegumento may be somewhat longer y^n y^e sack, in order to have free room for introducing y^e dressing, to keep the wounde open till y^e Inflam^n parts subside. — I begin the Incision over y^e edge of y^e Orbicular muscle & continue it downwards for y^e breadth of a finger or thereabouts, but y^e

length must very much depend upon the state of the Integuments & the parts underneath. I continue to go deeper with the Incision, now if I find myself at a loss for the Sack, I might do what some have proposed to do, introduce a probe into the punctum & make it enter the Sack: but if we have the probe appearing we have gone deep enough, but in a diseased state it is not necessary, we know upon the discharge of the Tears that we have perfectly made the Incision. I have prevented the Tendon of the Orbicular muscle, but instead of finding any occasion to prevent it, I find that it straitens the Operator, therefore I cut out this bit, & dilate the sack its whole length: & the callous joins the muscle sufficiently to the nose. —

Next I attempt to introduce the probe into the nose & shall endeavour that with all proper delay, I'm afraid in doing it I am now to make the necessary perforation I use a common probe for conducting the Trocar, the probe I introduce into the Sack, by which I collect what I demonstrated with regard to the situation of it, the innerside of the Sack rests upon the naval process of the outside of the Os Unguis, which has a ridge to which the membrane of the Orbit is connected, on the outside, & we are to keep within this ridge of the Os Unguis, otherwise the Tears may insinuate between the Ball of the Eye & the Socket & occasion troublesome Symptoms, the taking the perforator with the slightest touch of the finger I pass it into the nose, I next take the Lead en probe which I pass this the Silver one & can readily introduce it deep within the nose, but to prevent the point from pressing against any part of the bone & hurting it, I do not allow it to descend so far, but confine it by bending it: cutting of what may be unnecessary. We then incline the patients head forwards, & observe whether the blood passes out at the nostril, then we are sure that we have made the perforation: We then apply the dressings, & trust to a bit of sticking plaister. — But if we are to make a gentle Compression upon the Lachrymal Sack by the Sack there is an Instrument that has been used & found convenient for that purpose, it is an improvement of the Instrument exhibited by Dr. Rush this Instrument is a bit of Brass with bends to the forehead, but the place

mus.t we make y.e compression cannot be changed in its out.
ward flow: but here it is so made, y.t we can draw it out and in, &
with a screw we can make what pressure we please upon it, &
it is fitted for both Eyes. Generally wile need a treatment of a
month or 6 weeks to render y.e passage sufficiently callous &
to remove y.e Inflam.n, w.ch then take away y.e Tube, draw y.e skin
together & keep the opposite sides adhering by means of a
patch: & y.e the skin not united we need only touch y.e sides w.th
a bit of Caustic. ——— After w.t Cases of y.e kind w.ch I have seen
I do allege y.t y.e is convenient to attend. it is not so much as
might be imagined we are told y.t Sython now wants its long
leg, & no doubt it needs y.e were for it, but there is a figure of
contraction in y.e Lachrym.l duct w.ch prevents y.e Tears from
passing backwards, & the motion given by y.e Tears to y.e Sky
get into the nose, tho' y.e opening be not so large as y.e the
opening of y.e puncta, neither are we to imagine y.t y.e sides
of y.e Sack goes together, the flow continues for a great length
of Time: there is such a continual attraction of y.e Tears
y.e ready adhesion of y.e sides of y.e sack tho' after a violent
Inflam.n Swelling of y.e Internal membrane we may
suspect to happen. — I have only to add in a few words
some things belonging to y.e membranes y.t connect the
Eye lids to y.e Ball, the Inflam.n of y.e membranes of y.e
Eye lids, & there connected w.th them of y.e Ball, are a cause
of frequent disorder, may after an Inflam.n have gone
great inconvenience often follows from y.e situation of y.e Palpebra
especially in elderly people when they become slacked and fall
outwards, or do not so conduct y.e Tears w.ch fall on the Cheek &
the Under parts of y.e Eye are exposed sometimes against the
edge of the Eyelid is turned inwards, when y.e hairs press against
the Ball, here a great deal may be done by proper situation
as by a plaister drawing out the edge of the Eyelid, or if it is
turned so much inwards y.t y.e hairs still continue to irritate
y.e Eye, we ought to draw them, for the become stronger by
being cut, & the pulling 'em w.th a Forceps is not very painful
but should they still grow again it may be worth y.e while

to slit the skin of the 5. pointing inwards & cut out the Bulb, wch is between the Skin & Cartilage, so may be done with safety If the Eyeball is turned out from the Inflammation of the Tunica Adnata as Conjunctiva we may imitate the practice of Dr. Taylor who acquired great reputation from speaking upon the part, we first attempt to vacuify the membrane, to make punctures and discharge the fluid, & if they prove insufficient, we cut a convexity portion of it, we pass a common or male crooked needle & thread thro the membrane to extend it whilst with the point of a Lancet, Knife, or pair of Scissors, we take out convexity portion of it: but we are not to torture the patient, with the application of Caustics as Taylor did, we need only apply some gentle astringent & defend the Eye. —— In convey. of watering beginning in the Tunica Adnata there is a disposition to the growth of new vessels which extend upon the Cornea & form Specks the become quite opaque & an assignment cause of blindness, Sir Ig. Lowe out of 20. these Vessels did not exist at Birth, but form like the vessels in any Cicatrix & spread from the white of the Eye, & are upon the surface of the Cornea: By keeping the Eye from too much Light they become Regimen slight specks have gone off, Salts given repeatedly a strict diet, with a course of Quicksilver pills given so as to touch the mouth in the slightest manner have a most certain effect if the vessels if persevered in for some length of time: But what then meanwhile saie there is a way opened for an operation which has been practised by diff. oculists with good effect, & Mr. Miller has more merit here than in any other circumstance relative to the Eyes: Having fixed the Eye with the Speculum he takes either a common Lancet, or a male Knife like the common Scalpel, & cuts circularly round the Speck, he also cuts across it makes strokes over the Cornea in diff. directions to intersect the vessels, making the strokes slight, merely thro the inflamed vessels, not the practice another method which I had seen we have given pain: but I find does not, he takes a piece of plaister: suppose Diachylon, & folds it, & introduces the double haste under the Eyelid so as to press upon the Cornea

the vessel with a pair of pincers or forceps or w.ch we call a
a Tenaculum as is painted by Cheselden, w.ch we pass thro' y.e
sides of y.e vessel & then tie y.e thread abt it. — But Surgeons
have commonly chose, & in many Cases when y.e Artery
shrinks within y.e Skin & flesh, are obliged to continue an=
=other meth.d w.th a crooked needle, turned in a portion of a
Circle, they pass a thread nearly as large as y.e needle, around
y.e bleeding vessel; but it is a bad rule of Mr. Sharp y.t we sh.d
go round y.e vessel a third or so, the more we include y.e vessel
y.e better: so we sh.d first describe a semicircle w.th y.e needle as
nearly as possible, & y.t y.e whole circumference of the vessel may
be included, we enter it immediately ag.st & describe nearly a Circle
then we make a common Knot, sometimes y.e thread is passed
twice w.ch has been call'd the Surgeons Knot, but y.e is improper,
unless y.e vessel is very elastic, & y.e single Knot draws tighter
but we ought to draw it moderately, not to cut the vessel: to
prevent y.e first knot from slipping we may make a second
tho y.e is seldom necessary, but commonly it is done without
any bad consequences, after sometime, as y.e 5.th or 6.th day, when
all danger of bleeding is over, y.e Surg.n may cut it out, as before
it rots off it may cause fistulæ, & collections of matter within.
Next suppose y.t a thin membrane is cut, as a tunic of y.e Intestine
here we wo.d employ a straight needle, & wo.d make y.e abt common
Suture, or what is call'd y.e Glovers stitch, as a Glover sews a piece of
Linnen is sew'd by passing y.e needle thro' both y.e sides in y.e most
simple manner. I think it unnecessary to take notice of the
manner us.d by Celsus who wanted y.e crooked needle now in
use, so in deep wounds was oblig'd to lay aside y.e lips of
the wound & enter y.e needle from y.e bottom of it, from within
outwards on both sides. — In sewing membranous parts
I do not advise to pass more threads than one, with different
needles: to draw all the threads on either side together & twist
them & y.n to tie y.e two ends together as in y.e case of the Intestine,
the meaning is y.t by twisting y.e threads we make y.e Intestine

chanter & therefore thicker, thereby giving an additional
strength, imagining y.t y.e Cicatrice wo.d not have sufficient
firmness: but tho' we remedy y.e weakness y.e way, we shall en
y.e Cavity of y.e Intestine, & therefore perhaps upon the whole we
had better take to y.e common method of using y.e Glover stitch.
first to suppose y.t a part somewhat thicker, as y.e Lip is wounded
we now use needles for y.e purpose in place of thread, passing
on thro' y.e opposite side: & to prevent y.e retraction of y.e sides of
the sides of y.e wound we pass a thread over each needle giving it
one or Two Turns: & in this way we form a twisted suture,
making one thread serve for all y.e needles we employ.
first suppose a deep wound in y.e thigh wh.ch requires a suture wh.ch
a Crooked needle we carry a thread to the bottom of y.e wound,
& bring it out on y.e opposite side, & y.e General way practised
is this, after relaxing y.e muscles by extending y.e Leg, we bring
the Lips of y.e wound together: y.n determine as to y.e number of y.e
Sutures necessary to keep together y.e opposite sides: & y.e common
rule is y.t they shall be at an Inch distance, so y.t a wound
of 4 Inches will need 3 Sutures: & as any circumstance of
the Suture being prepared, suppose y.t y.e sides of y.e wound have
a considerable retraction, y.e suture is in danger of wearing out
so it is necessary to enter it at a considd.e distance from y.e Lips
of y.e wound, Sharp calls it $\frac{6}{10}$.ths of an Inch: but if y.e wound is
considd.e & we enter it so near as Sharp directs, it will come out
before y.e Lips of y.e wound are united. — Le Dran again directs
to a greater distance y.n is necessary, But y.e rule must vary
according to circumstances, & also according to y.e obliquity
of y.e wound, in a slanting wound we must be at a greater
distance when y.e flap is formed by the wound, y.n on the other
side, & y.t all the parts may be exactly & accurately y.e thread
must be carried to y.e bottom of y.e wound for if we were only
to tie up the skin y.e muscles wo.d retract, & we have a void
space in wh.ch y.e matter wo.d lodge, & form an Abscess or Fistula

but we then to unite together y^e Lips of the wound, & thereby enter our needles passing on this' both Lips of the wound: or are we to open y^e wound & enter y^e needles from within?

I apprehend y^t we are under y^e necessity of sewing a thin part viz^t even y^e skin of our head to a great extent, displacing y^e skin we can pass the needle thro' both sides at once: but in a deep wound when y^e muscles are to be included y^e methods of Suture & sharp are not practicable, unless the needle is very long we cannot make it pass at y^e distance of perhaps 2 Inches on either side of the wound, besides it is not advisable as we can't Judge of the depth, we may pass it too superficially, or we may go too deep, so we must first lay together the sides of y^e wound in y^e most accurate manner, determining in our mind y^e No^r of Sutures & y^e distance from y^e side, marking both sides with Ink, then lay open y^e wound & begin to pass y^e needles from within outwards for w^ch purpose we may have two needles upon the same thread: after all the Stitches are thus pass'd, proceed to tie them, beginning with y^e middle stitch, y^t y^e Lips may be aptly & more accurately: w^th regard to the way of tying Sutures y^e most common method will be found y^e best: to make a common knot not exactly at y^e middle, but a little to one side & we make a running knot y^t we may have it in our power to loose it: this is better y^n to pass bits of Linnen rolled up under y^e knot w^ch wd^d embarass y^e Surgeon, without having any particular advantage as y^e pressure by y^e Knot is not what hurts y^e patient & y^t is hurt by the thread cutting the Skin. — But when a wound is supposed to enter a cavity the common interrupted Suture leaves spaces too wide, as to allow turns of y^e bowels to push out, as y^t a hernia may happen in Time of y^e Cure: so to prevent this it has been proposed y^t y^e Quilt suture shd be used, viz. the taking bits of wood or pieces of plaister rolled in a Cylindrical shape, & using a thread doubled, on y^e one side w^t put in one of these, & make a running knot upon the other end of y^e opposite side now we may have this in view tho' perhaps y^t more common method will be found

to answer y.e purpose equally well. — Where y.e medicine is to be passed down to y.e bottom of any cavity, & cannot readily be introduced with y.e hand, instruments have been contrived for holding it, as a bit of Iron, split with a ring, w.ch by being pushed down shuts it: or the bits of Iron are made to shut w.th a Spring

Now proceed in explaining y.e particular Operations: I shall begin with y.e Surgical Treatment of urinary Calculi.

Concretions happen more readily in y.e ducts of y.e glands than in other places, because of y.e slowness w.th w.ch the fluids pass thro' y.e narrow Vagination to furnish ligneous for particles for them in many of 'em: & most of all they are likely to happen in the Urinary passages, from y.e very nature of y.e urine, y.t the salts so generated abraded parts of y.e body are here discharged from the Size of y.e receptacles y.e urine stagnates for a great length of time. — The appearances of y.e Calculi are various: we see y.e shape of the Kidney exactly imitated by some of those that have grown to a great bulk in y.e bladder. — These in the Bladder are generally of an oval shape, & they commonly have 3 different diameters, their length, breadth & thickness are different & it is of use to attend to this in extracting them. Some of 'em have a peculiar Equinous surface, almost resembling a file Cone; y.e kind is likewise very uncommon. — If two or more are included together, we find a smooth surface in some part or other of y.e one by w.ch we can distinguish that they rather have been applyed, Sometimes there is a kind of Articulation a ball & Socket formed, Surgeons have alledg'd y.t they have found Calculi adhering to y.e bladder: The case is possible, but I believe gen.ly clots of blood have been mistaken for Coats of y.e bladder adhering. I have seen substances resembling tough flesh, adhering to rough stones, but when examined I found 'em to be y.e coagulable part of y.e blood: But when y.e bladder is irritated by a stone it may become fungous & be attended w.th the adhesion of y.e Stone in its after growth: Sometimes a considerable number are found all united together but they are gen.ly formed upon distinct nuclei: I have a calculus

stone y.t was taken out of y.e Bladder after death. This lays
y.t any descend in y.e whole History of Physick it weighs 382.
There is generally a great difference in y.e colour & consistence
of the same stone, y.e inner, middle & outer parts differ very
remarkably. Besides y.e very wid.t causes w.ch produce Calculi
in y.e urinary passages we easily may conceive many others
to co-operate: perhaps we may trace y.e origin of Calculus
back to the Chyle-portic Organs, this by no means improb:
able y.t y.e Lacteal vessels in some persons take in matter w.ch
produces Calculus y.t by y.e Lacteal vessels of others are ex-
cluded, we may suppose a variety but especially y.t acting y.t
medicines in different ages have been found not only to lessen
y.e grain of Calculi already existing, but in some measure
to prevent their growth, I surely without being unreasonable
we may suppose y.t a person not diluting his food properly
may give occasion to Calculi: y.e earthy matter will not be
sufficiently dissolv.d, or we can conceive y.t different kinds of
violent labor may dispose y.e fluid parts to Calculi many of
the valid parts y.t is done in ordinary Exercise, so y.t the
waste of y.e body in such persons will be quicker; a greater
quantity of earthy matter carried round in the Circulation
thrown off by the Kidneys; or we can conceive y.t too great an
Absorption from y.e Kidney or Bladder may produce Calculus
A person may bring himself into y.e disorder by attaining the
water too long, from y.e size of the Bladder y.e urine must become
somewhat cooler when retained sometimes y.t when first thrown out
& y.e cold cooling of it to a certain degree independ.t of the access of air
disposes y.e urine to depose it its earth. Perhaps independant of y.e
particular circumstances I have mentioned, there may be many other
w.ch produce a Calculous Constitution, I formerly mentioned some
reasons for believing, that a Stone generated in y.e Kidney disposes
to Inflam.tion, an Inflam.tion of y.e Kidney, however produced, may oc-
casion y.e formation of Calculus, & there are many persons of a
Calculous disposition who, upon catching cold are apt to dis-
charge Sand w.th y.e water: & one person is more disposed to this y.n

another tho' lying in the same manner. — In the Kidney too besides y^e General Constitution there be a modification w^ch I can lay no means explain in a satisfying way: All I can to do is to give some Idea of the cause y^t may give y^e first origin to the Calculus disposition, & therefore y^e y^e method of preventing y^e disposition must vary greatly: & y^t we are to suppose by no means y^t any medicine shall particularly act against all the causes, nor to consider one method as Lithontriptic in every Constitution. — Let us next then determine the place when Calculi, either formed originally or grown to such a Bulk as to produce disorder, are to be found, & that here generally taken for granted y^t they descend from the Kidney, but there are many Calculi bred in the Vesica Urinaria, where the Urine is more disposed to coal: & when ever any foreign Substance is introduced into the Urinary passages, or when debris of blood are separated, y^e Calculus is in danger of forming upon such substances, without y^e access of the Air. These bodies attract y^e matter y^t produces the Stone, in a way we don't clearly comprehend, but w^ch we see take place in many instances we dissolve Sugar in water, & put a number of threads into it these threads attract y^e Sugar and make y^e Crystals form more readily as in y^e making of Sugar candy: & it is evid^t of y^t of Calculous matter generally in y^e same way y^t y^e Crystals of y^e Salts do, & on y^e surface of many of y^e Stones we can perceive regular figures formed. The Calculous matter is not merely deposited, & afterwards compacted into a Stone by the Bladder, when we cut any Stone y^t is large we find many Lamella varying from another, but especially the y^e layers differ from y^e last, & it is of use to attend to this, y^t while y^e Constitution of y^e patient, or the internal causes continues y^e same, y^e diet of y^e patient & other Circumstances have y^e effect in producing a harder, or softer kind of calculus Let us next imagine y^t a Stone within y^e Kidney or Bladder

have grown to a consid.ble bulk. Can we cure the patient with.t a Surgical Operation, are we to imagine y.t any medicine, whether'er y.t are already in use, or others y.t may in use hereafter, can not only alter y.e Constitution of y.e Patient, render y.e urine no longer disposed to generate Calculi; but can also dissolve Calculi already formed? or are we to trust to Lythontriptic Medicines. ——

I can't help calling in Question two things y.t are taken for granted. I find no clear proof y.t by medicines it is in our power to alter y.e Constitut.n so as to prev.t a Stone for generating, so I take to imagine y.t a person has had a Stone in y.e Bladder, & y.t this is taken out by a Surgical Operation: I do not also y.t we can assure y.e patient, y.t by his following a certain Course of medicines he will prevent other Stones from forming, I have known cases whilst under a Course of med.e called Lithontriptic but never y.t same thing happen with.t y.e use of medicines, some way or other y.e Constitut.n changes, & y.e part containing y.e Stone grows in an insensible, whether y.t y.e nerves are not blunted by an increased discharge of Slime &c. but after y.e disease has lasted some Time y.e pain frequently intermits, But to imagine y.t any medicine given by the mouth shall not only correct the disposition to form Calculi, but dissolve those already formed is beyond all Credibility, & there cannot be produced in y.e whole History of Physic, a single Instance to the Contrary, when a Stone was found by a Surg.n of Experience within y.e Bladder & afterwards y.t was dissolved by y.e use of Medicines: It has been alledged in print, but y.e Surg.n acknowledged he was deceived & so y.t we suppose not any medicine y.t is capable of dissolving Calculi: & we have no reason to suppose y.t there ever has been any such: let us consider the matter but a moment & reject the Conclusion: — By analizing Calculi: it has been found y.t they contain a quantity of fixed Air: & a Caustic Alcali is given with a view y.t y.e shall be carried round to y.e Kidney & Bladder & attract y.e fixed Air of the Stone, in consequence of which it shall fall in pieces as in the Cavity of a Retort. — But how does a concentrated Caustic Alkali shall have dissolved y.e Stomach which is

after wh. acid & this ye. Intestines unchang'd: In a few
weeks it is made neutral: & we might as well give a neutral
Salt as a Caustic Alcali: nay we go further upon y.t. as these
Medicines hurt the Stomach & waste the Constitution: I would be
averse to push the Trial of 'em so far: very great improbability of
succeeding, & I have no doubt y.t if we shall suppose 100. persons
laboring under Calculus to be tried wh. Lithontriptic & y.t another
100. are cut by a Surgeon, at y.e end of a given Space: suppose at
2. or 3. years, we shall find y.t more sink under y.e Medicines than
under y.e Operation; y.t more are kill'd, but perhaps not one single
Instance of a radical Cure only a great many free of y.e pain
wh. perhaps they wo. have been at any rate. — Soy.t a woman as
a Stone is discover'd within y.e bladder of Urine, & y.t from y.e time
of y.e patient having labor'd under y.e Symptoms, a sound y.e fee
of the Surg.n he thinks y.t it is too large to pass thro' the
Urethra, y.e best Cause as well as y.e most effectual I think to
be y.e Surgical Operation: We proceed to consider all y.e circum-
stances wh. a Surg.n ought to take into view before he performs
it: as y.e Steps in y.e Time of performing it: I think it unnece-
ssary to add anything concerning a Stone in y.e Kidney, & y.t
is too large to get out of it: We have no encouragem.t to hazard
an Operation, on acc.t of the depth of y.e part: y.e Quantity of
blood passing thro' y.e Kidney; y.e difficulty of disengaging y.e
Calculus from y.e parts: Structure of y.e pelvis of y.e Kidney: &
add to all these, y.t y.e Kidney is often in a diseased State soy.t
tho' we cd. disengage y.e Stone we wo. be far from making a
Cure as new Calculi wo. soon form. — We have Instances
of a Stone descending into y.e Ureter & stopping as it passes
into y.e bladder: I pointed out y.e situation of y.e parts in y.e female
y.t y.e entrance of y.e Ureters is closely connected wh. the Vagina
so y.t y.e Surg.n may be able to discover y.e Stone & able to take it
out by an Incision: he only risques a Fistula: y.t y.e wound
shall discharge y.e Urine thro' the Vagina: but even that
may close like Incisions made into the Urethra. —

But we suppose the Stone in y^e. bladder and we judge from a variety of Circumstances y^t. it is there. There from a variety of
If the patient has before suffer'd pain in y^e. Back in mak^g. water
& y^t. afterwards comes down to the bladder, or, in desc^t. of urine if he
finds an Inclin^n. to discharge his water frequently, & y^t. it
brings on in an instant upon changing his posture, as by rising
& walking thro' y^e. room, & yet y^t. y^e. Quantity is small & Gen^y.
of a pale Color, whether from y^e. manner y^e. Kidney is affected
in conveying y^e. urine from y^e. earthy particles are attracted by
the Calculus: if it suddenly stops after it has run in a full
stream, & before y^e. bladder is emptied if a quant^y. of slime is
intermixed: if y^e. chief pain is in discharging y^e. last drops: wh^n.
y^e. bladder grasps y^e. Stone: & pushes it against y^e. neck of the
Bladder: & the pain extends forwards to y^e. Glans penis: just
as when an injury done to y^e. end of a stump is felt in y^e. toes.
y^e. person judging from y^e. natural term in^n. of y^e. nerves: If he
finds y^t. if every jolting, sudden motion gives uneasiness, &
y^t. he walks easier upstairs y^n. down stairs, y^t. jolting being less.
If he passes after exercise blood mixed w^th. the water, if at any time
he passes blood mixed with water, if at any time he passes
small particles of Sand, or larger flakes of earthy matter we
judge w^th. probability approaching to certainty y^t. he labours
under y^e. Stone in y^e. bladder. — Tho' we are not altogether certain,
because ulcers and Cancers in y^e. bladder & Tumors of various
kinds: & are especially w^th. nephritic complaints have preceded
nearly all y^e. Symptoms I have mentioned: therefore y^e. Surg^n. is
not to think of attempting to operate till he has satisfy'd himself
by sounding y^e. patient y^t. a Stone is lodg'd there till he in-
troduces a probe adapted to y^e. passage into y^e. bladder: & feels
y^e. stroke of y^e. probe upon y^e. Stone: Before he proceeds to operate
he'd think it proper for some little Time to delay y^e. operation
till y^e. patient has had an opportunity, by y^e. use of diluents to
wash y^e. Kidneys fully, & till y^e. Surg^n. has had time to assure
himself y^t. y^e. pat^t. does not labour under a stone in y^e. Kidney at
y^e. same Time for if y^t. is y^e. case there will be a necessity of repeat^g

and, tho' no inflammatory symptoms have appeard, let him drink diluent liquors, with gentle Lithontriptics, tho' I wo'd not advise y'. use of any great quantity of these previous to y'. operation, least they have a bad effect upon y'. Constitution

Some have taken notice when speaking of y'. effects of Lithontriptics y'. it may be still imagin'd, y'. we can dissolve a stone lodg'd in y'. Bladder by throwing Injections into it. Dr. Blair an ingenious Gentleman has invented a machine for giving the injection, wch is very fit for its purpose. It consists of a small Oz bladder wth a stop Cock & pipe, wch may be longer or shorter for y'. different Sizes, they have two boards we can push y'. Injection with force sufficient to open y'. Sphincter of the Bladder, we only grasp the penis to prevent y'. liquor from being thrown back, so y'. we do not hurt y'. neck of y'. Bladder with the Instrument, & it was supposd y'. in this way the pain wo'd be greatly lessend, & we must now be able to bear it for two days & even weeks, but at length y'. pain came to be intolerable & the progress of dissolving y'. stone by y'. any mild medicine y'. we cou'd venture to throw in was so slow y'. it was'nt found possible to push y'. experiment to its full length.

Lecture 86th

I have also y'. as we are in danger of being misled, Surgeons do not cut for the Stone in y'. bladder, with'. having previously sounded y'. patient. i.e. introduced a probe into the Cavity of the Bladder, wch is accomodated to the shape of the passage In women it is made straighter y'. in men, & of the most hard materials made of Steel wch best communicate y'. Tremor to the hand. At present we consider y'. operation chiefly as y'. male, It is done more frequently in men y'. in women, who are less disposd to Calculus from their Constitution. & from y'. greater size of y'. urethra, from y'. shortness of it: & from its Situation at y'. under part of the Bladder. in the neck

posture, small stones are more easily discharg^d. We endeavour
to accommodate y^e probe as nearly as possible to y^e viæ of the
Urethra, & also y^e probe is less in danger of being catch'd by the
Rugæ of the Urethra y^n a small one: it prevents y^e formation of
y^e Rugæ by distending y^e Urethra as it enters: & we not only oily y^e
probe but warm it: w^ch eases y^e uneasy feel: & y^e cold probe
imitates y^e neck of y^e Bladder: & being of a like construction: from y^e
shape of y^e probe you wd imagine y^t we wd give it y^e natural
direction of the passage: yet commonly Surgeons enter it the
wrong way, & when they come to y^e turn of the urethra they turn
round y^e probe, w^ch gives a certain degree of pain: & therefore I wd
rather prefer y^e other way of introducing it. — The Surgeon places him
self between y^e knees of the patient, & upon y^e left hand, & y^e
staff with y^e right: & y^e two hands must correspond entering y^e
probe gently: & at y^e same time drawing y^e penis upon it: y^t y^e
Urethra may be made tense: there is a certain degree of resistance
of y^e neck of the Bladder: & where y^e disease has continued for
some time y^e irritation of the Stone occasions a contraction of y^e
muscular fibres in y^e mouth of the Bladder: & there is some degree
of Inflam^n & thickening there: If y^e resistance is considerable we must
not push y^e probe forwards w^th violence, but rather withdraw
y^e staff a little as it may be sticking at y^e Cervix of y^e Bladder,
a prostate gland: w^ch enters y^e mouth of the Urethra: & upon in-
troducing it again we have only to overcome y^e resistance of the
Constriction. It is further recommended y^t if we find difficulty
here introduce a finger of y^e other hand into y^e Anus: But the
only use of this, & y^t too but small, is the taking hold of y^e
Sphincter, we pull it outwards: & w^th it y^e Urethra: whereby
there are fewer rugæ formed. — But supposing y^t these methods
in y^e posture should not answer, we may raise y^e thighs a
little, w^ch gives a little more tension to y^e urethra & draws
it away: we make y^e attempt while y^e patient is sitting: or, what is
better in some cases, we desire him to stand up. Suppose
y^e staff introduced, we search for the Stone by turning the

the wound towards it, remembering y.t y.e bottom of the Bladder is lower in a full grown person y.n y.e Urethra: y.e There is a Sack or Sacke on each side betwixt y.e urethra: But if possible we must it, we must introduce y.e finger into y.e Anus as far as we can: & y.n push forwards & gain y.e stone & press it again y.e wound. But if we still find a difficulty we make y.e patient, sit upon y.e edge of a bed on his knees, w.ch throws the Stone more imm.ly upon y.e mouth of y.e Urethra: Where persons are subject to nephritic compl.ts it is a good rule, while we use diluting liquors, y.t they rise y.e time long.r sitting upon the knees & leaning forwards, when y.e particles of sand are brot. to y.e mouth of y.e Urethra. Now having felt y.e stone we take y.e Instrument upon it, and any person accustomed to do y.t will readily perceive y.e Tumor: nay we can not only distinguish y.e pressence of y.e stone, but may guess.r from some judgem.t of y.e size of it, nearly by moving y.e staff along it, & we may also distinguish y.e Size by introducing y.e finger into y.e Anus: & thus we are directed with regard to the size of y.e Incision. — Suppose we are determined to operate, it remains to consider y.e kind of operation y.t may be necessary. The Structure & Situation of y.e bladder has given room for Invention of Surgeons to propose various methods w.ch I do not think necessary to describe according to y.e time they were first practised; but rather to give you an Idea of 'em from y.e Situation & connexion of y.e Urethra & of y.e bladder. Before Anatomy was tolerably understood; Celsus & other Surgeons introduced one or two fingers into y.e Anus & endeavoured to lay hold of y.e Stone w.th y.e point of y.e fingers, pulling it forwards & cut where it appeared. But it is evid.t y.t this operation cannot be practised in large or full grown people: we may feel y.e Stone w.th y.e point of y.e finger, but we cant catch 'em so as to bring 'em forwards, & y.e Situation will accidentally vary, neither have we any thing to guide us in performing y.e operation, we have no sure Conductor, nor can we tell y.e parts necessary to be wounded. Some are in no shape to think of imitating y.e Operation. — After him Surgeons endeavoured to direct their Instruments w.th greater

certainty to y^e^ bladder, by intis^g^ during a furrow'd probe into y^e^ urethra, w^t^ is call'd y^e^ operation for y^e^ stone, w^th^ the greater Apparatus. — A furrow'd probe is first introduc'd to guide y^e^ Knife w^th^ greater Certainty to the Bladder, & they cut upon it w^th^ a large Lancet, or they might have done it with a common Scalpel. The Scrotum was lifted forwards & they cut in upon y^e^ staff, when the Urethra makes the turn upwards i.e. they made y^e^ cut as near to y^e^ bladder as they cou^d^ find it, with Certainty. — Having made an opening into y^e^ urethra they next intro^d^uc'd a Conductor having a Button near y^e^ end, they next took another Conductor split at y^e^ point, fitted to y^e^ Edge of the former. After both were introduced parallel y^e^ Surgeon separated his hands, & tore open y^e^ urethra from y^e^ turn as far as the neck of y^e^ bladder: then they withdrew y^e^ furrow'd probe, & introduc'd between y^e^ two conductors a pair of forceps: y^e^ Conductors were then withdrawn & y^e^ stone extracted — But y^e^ method ought never to be practic'd, because instead of cutting y^e^ urethra open, we tear it, giving more pain y^n^ is necessary, & from a cut w^ch^ will heal with more difficulty y^n^ an Incision, Besides we cut more of y^e^ urethra open y^n^ what is necessary, with^t^ gaining a greater admittance into y^e^ bladder. So Dr. Sharp rejects y^e^ method, & y^e^ attempts made by Mr. Dran to amend it, by introducing a small Knife into y^e^ staff &c. The Objection still arises, Why make such an Incision into y^e^ urethra, when it is cover'd w^th^ Spongy substance & when we must cut thro' y^e^ latter in entering into y^e^ bulb of y^e^ Urethra, & thereby occasion a great discharge of blood. Practice therefore of following y^e^ furrow'd probe by cutting into it immediately beneath y^e^ Skin &c. let us describe what is call'd y^e^ Lateral operation i.e. make y^e^ Incision between the Anus & y^e^ penis & urethra till we come near to y^e^ neck of y^e^ bladder: & y^n^ open y^e^ urethra in the membranous part at y^e^ neck of the Bladder: this was first practic'd by Frere Jacques: a Man by no means conversant in Anatomy, & great Improvements have been made on it since by Cheselden & others. — But Surgeons not fully satisfy'd w^th^ dividing a part of the Urethra next y^e^ bladder have thot of opening the Bladder itself: & have preferr'd y^t^ after we have open'd y^e^ Urethra

of the Urethra we wh. endeavour to enlarge y. Incision laterally
Mons. Le Cat proposes to raise y. side of y. Bladder on a sunnd
probe, & then introduces a long double edged knife into y. Groove
to cut y. bladder: but y. operation is difficult: & on withdrawing
the Instrument we are in danger of catching hold of some of the
wounded membranes. — Still later a method has been proposed
in y. French memoirs by Mons. Foubert of making an opening
into y. side of the Bladder: but with. having previously cut any
part of y. Urethra. — Another French Surgeon, Mons. Thomas has
endeavoured to join all Fourche Instrum. into one piece, wh.
gives a general Idea of y. Operation: There is a Lancet at y. end
then a Sid knife, with a regulator y. can raise y. Knife at pleas-
ure, & a Gorget intended as a Conductor to the Forceps. —
Now y. Operation is to be done in y. manner: we have no occasion
for a Staff on y. contrary y. urethra is to be stopped by tying a lig-
ature on y. penis, & y. bladder is to be distended with urine to
make it stretch out sideways. — Then the Surgeon is to make an
Incision thro' y. Skin & muscles between y. Perinæum & penis
& the Urethra: the Lancet is then plung'd into y. body of the
Bladder at one side of the Urethra. the Lancet carries w. it y.
Sid knife & the Gorget having got within y. body of y. bladder,
we take hold of the Gorget with y. left hand: & with y. right hand
raise the Knife, & pulling out y. Knife and Lancet we make
a sufficient opening in y. side of the Bladder. next we passing y.
forceps along y. Gorget, y. withdraw y. Gorget. & with y. forceps
extract y. Stone. — But there are several objections against
this method: A great deal depends upon y. degree to wh. y. bladder
is distended, & y. place cut various accordingly: If I use a staff I
am certain of getting into y. body of the bladder: but take the
common case of Surgeons & you will find y. y. bladder would be
often missed or cut in an improper place: & as soon as y. opening
is made & y. bladder collapses, y. wound of y. bladder slips
away from y. wound of y. Tegiments & y. urine gets into y. Cellular
Substance within y. pelvis is in danger of a spread. wound & of occas-
ioning dangerous Inflam. & Abscesses: So it is not likely that y.

method wch we are come into common practice now does it appear
y.t Foubert has been followd in it. — One main operation still
remains, we can conceive y.e Bladder to be cut in a diff.t manner,
at its Anterior part, you have seen y.e y.e peritonæum covers the
Bladder only so far y.t goes from it upon y.e musculi Recti: there
fore we may make an Incision between y.e Os pubis & y.e
peritonæum, or we may perform what has been called the
High Operation for y.e Stone &c. I shall begin wth shewing y.e manner
of doing y.t Operation. — In y.e high Operation it is nec.y y.t y.e Bladder
must be distended exactly for in its collapsed state it falls under
the Os pubis, therefore when we propose to do y.t operation y.e first
int.t is to drink freely any watery liquor, & y.e urine is to be
retained till y.e Bladder is very fully distended: y.t is a method pre-
ferable to forcing in water by a Catheter into y.e Bladder wch is
in danger of distending y.e fibres beyond their Tone & perhaps
of bursting the Bladder. So the Surgeon carefully watches the
patient, a Ligature may be put round the Penis & y.e Bladder
examined by the Touch, & unless y.e distention is quite above
the Pubis the Oper.n is quite impracticable — For our present
purpose I shall distend the Bladder wth Re.. — With a common
Scalpel I begin y.e Incision about y.e Os pubis, & carry it upwds
towards y.e Umbilicus, to near the Top of y.e vesic.a in the Bladder:
first I only cut the Skin exactly in y.e middle in y.e Intersticies
of y.e Recti muscles, next we divide y.e Cellul.r Substance, & wth
y.t we being y.e middle Tendons in view; & continue y.e Incision
between y.e muscles, y.e edges of the Recti appear, & y.e pyramidal
cis, & now we see y.e bladder, we next take a concave edged Knife
sharp at y.e point, & introduce it at y.e bottom of the Incision: &
the Bladder collapsing onto itself upon y.e Knife: & following
the Knife wth the finger, we introduce it into y.e bladder, & wth it
we support y.e Bladder with y.e greatest ease, & there we dilate the
Opening at pleasure, & can feel to the bottom of the Bladder
by passing my finger all around it, & wth the finger we readily
direct the forceps. — Now notwithstanding y.e seeming ease
in doing y.e operation it has been said & is almost universally
one reason occurs at first sight, y.t as the Bladder is tyd very

loosely to y.e os pubis, by a loose cellular substance, for allowing it to change its place, as it is more or less distended, y.e urine gets into y.e Vagina into y.e Cavity of y.e Pelvis, there may be danger from ye large a wound inflicted into y.e body of the bladder. That persons have recovered after this operation is beyond all doubt, but suppose any convuls.e Instam.t to take place from some accidental cause, y.e danger must be increased in a high degree, the Calculous Cavity of y.e bladder is usually much contracted, & cannot be raised to the necessary height: this therefore must be determined by y.e Quantity of urine y.t pat.t is able to retain, by drinking freely & diluting Liquors and retaining 'em long, & tho' in common practice we prefer y.e lateral oper.n to it, it is by no means an improper y.e Surgeon have it in their view, as it may answer well in particular cases, nor can we yet with precision determine y.e degree of danger w.ch attends it Paction to the Operation w.ch I must particularly recommend to your Imitation — viz. the lateral method. as it is now improved & proceed to consider y.e several Instrum.ts us'd, & the manner of employing them. — First we introduce a Staff or furrowed probe & make y.e furrow quite open to the point, for when it is shut, as y.e French use it, we can't cut y.e Staff when we choose and we make it somewhat Conical at y.e point, y.t it may not catch upon y.e edge of the prostate Gland, but we must endeavour in introducing it, making only repeated gentle efforts. — Next I am to make an Incision into y.e Staff, & am first to consider y.e proper position of y.e patient. — Surgeons have made it a rule to tie y.e hand, least y.e patient starting in the time of the Operation shd disturb y.e oper.n It is tyd to the foot: y.e manner of doing it is perfectly simple: I make a running knot upon the Waist w.ch secures the hand, next we desire y.e patient to lay this hand upon his side, & we bring one of the Straps under the Sole, & the other around the Ancle, & tye 'em making a running knot y.t y.e patient may be disengag'd at pleasure, y.e patients body is to be laid upon a Table, nearly of the height of this before us: & the shoulders may be raised a very little, but not to an Angle of 45.° According to the French, when y.e back part of y.e bladder

prefer against the forepart & we are in danger of cutting
the back part and we find it more difficult to get hold of y. Stone
the patient too is more in danger of fainting: y. y. shoulders
are only to be moderately raised to slacken y. bowels a little: y.
the patient we are to operate upon is to be but to y. Edge of y. Table
& we need an assistant to each of the Knees, & still more one,
who w.th one hand may support y. Scrotum, while w.th y. other y.
right he manages y. Staff; w.ch is not to be held straight
for y. Penis is upon y. back of it, & y. is to be turnd directly
towards y. Os Ischium — The Surgeon places himself before
the patient sitting: & in all operations he ought to study y.
ease of his own situation as well as that of the patient.
With regard to the place where we are to make our Incision, the
Raphe perinæi & urethra are our constant Guides, w.th y. point of our
finger we feel y. Raphe perinæi join the Urethra, & we can't go higher
than this: when we are thro' the Tegument, we conduct y. Incision
in a slanting direction till we are half way between y. Anus &
Tuberosity of the Os Ischium, using a common Scalpel: we next
cut thro' the Cellul. Substance under y. Skin, we next bring into
view the Transversalis perinæi muscle at y. bottom of y. Incision
& higher up the Levator Ani, w.ch muscles we cut thro: we make
y. wound in the Tegument large as being more apt to close;
a fresh wound of 'em will not be found to produce any dangerous
consequences: having cut thro' these muscles, I begin to feel for
the Staff & feel it covered only with y. membranous part of y.
Urethra, & behind it the prostate Gland, a Substance distinguish-
able by the feel: I now cut into y. membranous part of the
Urethra, w.ch I might do with y. same Knife, only we turn y. back
of it towards the Intestinum Rectum: & y. edge towards the
membranous part of the Urethra: I now guide it w.th the fore finger
of the left hand: but in place of the common Knife Surgeons
take one y. is shorter, as that employ'd by Cheselden: or what
I know to be better, a shorter Knife, but sharper a little on y.
back giving a free opening into y. Urethra, on w.ch the Success of y.
Operation very much depends. — The Staff must be held very

steadily, while you make y.d Incision, & at every stroke you feel it; and keeping close by y.e staff whilst you cut a little Backwards & forwards, you are sure in y.e smallest danger of wounding y.e Internal Pudum. It only remains y.e Instrument slip open y.e Neck of y.e Vesica & with it y.e neck of y.e Bladder. —
till of late years our Surgeons us.ly imployd a Gorget: a wedge like Instrum.t with w.ch they first open'd y.e neck of y.e bladder: but Mr Hawkins has made an Improvement on it, by making one side of it sharp, wherby it answers y.e purpose of the Knife, viz.t we cut y.e urethra instead of tearing it whilst we enter y.e Gorget. Some have proposd making openings with more complex Instruments as w.th y.e Knife of new Contrivance &c. but I wd prefer upon y.e whole y.e cutting Gorget We take care y.t y.e point of y.e Gorget is entered into the Groove of the staff, it is next recommended y.t y.e Surgeon shall take y.e staff into his own management, y.t the Two hands may cooperate, but if y.e assistant be skilful it is better y.t he shd draw it towards him & hold it steady: for if y.e Instrum.t shd slip we can not so readily replace em. — We direct y.e edge of the Gorget outwards so as to make a truly Lateral incision by y.e mine running at wch we are sure I am within y.e Cavity of the bladder. —
I now withdraw the staff, & it remains y.t I introduce the forceps w.ch I do conveniently in y.e hollow of the Gorget. —
The points of the forceps don't meet altogether y.t they may not catch hold of y.e membranes: and have to the near to y.e point to get a hold sufficiently of the Stone. If y.e stone is large I can safe a Knife along y.e Gorget to dilate y.e opening a little, as I endeavour before I attempt to extract the stone to dilate it with y.e forceps, & a gradual dilatation will be as necessary here as in y.e delivery of a child, so we shd dilate y.e neck of the bladder gradually, by introducing the finger, & by opening y.e forceps gently; I now turn y.e forceps about till I strike y.e stone, & I must readily find it in y.e back part of the neck of the Bladder, I am only attempt to open the forceps

after we have found the Stone, must endeavour to dilate y^e^ Stone, as they have a diameter for y^e^ most part it is material to catch it when it is thinnest, & with y^e^ end of it towards the wound, therefore instead of grasping it fast, we grasp it very slightly & attempting to draw it out it will turn to the farthest distance. — When attempt to extract it, & y^e^ common rule is to turn y^e^ Bladder & y^e^ Rectum^t^ towards y^e^ os pubis, & strait. rectum, as they hurt y^e^ parts less by the rough edges of the Stone, & we work out the Stone in a gentle & gradual manner keeping y^e^ pressure off from y^e^ Os pubis, & drawing backwards when the parts yield for we clearly we gain much room: If it sticks much let us push the forceps a little back, & enlarge y^e^ opening a little for tho' we can tear it further in y^t^ direction pretty readily, yet the Incision is preferable to the dilatation. After the Operation we are to dress in the lightest manner, a little dry lint is sufficient, & we cover y^e^ wound w^th^ some soft substance as a poultice w^ch^ keeps the Inflam^n^ exclude the Air, & unites up the Veins, & when laid in Bed a folded sheet is to be put under him & chang^d^ from time to time. So far I have mention^d^ y^e^ common method of operating, & y^e^ common Instruments. — There is some little room for improvements. First too much is left to the Assistant from y^e^ groove being in y^e^ back of the Rectum^t^ as we do not make y^e^ open. upon y^e^ side of the Urethra, but are in danger of wounding y^e^ mouths of the Seminal ducts: & some persons after Lithotomy have not been able to discharge the Semen, it was therefore be an Improvement to make y^e^ furrow on y^e^ side of y^e^ Staff. And Mr. Hawkins's Gorget has a large shoulder upon the opposite side, let us therefore make this Rectum^t^ like a half Gorget w^ch^ is equally fit for conducting y^e^ forceps into y^e^ Bladder, & we are in no danger of pressing against the opposite side of the Urethra, and the button may be

made use of: we can't punch it out, nay it wd. be impossible for a Surgeon to miss the Bladder, & still we can with draw the Staff from it. 2dly. Suppose another Improvemt. as we leave the Gorget in the Bladder, to conduct the Forceps alongst it, yt. Bladder is in Danger of being wounded upon it, especially as in the Operation yt Gorget is turned Sideways, now this may be prevented by fixing a blunt Gorget to a sharp one, using it as a sheath Gorget tile it has entered the Bladder, & then while yt. wine comes out we punch in the blunt Gorget, withdrawing the sharp one, and we may move this freely in the Cavity of yt Bladder.

Lecture 87th

It sometimes happens yt a Stone in Ladys wo'd lie behind the beginning of the Urethra, yt Surgeons have found it necessary, as alledg'd it to have, yt instead of the common forceps, they shd be provided wth crooked Forceps of diffr degrees of Curvature, as it is just possible to conceive yt such an Instrument may be needed: as when a Stone has formed a Hernia in yt bladder, an Instance of wch we have in the Philosophical Transactions where the inner Coat was punched out between yt muscular fibres - But the managemt of such an Instrumt must be very difficult & the Case I have stated is perhaps the only one in wch they are really needed: the Stone breaks in the forceps, Surgeons have endeavoured to prevent yt by making the handle turn upon a Circle &c. But this is unnecessary in practice, & the Surgeon will succeed better by interposing his own hand & giving the necessary pressure, notwithstanding however all the precautions even in yt hand of yt most experienced Surgeon: yt accident happens, therefore it is necessary to know the manner of extracting it, when broke into pieces: & with the Forceps we extract yt larger portions

carefully guarding y.e sides of the wound from y.e sharp
edges of the fragments, next we endeavour to bring the urine
more out by a spoon, or we may introduce y.e spoon of Catheter
w.ch will answer tolerably well, but in such cases y.e repetition
of y.e Operation is attended with danger: for when there is a
number of Stones in y.e bladder, w.ch is usualy a Calculus Bovinus y.e
when one is broken into pieces, y.e patient generally dies
after y.e Operation, we do know this y.e when the larger are taken
out instead of attempting to wash out the others it would be
better to put the patient into a standing posture, & with a
common large Syringe & pipe let us throw up a Quantity of
any mild Liquor as a Solution of Gum Arabic, or an Infus-
-ion of Althea, milk warm, & if y.e pieces are not washd out by
the Stream, we may next confine y.e water till y.e Bladder is
moderately full then draw the pipe & give the water y.e full
effect in washing out the Stream — Now let us consider the
proper Operation for the Stone in Women. if not with the Land
the Situation of the prostate gland, & ducts of y.e vesiculæ
Seminales, we prefer in the Male y.e Lateral Operation it follows
y.t we do the same in Women. One thing further to be considered
is whether from the Situation of the Bladder & urethra & w.th
respect to the Vagina, a method preferable to the latter can be
devised, for you remember y.t we have seen, y.t y.e whole of the
Urethra, & a considerable part of the body of the Bladder under
the peritonæum are closely connected to y.e anterior part of y.e
Vagina, therefore its possible to cut directly into the body
of the Bladder without any danger of missing it, & penet-
-rating into the Cavity of the Abdomen, from the Vagina
There is a case of that kind described by Fildanus. a Stone
had worked its way thro' the Vagina till it could be felt
whereupon they cut directly in upon it from y.e Vagina, &
Mr Gooch imitat.g w.t Oper.n found it attended w.th y.e same

Sinuses. Yet upon the whole I think it wd. be
ought to prefer the Incision of the Urethra thro' the bladd-
-er, for we run much the risque of a Fistula, y^e membranes
being thin, & if in some few lucky cases there has been
a compleat union, in many others the wound has rem-
-ain'd open, whereas in the other way this will not happen
& the parts wounded are not so important, so for common
use we wd. prefer the cutting of the Urethra: for w^th regard
to the dilatation of the Urethra in the old method I need
say nothing on acc^t of the greater pain it gives: & the
danger of the patient never being able after to retain her
water, we prefer the operation done by Incision. and
there are two ways in w^ch we can perform it, either by
copying y^e steps of the Operation in the male, & I know y^t
that is practicable in women whether they have had
Children or not. But in common use we wd. prefer y^e cutting
open y^e whole side of the Urethra, y^e difference of y^e length
of the Incision is not above an Inch, & the danger from
not retaining y^e water is from the cutting the Sphincter
of the bladder, & Surgeons can execute y^e Operation with
the greatest ease. It has been very well performed by
introducing a knife covered & then opening it: & I would
prefer y^e to y^e double Knife y^t cuts on both sides, for with
one side we can make a sufficiently large wound, as we
saw Mr. Hawkins cutting Forget, or the Sharp & blunt one
together. — The patient is to be placed as in the male
& all you need for performing y^e operation is a crooked
probe w^th a very gentle curvature to give room for the
Surgeons hand, y^e cutting Forget and a pair of forceps.
You know y^e method of sounding in women, we may
either crook y^e Instrument a little or have it straight
but when y^e bladder is distended y^e urethra in women
is crooked, so it will answer better crooked y^n straight
& a Surgeon ought to be furnished with these Instrum^ts

perforated with small holes, because they are more thin
but he ought also to have a Catheter with a large opening
at the Side, for viscid Slime wch occurs in this disease, may
stop the small holes, or particles of blood may have the same
effect: we introduce the Catheter by putting the point of
it under the Plexus between y. nymphæ, it now projects &
pushes down into the vagina, the posterior part of y. Bladr
presses against the back part of the Vagina: If therefore
we were to make an Incision, cutting in here we wd. beyond
all doubt get into the Cavity of the Abdomen & Bladder. I do
not mention this wth a view of making such an Incision: but
wth another view, I mean y. puncturing the Bladder in case
where the Catheter cannot be passd thro' the Urethra: Suppose
a violent degree of Inflammn. or a Tumor to form in it: Now
wd. puncture y. puncture within y. vagina to one above the Os
pubis, for if we introduce a Canula it irritates the bladder
& if it is short, y. Bladder collapsing, leaves it: & y. urine
gets into the Cell. Substance, whereas if the puncture was
made from the Vagina, we have the Canula with any inconvenience, or what will answer better: a flexible hollow Tube
as a bit of wire coverd with Plaister: & y. urine readily distills
thro' it, & making an Incision in a slanting direction, the
sides of the wound will be pressd together, like the mouth of
y. Duct. com. Choledoch. We secure the Canula by a bit of tape
round the waist. ——— Next I am to shew the Lateral operation
Dissect the staff directing the groove to y. space between y. Vagina
& the Ramus of the Ischium, turning it sideways, & a little
backwards, y. taking Hawkins Gorget & push it in till from
want of resistence I am sensible y. I have divided y. Sphincter of the Bladder, & now I draw Lewis' Lancet, a Paracentesis
Instrument: I cd. do the Operation wth a case but part of y. Knife
is open within y. Cavity of the Bladder, whereas the other
cuts as it enters, & the moment it has entered we know how

the want of resistence, & then we stop; withdraw the Staff, & upon the Gorget introduce the forceps: the back of the Gorget fully protects the vagina so y.t we are in no danger of cutting it in the time of the Operation. — We now return to the operation proper to the male. We find perhaps next that a Stone shall be lodg'd partly within the Bladder & partly within y.e urethra, y.t therefore the Surgeon finds it impracticable to use y.e Staff, unless when the Stone is small, so y.t with y.e end of the Staff he pushes it back into the body of the bladder, w.ch in some cases it may be advisable to do, as it is easier to operate y.n when it sticks within y.e bowl. But if y.e Stone is large there is an evident necessity of cutting directly upon it, & performing the Operation very like to that of Celsus, only the neck of the Bladder & urethra were y.e pressure of the finger introduc'd into the Anus, & name the Stone. Having said it before we attempt to bring it forwards by the Spoon of Celsus, or we laybold of it with the forceps, cutting y.e parts where we best may by introducing the Knife upon the finger. — Next withdraw y.e the Stone has got entirely out of the bladder, & has stopp'd in y.e urethra & there grown to a consid.le bulk in y.e bulbous part of y.e urethra In this Case we must cut directly upon it & turn it out. But if a small Stone has pass'd thro' the Sphincter, it may likewise get thro' the rest of the Urethra: if we assist by y.e use of diluents to push the Stone forwards, by lubricating y.e passage with melted Hogs lard, or oil, & the Surgeon at y.e same time pushes the Stone gently forward with his finger: or we may employ an Instrum.t long ago described by Sanctorius & w.ch again exceed to the ingenious Dr. Hales for laying hold of y.e Stone. By these means we may succeed but I do not advise y.e w.ch was much force because y.e pain & disorder from pulling the Stone with violence will be greater y.n y.e occasioned by an Incis.n made upon it, for experience shews y.t we can cut into the Urethra with.t much danger of a Fistula remaining, provided the Operation be done in a proper manner; we take a common

Scalpel, suppose it to be lodg'd about y^e. middle of y^e. penis, instead of cutting directly upon it, w^ch. we wo. be ready to do, least the urine sh^d. get out into the Sub cutaneous Cell^r. Substance, but at trial it's found y^t. we may venture to push the Skin first & make an Incision upon the Stone, & then allow y^e. Skin to fall back so as to cover the wound, & the Inflam^n. prevent y^e. urine from escaping, or we may do this by gentle pressure, or we may introduce a flexible Catheter, but if the Urine after all sh^d. escape, we must repeat the wound in the Integuments directly above the wound in the Urethra, but experience shews y^t. this is seldom necessary — I shall next suppose y^t. y^e. urine is confined within the bladder of the male, & y^t. we can't relieve y^e. pat^t. by introducing the Catheter, & are under a necessity of making a puncture in the Bladder, formerly I endeavoured to shew the properest place & manner of performing the Operation. — The same reasons y^t. determine against making y^e. perfor^n above y^e. os pubis in the female, ought to determine ag^t. y^t. place in the male, we can introduce a perforating Instrument with the same safety near to the neck of the Bladder, we can leave a hollow Tube with less danger, & for a greater length of time, But we are not to follow Heister & others in attempting to trace y^e. natural passage in the male, we ought to open y^e. Urethra near to its membranous part, & to introduce y^e. Trocar in the direction of the urethra, But still in this way we wound the prostate Gland, & are in danger of bringing on a diseased State of the neck of the bladder, let us therefore direct y^e. Instrument outwards in order to avoid the prostate Gland, neck of the Bladder & make the Incision where Mons^r. Foubert opens for Lithotomy, we cut the Skin between y^e. urethra & Crus of the penis, & then enter the Trocar parallel w^th. y^e. urethra, at the distance of a finger breadth, so as to get with^t. the prostate gland: & the Instrument is made to come out at a sufficient distance from the neck of the bladder, & if the Bladder is fully distended there is not y^e. smallest chance of wounding it. — That is beyond all doubt practicable to make an

to make a puncture from the Intestin. Rectum w.th a curved
Trocar & Canula for when the Bladder is so much injured, & we fear the danger not only of a fistula but of wounding y.e vasa deferentia & vesicula Seminales, & shall next endeavour to dilate y.e Urethra & neck of the Bladder so much as to allow the Urine to drain as fast as it comes from y.e Ureters, & y.e Common methods have failed, & y.e patient needs y.e Surgeons assistance, this lowering is by mechanical pressure to hinder the urine to pass thro' the Urethra, then for the applic.n what has been called the Jugum Penis, w.ch makes a compression upon y.e whole penis but particularly upon y.e urethra there in common are all defective in this they are difficult to manage from wanting a spring, &c. I have caused a piece of elastic metal to be bent, & sewed to be passed thro' both plates, so y.t we can bring y.e sides to fit y.e part exactly, the Button is made flat and thin, & can be removed, & applied with very little trouble, In one or two cases this very Instrument has been worn w.th relief: in one or two others either from carelessness in y.e pat.t of patient being hurt by it it was found troublesome, & y.e patient rather contented himself w.th endeavouring to confine the Urine: I omit.d of adding a button at y.e under part to press on the Urethra, but it unnecessary if other pressing sufficiently In women there is more difficulty, & after all y.e variety of methods that have been attempted y.t proposed by Heister will be found y.e best, viz. to use y.e same kind of round & oval piece of wood within y.e vagina, y.t is employ'd for supporting the uterus when disposed to fall down, because y.e urethra pressed by y.e anterior part of y.e vagina, & in Barrenness pat.ts find it difficult to fit exactly y.e ring, let a bit of sponge be tied to it & introduced dry, & y.e swelling when moistened will be found to make as exact pressure as y.e urethra as is necessary. —
Tho all must suppose y.t there is a contraction in y.e urethra, & y.e Caruncula or Wart has grown within it. The Contraction of y.e Urethra is generally admitted tho' Sharp & others doubt exist.ce of the

Existence of Caruncles, as many doubt the existence of ulcers in y^e^ Gonorrhœa. Now I affirm y^t^ I have repeatedly seen Caruncles in y^e^ urethra at 1/10. of an Inch or more depth, & I have seen Caruncles of very considerable length, where y^e^ patient was under a necessity of frequently tearing away pieces, & have found them rooted at the depth of 3/4. of an Inch, Yet have been found necessary to introduce a file within y^e^ urethra to rasp these Substances off as soon before y^e^ patient could make water So we are not to treat their Existence as imaginary, but must admit y^t^ they sometimes grow, y^t^ contractions of the urethra are more frequent I admit, for often a common Gonorrhœa w^th^ Caules nothing is more frequent, y^n^ to find particular places in y^e^ Urethra harder y^n^ others, & we can conceive y^t^ the swelling w^ch^ may be distinguished w^th^ our finger must upon the inside affect y^e^ urethra & retrain y^e^ passage by inflam^n^ how in all such Cases experience has shewn y^t^ mercury has no very considerable effect in removing the disorder, y^t^ mine depends upon a proper cooling diet, particularly y^e^ a milk and vegetable diet are the most effectual in assisting to remove constitutional & topical Complaints in y^e^ urethra follow^g^ y^e^ venereal disease, But we are likewise to assist mechanically to introduce Bougies, conical bodies found of plaister mild, as to the Composition, many pretend y^t^ the materials have a remarkable effect, & therefore mercury in various forms has been employ'd But I am much disposed to believe w^th^ M^r^ Hunter y^t^ a Bougie is to be considered as a mechanical Instrument y^t^ if we get it of a proper softness & firmness with a Conical shape, it is all y^t^ is necessary, it acts by mechanically dilating y^e^ urethra in a gradual manner with^t^ putting it to the pain to inflame it: so one made by the receipt he has purposed will be found to answer as well as those purposed by Dawson. I refer you to an excellent chapter on y^e^ Subject in the Critical Enquiry. I am persuaded that this observation is just, y^t^ along Continuance is generally necessary, we are to work our way slowly, not to hurt y^e^ Sentiment with

[illegible] of Wounds

considerable force. We begin with a small Bougie, after y.t a larger one, wearing it at first a sufficient y.t lengthening y.e Space & we must be guided by the feelings of y.e patient: nor are we to despair too soon, after 2. or 3. weeks we may have made little progress, by stay in some months the Cure may be compleated. I shall next suppose y.t there is not only some part of the urethra y.t is Constricted, but y.t behind y.e Contraction a fistula has formed, y.t there is a passage made thro' the membranous & spongy part of the penis into y.e subcutaneous Cellular Substance & thro' the Skin, so y.t the urine comes to be voided in consid.e quantity, & generally passages of this kind are formed behind the Scrotum, abt y.e perinæum, so y.t the most common Term is Fistula in Perinæo. I shall suppose that there is a passage leading from the urethra into y.e Cellul.r Substance; or thro the Integuments, now in what manner ought this to be treated In practice it is one of y.e most troublesome disorders, & perhaps rules either for examining it, or for y.e management are not laid down. We must take two things in our view — 1st it is very material to determine y.e beginning of the Fistula, almost always you will find but a single opening in the urethra, but y.t may be followed by many openings in the external parts, & sometimes even swellings; & even Pores, I have seen the Scrotum swelled to many y.s the bulk of both my hands, & almost as hard in some places as a piece of Cartilage, so many y.e urine diffused under y.e Integuments Now in what manner are we to trace y.e several passages, so as to reach to the root of all? Surgeons commonly attempt this with the probe, but for the most part in vain, for like the holes a rabbit forms in the ground, they are crooked and irregular: the probe stops at every turn, so we find it more convenient to trace the passages by Injections, they throwing in air, & throwing at the same time a flexible Catheter into y.e urethra, & observing when the air gets into it, as we inject milk & water, & y.t brings us to the communication with the urethra. This is the first thing to be looked for, for after we find it we are to make a free

[illegible] ment of Fistula

passage from y. outward to prevent the urine from stagnating & spreading in the Cellular substance, we divide the Integuments by an Incision & cut into y. passage, w.ch comes directly from the Urethra, y.e patient now in making water discharges part by the penis & the other part by the wound, the suspension varying according to the degree of stricture in y.e Urethra & we shall be able to judge of y.e seam the stricture when a great part of the membrane is eaten the urine may gush out at the wound, when perhaps the stricture is in a great measure gone, & perhaps y.e discharge made by the aperture of the urethra has ceased y.e Inflamatory hardness having made this fore passage we are not immediately to have recourse to a further Incision, but we have recourse to Bougies w.ch we introduce part y.e communic.n between y.e urethra & fistula, whereby we have a better chance of healing y.e fistula, & in this way it will often heal of itself; but supposing it not disposed to heal, we take care to preserve y.e opening made in y.e Skin, w.ch is more disposed to contract y.n y.e internal part, by a bit of stern or lint, & when ever y.e patient finds an inclination to make water he draws it out, letting y.e water pass freely, thereby keeping up in the Cellular Substance & preserves new Fistula, or we may introduce a small pipe and fix it to the side by a bit of plaister, thro' w.ch y.e urine may run freely, & when we come to find y.e when passage is made, the urine runs thro the Urethra in a natural stream, we glue together the fistula by making an Incision, following it into the Urethra, & we might perhaps hasten the healing of the Fistula by keeping a flexible Cathe introduced within y.e urethra, & y.e patient might press upon the fore part end of it in y.e time of making his water, or at least let him endeavour by the pressure of the hand to prevent the Urine from passing thro' the wound, w.ch might dispose y.e passage to become again callous & the Fistula to remain notwithstanding the Operation.

Lecture 8th

I have endeavoured to explain the treatment of Fistula

communicating with the Urethra. Here I shew you a preparation of one that is very singular: for in the common Fistula the urine spreads in the Cellular Substance inflames very fast it breaks & occasions considerable hardness, but without any remarkable degree of distention made by the urine, whereas here we find a new and artificial vesica urinaria, The History of the case is shortly this: After a Gonorrhœa a Patient had a difficulty of passing his water, & began to observe a swelling and pain in the perinæum, the pain by degrees abated, but the swelling continued to increase, & in making water, by pressing his hand upon the swelling, he encreased discharge Ziij: a lb. When making an effort in the common way, he again filled the sack: he continued in this miserable way for 7 or 8 years without mentioning his Case: at length Mr Wood & I were called, when he had all the Symptoms of what we call a slow nervous fever, with a retention of his water, nor could any of his water be discharged, upon pressing on the Tumor. Mr Wood endeavoured to introduce a Catheter into the Bladder but in vain, the urine in the sack had regurgitated by reason of the urethra together, We made an Incision into the Sack, & the urine came freely out by the Fistula, but the Symptoms of a Fever continuing he dyed 5 or 6 days after the operation: the bladder was much enlarged & thickened in its Coats, & there was a large hole in the Urethra leading into the Sack — Had he recovered of the Fever we intended to have introduced a flexible Catheter into the urethra, beyond the fistula, which we saw distinctly, & to have endeavoured to shut up the Wound, & there was a sufficient thickness of the Tegument to have closed it firmly. Injections into the Urethra in Gonorrhœa have been practised by many with a Glass Syringe with a conical short point to introduce the Urethra entirely: of late a machine has been used, made of the Juice of a plant found in the East Indies, & in South America, resembling Caoutchouc: the Art is this it resists moderately to pressure, & can bring the opposite sides to touch but as soon as I let it go it swells to its former bulk, & then I dip the pipe fixed to it in water, while it is thus compressed, & then remove the pressure, it is filled quite

Tube of the Ligure, and we can thrust it by screwing on a bit of Ivory we y^t the materials for the Injection can be carried in it in one pocket, water does not affect it: nay we hardly know of any substance y^t consider it, we may carry a bit of Vitriol in it: suppose y^t bottle larger it wd. answer for giving a Glyster, & it may be made so large as to contain two pints, or only 8^{oz}. But it has no material advantage over the Common Syringe.

I wd. however be far from recommending these Injections as necessary or useful in y^e common case of Gonnorhea: they by no means answer expectation: & what has been alledged by in any of their effect: I am to give a probable argument against them, tho' it is not conclusive altogether. Nor do Surgeons agree in their Composition: some use weak Solutions of Copper, others Salomel suspended in Gum. Arabic. others volatile Alcali, & one wd^t disadvantage attending their use, is that y^e venereal poison is conveyed deeper into y^e Urethra, notwithstand^g all y^e pains we can take to y^e contrary If a person is to use the Injection he wd. empty y^e Urethra by hasping his Urine first, but while some of y^e matter first is carried deeper, & it is y^e natural progress of the Disease to go deeper & deeper: so we are in danger, of affecting a greater portion of y^t might otherwise have been affected: & when the matter reaches the Bottom of y^e Urethra y^e Gonorhea is generally attended with a swelling of the Testicle: & I wd. also y^t y^e use of late much in use frequent, merely because Injections have been employ'd: even y^e most innocent Substances do harm: Oil has been spoken of, but it gives not any relief, it does not adhere to the wet Urethra: a Solution of Gum. Arabic will have a better effect tho' inconvenient. — But tho' the Injection succeed to our wish, y^t they come at the spring: power, it stops the running, we disque y^e fainting of the Constitution, y^e matter more readily enters into y^e mass of Blood for it is a mistake to suppose y^t y^e Gonorhea is not capable of communicating

the Lues Venerea, they are the very same disease
A few Complaints of the penis still remain to be mentiond
The prepuce is much subject to disease, y^t. opening in it is
sometimes not sufficient to allow y^e. urine to Children to be
discharg'd freely: & in the Adult, as a sebaceous matter is
secreted upon the inner side of it, y^t. by stagnating some-
times becomes very acrid & gives a great deal of uneasi-
ness: the patient will receive a great deal of relief by wash-g
the part freq^tly. with a weak Solution of Vitriol. Alk. or
Saccharum Saturn. — The Venereal Cancer of y^e. prepuce is very
often affected w^th. Inflam^n. & Thickn^g. with^t any ulcer or
Chancre, but for the most part when it is thicken'd on
Inspection we will discover in some place Chancres par-
ticularly when y^e. fraenum is corroded: the straitness of
y^e. prepuce whether natural or brot. on by disease may have
y^e. effect of preventing y^e. urine to get out, by forming a
Ring at y^e. anterior part of y^e. Glans can not be uncover'd
when the penis is erected, & y^s. call'd Phymosis. as y^e. Skin
may have been naturally sufficiently lax: but a swelling
brot. on by disease behind y^e. Glans: & y^t. is called Paraphymo-
sis as a straitening beyond the Glans, as they are the
same disease, but with a different Situation of y^e. part.
If the common methods of relaxing or remov^g. y^e. Inflam^n.
fail, recourse is had to Surgical Oper^n. but we shall here
y^t. Operations of y^e. part, at least when a compleat Cure is
remov'd, are not necessary, as often as Surgeons imagine. —
I have prevented a N^o. of persons from having y^e. Oper^n. done,
I got y^e. Oper^n. to be delay'd, & in consequ^ce. of y^t. y^e. Inflamm^n.
subsided, letting blood has a considble. effect from the Arm:
for I wo. be aware to do it near y^e. part. Mr. Cowper Ld Surg^n.
into y^e. practice: alledging much from theory, y^t. from experi-
ence: & y^e. opening y^e. vena Dorsalis penis has good effect:
but I wo. be aware to open this vein on account of y^e. considerable
nerves y^t. run near it, & terminate in y^e. Glans of y^e. penis

the blood tho may get under y^e Skin of y^e penis & scrotum
the part^t from y^e dark colour, tho' it is not so material an
objection, as the others with respect to y^e nerves; many apply
leaches to the part: but I make an objection to them, as the
wounds they make are apt to turn into Chancres, where a
particle of y^e matter rests on 'em, so we draw it from y^e part
pursuing y^e Antiphlogistic course we are to bring down y^e
Inflam^n. & y^e acrid matter is Lady'd within y^e prepuce we
find benefit from bathing the part & washing it. ——
Diluted mercurial Ointment, made with^t Turpentine may
also be thrown in; tho' y^e may increase y^e sensibility of y^e
part. —— While we said it is proposed y^t Circumcision
sh^d be performed, y^t y^e skin sh^d be cut in a circular way,
particularly when y^e straitening is at y^e point of the penis:
this has been a religious Ceremony performed on all persons
in certain Countries, & has been supposed of advantage:
but it will need strong Arguments to convince, y^t any part
of y^e human body can wholly unuseful to us: I shall suppose
y^t we can't draw back y^e prepuce, or y^t y^e passage for the
Urine is straitened: Is it necessary to cut round: I apprehend
it is not, & y^t an Incision at y^e side is fully sufficient:
cutting at y^e utmost on both sides we enlarge y^e circle, as
y^t we can draw back the skin: there will be a distance but
it will fill up by granulating flesh, & y^e circle will be
enlarged only y^e new formed part will be tyed down w^th a shorter
Cellular Substance y^n y^e natural part, but w^th time when
y^e lengthens, & we may bring y^e Skin forwards again. —
However if we are not satisfyed w^th y^e Advance to follow y^e former
practice, we may make y^e Circular Incision & instead of drawing
y^e skin forwards, you attend to y^e straitened part & push it back
wards, y^n lay hold of y^e very edge of y^e straitening, & where there
is any increase of thickness, cut it off w^th a Knife or
a pair of Scissors, y^e Scissors are easiest managed, but they
give more pain, & y^e knife is preferable tho' it takes more
time. — But if we are merely to slit open y^e side, as in a

as in a mineral Case, when y^e Skin before the Disease was sufficiently long, it may be performed in a very easy manner, We may introduce a Canula, or small pipe, such as have been us'd for Bronchotomy, between y^e Gland & Skin, carrying it as deep as the Stricture, we then take a sharp pointed knife, w^ch we pass thro' y^e Skin into y^e Canula, & man y^e Canula, & knife were one Instrument, we slit open y^e Skin, & cut it thro' safely & readily, with^t y^e danger of wounding the Gland, w^ch is unavoidable in y^e introducing a pair of Scissars: or instead of y^e Canula, we may use a thin plate of metal: I must suppose y^e Case of paraphimosis, y^t y^e straitening is behind y^e Gland that Situation of y^e prepuce may have a great effect y^n the other, for if is consid^d there is hazard of y^e Gland mortifying of the blood, not returning freely to the veins: In Surgery we ob. proceed exactly to y^e operat^n Daily y^t is necessary in y^e cutting the Skin freely w^th a common Lancet: whenever a bud is obs. especially at y^e side, in order to avoid y^e prepuce beneath & above, y^e principal vessels & nerves, for y^e veins bleed freely into y^e Cells y^e blood being pressed into 'em: & we readily y^e stricture all around w^th y^e common Lancet w^ch is better y^n y^e Scalpel. I shall next suppose y^t y^e penis is affected w^th Cancer proceeding from an Internal cause, for tho' y^e accum must frequ^t in Glandular Organs, any part is subject to y^e disease, or we may suppose y^e Cancer, inoculated in coming of commerce w^th a woman who has a Cancer of y^e uterus, w^ch is by no means an uncommon disease: Here we make y^e common progress is w^ch I shall speak of afterw^d: when I shall determine what expectation adv^ge may entertain of curing with^t the disease returning: My Father us'd to inject y^e mutilated part by Regnoch & others from Surry: they apprehended y^t after amputating y^e penis, it was not necessary to take up y^e large vessels but as y^e blood naturally flowed into y^e cavernous substance: y^t it was to be dreaded from any ball: as y^e performed y^e operation by ligature having previously introduced a

a Canula into y^e Urethra. But it has been prov'd from these
Cases y^t it not necessary one by Vogelii another by M^r Warner
and a 3^d by the late M^r Bilcliffe. — Suppose y^e Glans Clavata
Cowperi to be affected, we take away all y^e in a hardned
State examining y^e Color & feel of y^e Skin, next we have ready
a Strap for a Tourniquet, or a Bit of knitting, to be twisted by
a probe, or let the assistant grasp y^e penis w^th his fingers,
we first make a Circular Incision in y^e Skin w^th a concave
knife y^t has a blunt point, w^ch then draw back the Skin,
indeavouring to preserve as much of it as possible: to cover
y^e end of y^e Corpora Cavernosa: Having made our Incis^n
we remove y^e prepuce from y^e penis & take up y^e mouths of the
bleeding vessels, & take them up w^th a needle, or we draw
a suture thro' them, applying dry lint to the end of y^e Corpora
Cavernosa in the common manner: & it is not found necessary
any to apply any Styptic medicine for having tyd up y^e principal
branches y^t wd stop themselves: y^e urethra has been found to
be contracted by the Inflam^n. Then we wo. indeavour to pursue
y^e opening by introducing a small bit of flexible Catheter.
If in consequence of y^e Cancer some of y^e Inguinal Glands
are swell'd, these must be taken away at y^e same time other-
wise y^e gland subsiding, conveys all its hurtful humours
into y^e blood: only conveying their Situation w^ch are next to
y^e femoral Vessels, we wo. not rashly undertake y^e extirpat^n
of them if deep; or if y^e operation be undertaken we wo. proceed
with Caution: for a short Cellular Substance will be found
to glue y^e Glands to the Coat of the Artery: some others near-
est to the penis will be found to have y^e Lymphatics directly
entering into them, w^ch y^r extirpation will be necessary: & y^e
same Glands will be found affected y^t are found swelled in
y^e venereal Disease: I shall not mention some Cautions
concerning y^e Cesarian Operation. — If y^e person on
whom we are to perform y^e operation: by w^ch is understood an

Spongiosa.

Incision made into the cavity of y^e^ Abdomen & then into y^e^ Uterus in order to extract a fœtus, y^t^ has been killd by a sudden Accident in the last month of pregnancy, or has died by a slow suppose, we need not be very exact we make y^e^ Incision as quickly as possible — But if we are to operate on a person in Life surely we must not think of doing y^e^ operation; if y^e^ person has ever on any former Occasion been delivd of a Child w^ch^ is a sure proof y^t^ y^e^ natural opening is sufficiently large: and suppose y^t^ y^e^ Os Uteri is not fully dilated, it will be better for y^e^ patient to have it dilated forcibly, y^n^ to have this Operation performd w^ch^ is attended with most imminent danger. — Next we ought to examine y^e^ state of the Bones of y^e^ pelvis y^t^ we may not imagine y^t^ y^e^ bones prevent y^e^ delivery, when perhaps y^e^ soft parts only may be in fault, & we may presume y^t^ there is a sufficient widenss in y^e^ bones of y^e^ Pelvis; if y^e^ pat^t^ is not also to have deformity in other parts of y^e^ body, as a deformity easily occurs in y^e^ pelvis with^t^ rickets or a Curvature of the Spine, not but in a few cases it may happen. But suppose all these circumstances attended to and the Oper^n^ is determind, next let us consider y^e^ proper steps to be taken in it. — 1^st^ first empty y^e^ Intestines & Rectum, and Vesica Urinaria, y^t^ y^e^ pat^t^ may not be disturbd so soon after y^e^ oper^n^ & y^t^ y^e^ size of the Bladder may not interrupt y^e^ oper^n^ 2^dly^ Say y^e^ pat^t^ in a horizontal posture, y^t^ y^e^ Intestines be not pushd down between y^e^ Abdominal vessels & Uterus: & we shall generally find y^e^ uterus to present when we make y^e^ Incision, tho y^e^ Turns of y^e^ small Guts may be interposed, 3^dly^ in making our Incisions are to avoid y^e^ large Intestines in y^e^ containing parts, if we were to go m^ch^ outwards we might wound considerable branches of y^e^ circumflex: if inwards y^e^ Epigastric, or y^e^ best place is between y^e^ recti muscles, or upon y^e^ outside of the rectus, w^ch^ last is y^e^ common place, & readily get into y^e^ uterus, tho' not in y^e^ middle w^ch^ we could wish: because the vessels of y^e^ uterus enter at its side & disperse and are divided into small branches in y^e^ middle, so y^t^ there is less

bleeding in y.e middle & therefore between y.e incis.n wound
answer very well, but we choose y.e outside of the Rectus rather
because of the vessels there as being in danger of contracting
Inflam.n from y.e Incision. — Except y.e danger of wound.g y.e small
turns of the Intestines, there is no great difficulty in performing
y.e Oper.n yet several Cautions are to be observ.d. Operators have not
been aware of y.e Causes of y.e danger: & we have more favorable
Accts of y.e danger in y.e Oper.n y.n we have a right to expect: which
find in practice y.t we shall be more frequ.ly disappointed y.n
we wd. imagine from looking into y.e Authors y.t have only
mentioned y.e fortunate Cases: In y.e Place y.e oper.n has been
performed five Times and all y.e Pat.ts have died: tho' some of them
before y.e operation were in ordinary health. y.e great danger I
am persuaded arises from y.e admission of y.e Air, as well as
from y.e parts divided: & I have repeatedly found in making
Experim.ts upon Animals y.t if y.e Air was let in upon y.e Abdom.n
Bowels for a few minutes with.t any further Injury, y.e Anim.l
recovers with.t utmost difficulty & often dies: and y.e still more
readily happens if a consid.le qu.ty of red blood be extravasated
within y.e Cavity w.ch produces a most violent Inflammation.
Therefore y.e Surg.n is not to go at once into y.e Cavity of y.e Abdom.n
but he first divides y.e Skin and muscles, leaves y.e peritonæum
entire until y.e bleeding from y.e vessels has entirely ceased, &
y.e danger from y.t way I find is very much lessened; we then
open y.e peritonæum making first a small hole: & observing
if y.e uterus is contiguous, if it is, we slit it w.th Caution: & y.e
Assistant by making a moderate pressure, hinders y.e air
from getting into y.e gen.l Cavity of y.e Abdomen. As y.e discharge
of blood from y.e Uterus is smaller, y.n we wd. expect: we then
cut y.e membranes, separate y.e Placenta to extract y.e Fœtus
discharge y.e waters: & as soon as y.e Fœtus & membranes
are removed, y.e Uterus w.ch is beyond all doubt a muscular
Organ, contracts of itself: y.n let y.e Surg.n pass his hand into
ye Cavity of y.e uterus & with one or two fingers open y.e os uteri:
y.t y.e blood naturally discharging into its Cavity, & from the
wound, may get readily out, the uterus y.e alone may be a

cause of death. We then shut y^e^ wound, & instead of leaving
an Opening for y^e^ discharge of matter, we trust to the Adhesion
for w^ch^ constantly find y^e^ very close Suture; contributes to the
Cure, w^ch^ we view y^e^ containing parts of the Abdomen with y^e^
Glover stitch at 3/4 Inch distance, making y^e^ needle take
this y^e^ Skin & part of y^e^ muscles but not within y^e^ Cavity:
leaving y^e^ peritoneum entire, as if there is a consid^le^ effusion
of blood & water let us at least close all but y^e^ under part
and cover it carefully with a thick compress, & introduce a
soft Tent & y^e^ patient is to be kept on a strict Antiphlog-
istic Course.

Lecture 89.th

In this meeting I purpose to treat of diseases y^t^ are improperly
called Hernia: viz. of y^e^ Hydrocele of the Spermatic cord & Testicle
or dropsical humours forming in these: & the Sarcocele or Schirrus
either of the Testicle or Cord, or both. — In the Hydrocele y^e^
water may be collected in various places & in consq^ce^ of this y^e^
Appearances will be very different. — 1^st^ In Anasarca ascend-
ing higher y^n^ y^e^ pubis we also y^e^ Scrotum distended from the
communication of the Cell^r^ Substance: But from y^e^ dependy
situation of y^e^ Scrotum it is sometimes necessary after punc-
turing y^e^ Legs to puncture y^e^ Scrotum likewise: the water
is then lodged im^d^ beneath y^e^ Skin of the Scrotum. Sometimes
in Ch^n^ soon after birth: then is a swelling of y^e^ Subcutaneous
Membrane of y^e^ Scrotum from some Injury done to it in del-
ivery: but y^e^ worn dis appears of itself. — Next y^e^ water may
be confined within y^e^ Sheath of the Spermatic Chord, for we
can blow Air from y^e^ Spermatic Vessels thro' y^e^ Cellular
Membrane to the Top of the Testicle, but this very rare, we
have not above perhaps 6. examples, of it in Authors where
an Oper^n^ was necessary. — Next water may collect in y^e^ Cell^r^
Substance w^ch^ lies y^e^ ext^rn^ coat of y^e^ Spermatic Duct w^ch^ in
y^e^ Testicle: the Tunica Albuginea confining y^e^ water: But
this Complaint is rare, I dont find above 2. or 3.
well attested Cases of it, where an operation was necessary:
Next, as the Testicle changes its place, & is into a process of

Schisma
x

ye Peritoneum, & low a part of wch includes ye Testicle originally in man, ye Structure of ye Vaginal Coat of the Testicle, is nearly ye same as we find it in an Adult Quadruped, naturally ye Process from causes we can't assign shuts from ye top of ye Testicle to ye Ring of ye Muscles, & yt in a very regular manner, for always ye Sp. of ye Epydidimis remains without adhesion, & ye other half contracts the adhesion, as we find one half of ye Epydt floating within the Vaginal Coat, now water may fail in bringing about ye Union of ye Sack, or ye Process may be the occasion of ye Hydrocele or ye vaginal Coat of ye Testicle may supply moisture in such quantity as wont to occasion Ascites. — By the adhesion of the Sides of ye original Process of ye vaginal Coat may take place in part, it may happen above ye Testicle, Against the Ring of the external obliqus, when ye parts are pressed more closely together, so between those places a sack left. & a Hydr. found, ye Testicle floating loose below: and ye Spermatic Chord distinctly felt above while ye water is lodg'd in ye middle of the Original Process.

Next a humoral Sack further down very often as low as ye vaginal Coat of the Testicle, when ye natural structure takes place, & acquires adhesions to ye neighbouring parts & suppose ye Bowels to return into ye Abdomen, & the patient wth a Truss to confine them, by pressing ye sides of ye Sack he may bring on an adhesion, & leave an empty Bag, between yt & the Testicle, wch if there is a disposition to dropsy, may fill wth water; tho' I have no instance of ye Next independant of ye orig. Process & of a remain. Humoral Sack, a preternatural Cyst may take place in ye Spermatic Chord, & we may meet with a preternatural Encysted Dropsy — Six Instances of wch I have seen. One Species more remains & by far ye most common viz. ye Hydrocele in ye Vaginal Coat wch occurs in 99. of 100. Cases it is ye common Hydrocele. — There is a possibility of an other sometimes occurring, we find small Cysts hanging loose within the Vaginal Coat, about the Epydimis, there may well be such a degree as to fill the Vaginal Coat.

Having endeavoured to describe the various Species of [illegible]
Hydro. next let us attend to y^e signs by w^ch we distinguish
'em. Several are so evident y^t it is not necessary to say any
thing ab^t 'em, as where y^e water is diffused under y^e Skin: If
it be diffused in y^e Spermatic Chord, we judge of y^e disease
from y^e Shape of y^e swelling, from y^e enlargem^t of the Chord,
from y^e softness, the pitting on pressure, they also being little
chang'd in the Scrotum by a change of posture, & this last is
what we must particularly attend to as it distinguishes
the Encysted Species of Dropsy here, or Hydrocele from a
Varicose stat of y^e Spermatic veins from Rupture: We
likewise attend to y^e progress & present appearance
of y^e Encysted Hydrocele, y^e swelling increases in a slow
& gradual manner with^t any pain to the patient, only a
degree of stretching of y^e Spermatic Chord may produce
a little uneasiness: y^e belly is not affected as it is in the
Rupture, by y^e last we discover the Chord round between
y^e swelling & Ring, we distinguish by y^e equality of the
Shape by it's not changing, or diminishing by laying
y^e patient horizontally, by y^e fluctuation we feel; we are
also directed to examine y^e Hydrocele w^th a clear light, but
y^e Coats of the Intestines in a Rupture Sack will be
transparent likewise. ——— By these means we may
judge with^t any danger of mistake, next we distinguish y^e
Preternatural Encysted Dropsy, from y^e natural Encysted or
Hydrocele of y^e vaginal Coat, by y^e former y^e Tunica is felt
y^e ring of y^e muscles and Testicle, w^ch can be distinctly felt
at y^e Bottom, & we can go round y^e whole body of it, w^th y^e
finger except where y^e Spermatic Chord enters it, where
as it is in y^e vaginal Coat: it is buried in the water &
is only to be distinguished at y^e posterior part where it is
tied to its Chord: & in y^e Complaint y^e Testicle preserves
its natural place having y^e water on y^e fore side of it: this
is not always y^e case, however so far we know y^e Compl^t
from Rupture; we are only next in danger of committing
a mistake with respect to Schirrus of y^e Testicle or Sarcocele

If y^e^ Coats happen to be immoderately thickend, and especially if y^e^ fluid contain'd within be not pure water, but y^e^ blood is from any cause extravasated, there is a higher degree of irritation & thickening, we distinguish y^e^ one from the other by y^e^ circumstances y^t^ gave first occasion to the Complaint, if with^t^ any acc^d^ a swelling has begun, &c^t^ it advances with^t^ pain, we may suppose it to be Hydrocele where as if y^e^ Testicle is diseas'd there is gen^lly^ a pain from y^e^ very first beginning: We likewise judge from y^e^ equality of the Tumor in y^e^ Sarcocele y^e^ Tumor is seldom perfectly diseas'd thro' out, but while parts^t^ portions retain the usual vascular & tubular Structure in others we find knots & a matter extravasated of a harder Consistence y^n^ the rest. We judge further by examining y^e^ particular^s^ in y^e^ Hydrocele the glans pen^s^ has a much smaller size, only a hard Spot equal to the natural Bulk of y^e^ Testicle, but in y^e^ Sarcocele y^e^ substance discover'd is much broader. We may perhaps judge further from y^e^ weight: the Scrotum will feel more weighty to y^e^ hand for it sinks in water, so upon the whole by a carefull attention we may distinguish y^e^ Hydrocele from the disorders. — Suppose it y^e^ known Cause we consider y^e^ manner of treating it: Experience has sufficiently shewn y^t^ after it has made a certain progress, especially if it is not owing to an external accid^t^ medicines have very little effect upon it: not but y^t^ in some few lucky cases, the Swelling disappears in y^e^ use of medicines, as of itself, but y^t^ will not occur in perhaps one of a 100. Cases, so we are not to propose to a patient any course of medicines w^ch^ can have y^e^ Chance of hurting y^e^ Constitution, we may give a mercurial purgative once a week: & gently some discussing medicines, to satisfy our patient by doing so y^t^ y^e^ operation is necessary. — These being supposed to fail — We must have it in our power to palliate y^e^ Complaint, to draw off y^e^ water relieve y^e^ patient if y^e^ Cause from time to time, or to make a radical Cure, by a more severe operation: from y^e^ great size to which y^e^ Tumor has arisen from y^e^ broken constitution

of the patient, or from this cause, y.d Surgeon may chuse
merely to palliate y.e disease, or y.e patient, may refuse to
submit to any operation: In either Case we let out the
water by a puncture & the method of doing it may be mad.
very easy & safe: some Surgeons use y.e Lancet which they
thrust into y.e lower part of y.e Tumor: but in this way the
skin is in danger of slipping away from y.e orifice of the
sack, & even with y.e assistance of a probe there is some dan-
ger of this happening, most commonly therefore Surgeons
use the Trocar w.ch they plunge into the Tumor till there is a
want of resistance then they withdraw the perforator & leave
the Canula till y.e water is discharg.d. But the toughness of
the skin is such y.t generally notwithstanding all care being
taken, it's perforat.d in emidiately & y.e Tumor is made the
Portion may readily be wounded: Hence therefore Bell and
others to use both Instruments, viz.t we side ned a Lancet
& Trocar & a probe, & we ch. employ a very small Trocar
whereby we avoid two accidents: the point of a large Trocar
strikes upon some vessels, wounds them, & y.e sack fills w.th
Blood instead of water, & it admits of air too fauly, w.ch
may bring on the Inflam.n we study to avoid, y.e Canula may
be made flat, & y.e perforater with a Lancet point: but I
prefer y.e round one, as we get a probe, when y.t is necessary
past the cavity thro' y.e orifice — Let us next pay attention to
every circumstance, Surgeons are commonly negligent
when they mean to take in y.e management of their Patient
no medicine is given before, & after the operation y.e patient is
allowed to go about, at least y.e following day: & we find
y.t when they come to take y.e patient a second time there is
blood discharg.d & y.e disease returns very fast: the Tegu-
ments of y.e sack come to be much harder than before.
Now all of these depend upon y.e want of proper attention
therefore I make it a rule to give a brisk purgative be-
cause y.e Peritonæum, y.t y.e patient may not be under a
necessity of rising soon out of bed, next as the water runs

out, we then make a pressure w.th y.e hand, & after w.ds
continue a proper pressure, w.th a compress & bandage as
y.e T. bandage, & y.e compress may be dipt in a Solution
of Saccharum Saturni, w.th vinegar & Spirits; & it may made of
Flannel: the patient is to be confind to his bed for some
days, & for some days more to lie upon y.e bed & keep
very much to a horizontal posture to prevent y.e discharge
of blood y.t occurs independant of y.e wounded vessels, for
when a large Abscess is let out there run a mixture of blood
w.th pious out from y.e Extremities of y.e vessels, or, some
Vessels are ruptured, wch by the pressure & medicines the
Sack collapses more fully, & y.e Ligures form y.e parts are
not so readily sucked into it, & y.e operation will need to
be less frequently performed, not perhaps above one in
y.e year. —— Supposing y.e patient prepared for y.e operation
he is laid in bed: the Surgeon examines the Tumor carefully
presses y.e sides of it together, & feels y.t there is no adhesion
of y.e Testicle at y.e lower part, & being certain y.t y.e water &
Testicle have y.r common Situation, with the left hand he
grasps the Tumor, & makes it long shaped pressing it down
wards, chiefly in making y.e distance between y.e Testicle
& lower part of y.e Sack: He next views y.e Skin & avoids
any considerable vessels y.t run in it he then makes a very
small puncture in y.e Integuments of the vessels w.th y.r Lancet
merely cutting y.e Skin & making a hole large enough to
admit y.e Trocar & y.e with y.e Trocar graspd in y.e hollow of y.e
hand & w.th y.e forefinger near to y.e point of it, to within a finger
breadth he enters it, making like a drill till for want of
resistence he is sensible y.t y.e point of it is within y.e sack
then with the left hand he takes hold of the Canula pushing
it inwards, at y.e same time withdraws the perforator &
applying y.e hand moderately to the Sack, he discharges
very deal of the water, If there is something stopping the
mouth of y.e Canula, we may introduce a probe to examine
it, but generally it is owing to the Surgeon pressing the

high up, resting the end of it against the Sack a Tenticle, while the water is laying the hind the point, so the changing the situation will be sufficient. Then we put a finger upon the Skin, & withdraw y.e Canula: & further we ought to pass the Trocar in a slanting direction in order to exclude the Air after it is armed. Valve to hinder y.e water to insinuate into y.e Cell.r Substance, the Surgeon y.n applies some Lint to the wound, Cover it a piece of Scotch and a compress with a Bandage as before mentiond — Inhallers suppose y.t a radical Cure is intended, y.t is brought about by such an Operation, as occasions a connection of y.e opposite sides of the Sack, & therefore in y.e common Hydrocele the connection of y.e vaginal Coat to y.e Tunica Albuginea, or body of the Testicle, now there are various ways of doing y.t the chief of wch Inhalle mentions to you & shewn you — It has long ago been proposed to effect the Cure by injecting irritating Liquors, these after tapping in the common way, Claret or weak Spirits are injected into the Sack, to bring on an Inflam.n & I have known y.m succeed, but if it produces too little Inflam.n there is only a partial adhesion, if too much there is a Suppuration of matter, wch does not find a sufficient outlet, so y.t y.e method is to be avoided — Next to incision which we do not submit to Incisions have been cured by the Application of Caustics: the common manner has been the Opening y.e sack nearly its whole length, by laying a train of Caustic upon it & destroying the Integum.ts the Eschar is found in a few days after, or is allowed to cast off, but y.e is the same with an Incision, & we are merely to view it as an expedient necessary where y.e patient will not agree to the more eligible operation — Of late a supposed Improvement has been made on y.e common use of Caustic instead of laying a train the whole length, we have been told y.t a Cure can be

unplaited by laying it on at y.e under part, not large
in size y.t a wing Quill, y.e spread, and being on an Inch or abt
the size of a Shilling y.e — But y.e lies open to many y.e examin-
ations, with y.e thread in of y.e acid Liquor: if y.e injection is
too small y.e union is not complete: if too much y.e opening is too
small for y.e discharge of y.e matter, & if y.e practical Observa-
tions differ where y.e Patt labors under a worse complaint y.n y.e
Hydrocele, & from y.e accot given of it by Mr Wood, y.e Inflam.n is
just as violent as when y.e most common operation is
performed: & we had lately in y.e Infirmary a case treated in
y.e manner, formerly when y.e disease had returned, & yet y.e
Caustic I make no doubt had been applyed for a sufficient
length of Time, for I examined y.e Sack, & found y.t y.e Ligam.t
at y.e place adhered to y.e under end of y.e Testicle, so y.t method
is not to be depended on y.e disease may return. ——
There are two other methods y.t remain the one is y.e passing
a Seton thro' y.e Sack: the other, laying open the Sack by an
Incision, cutting y.e Skin & Sack in one streight line. ——
The Seton has been long proposed, & an excellent Instrum.t
is painted by Heister for the introducing it — the Crooked
Trocar, we pass it thro' y.e Tumor & as soon as we find a
want of resistence we withdraw y.e perforator, & now we
push on y.e Canula, till we bring it to press ag.t y.e opposite
side of y.e Tumor, when we again press down y.e perforator
& push y.e Canula through. Heister must propose we tie y.e
Thread to y.e end of y.e perforator & to bring it back again
but its better to have y.e Cord ready w.th a long needle w.ch we
introduce into y.e Canula, or imitating Heister instead of
using y.e Trocar, y.e Instrum.t may be made flatter, and the
perforator made to serve for a needle, so y.t we bring it en-
tirely thro' at y.e Thread, y.e best way is to enter at y.e upper
part, y.t we may confine y.e water, till we bring out the

point of the Trocar below, only we carefully avoid y.
place of the Testicle, keeping to the fore part and lower
somewhat y.t y.e top of y.e Tumor: y.e in making y.e Incision
is perfectly simple we begin near y.e upper end of y.e Tumor
& continue it to near y.e under end but it sh.d never be made
y.e whole length, for y.e Testicle is in danger of dropping out
of its sack, so we are to leave a piece sufficient to sustain y.e
Testicle. — We first make y.e Incision in y.e skin only y.t y.e
water may not get out, till we are fully prepar.d for cutting
the Sack, & we use y.e larger vessels of y.e vaginal coat, from
w.ch there is sometimes a consid.le Hemorrhage; we cut the
Sack w.th a straight knife having a probe point, y.e sharp
pointed knives are dangerous & begin towards y.e upper p.t
cutting into it till y.e water follows y.e Incision, & we make it
wide enough to admit in y.e finger, w.ch is y.e safest direction,
tho' it is proper to have another ready, then upon y.e finger
we dilate first upwards & y.n downwards: now Dr. alledges
y.t y.e simple Incision is preferable to the Cod. — Upon
of the Question a method of entering y.e Cod w.ch I have
seen practic.d, making a larger hole capable of allowing y.e
finger to enter, above & another such near y.e lower end, leav
-ing a piece of Skin & Sack between em, w.ch I consider an an
Ingenious way of testing a patient, & not y.e method of
the Seton proposed by Pott & others: for here we have very
Symptom produced by the common method, y.e Air having equally
free access: & we have moreover y.e pain & irritation of the
Chisel applyd in an unequal manner to y.e body of y.e Testicle
In y.e common way in w.ch y.e Incision was formerly opened
it might produce worse Symptoms y.n y.e Seton, & taking
sharper acc.t of y.e operation no doubt y.e Seton is preferable
but from a great deal of experience I know y.e sharp des-
-cription of y.e Symptoms attending y.e common incision is
exaggerated: He continues to sustain Cases that were

wounded 20. years ago, & were attended wth. uncommon
Symptoms, now daily later Experience shews yt. the danger
does not attend yt. Operation — My Father treated 30. patients
by incision, or with Caustic, where the Incision was not
allow'd, & in none of them did the Symptoms rise to a degree
threatening Life, there was a considerable frequency of pulse
& swelling of yt. Cord, but not one patient lost his Life, & in
not one of the whole did the Cure fail to be radical. I have since
had occasion to see near 20. patients treated in the same
manner, & a No. of em myself. under my own direction &
since last year I have had 4. cases with Mr. Wood, yt. method
I wd. recommend upon the whole in this. — 1st. Let the palliative
method, yt. puncture be performd, 2dly. be averse in common
practice to the doing yt. Radical Operation with. having first
tapped yt. patient, because when the water returns yt. shews yt. yt.
Operation is necessary, & after the water is let out yt. Surgeon
can examine the State of the Testicle, & know if it be sound,
it may be said no matter it is sound or not, since if on
performing the operation, the sound affected, we can take it
away, but were we do so with. previously informing the
Patient of the necessity of it we wd. incur great Censure. —
Further as the Symptoms of Fever &c. are gen. ly in proportion
to the Size of the Sack, by tapping first we can proceed to the
Operation, before yt. Sack has acquird, yt. 3d part of its former
Bulk. — A Case I attended last winter was very instructive
A patient was sent into Town with a large Swelling in both
Sides of the Scrotum, wh. the Surgeon apprehended might be owing
to Schirrous Cancer, upon yt. right side yt. Tumor was some
what larger yn. yt. first, very hard, unequal, & yt. fluctuation
not at all to be distinguish'd, & it was apprehended that the
Testicle on this Side was in a Schirrous State, on yt. other side
the Tumor was near yt. size of both Fists, & a fluctuation cd. be
distinctly felt, but at yt. under & posterior part there was a sur-
=bous excrescence, discharging matter resembling that of a

uncertainty

Cancer, & was supposed to be the Cancer of the Testicle: The method agaud on was, first, that the water shd. be let out of ye. large Sack to lessen ye. pressure upon the Testicle by puncture The Testicle was not enlarg'd in its size, but the fungous Tumor adher'd to it, so we had apprehension of a cancerous disposition partic.r of the Epid.s ye. 10. days after we treated ye. right side in the same manner, agreeing w.th regard to ye. of the State of the Testis, &c.t (if there was water, and we cou'd now distinguish some fluctuation.) & the Testicle found we wo. be able to make a cure, by a simple Incision, &c.t if it was discard'd then wo. be a necessity of extirpating it: we found a great thickness of ye. Tegumento, a watery liquor mixt w.th blood in Cells, lining ye. vaginal Coat, as in an aneurismal Sack; as ye. head ye. fungous ulcer went off & it probably had been occasion'd by the rubbing of the Tumor against the Breeches. — After laying open ye. Sack as I have shewn, & ye. bleeding has entirely ceas'd, I have found it of consequ.ce to do what has been frequently & com.ly neglected, except by Pott, ye. we shd. apply a poultice, suppose ye. operation done in the morning, ye. before the pat.t is laid quiet at night, a poultice be apply'd, or if there is any Hemorhagy we delay it till next morning, the Patient being confin'd to absolute rest in a horizontal posture in bed; and kept on ye. Antiphlogistic Regimen, If these circumstances are attended to there will be no more seen in dwelling, than in the Cure of the Seton, when it produces one while the Seton makes a more unequal Impression, & may make a partial Cure: Ow can't discover the state of ye. Testicle whether there is a Hydrocarcele & beginning Schirrus in ye. Testicle, and may readily change it into a Cancer.

Lecture 90.th

Having explain'd ye. various species of Hydrocele, took the most common the Hydrocele of the Vaginal Coat, for an example & shew'd ye. manner of operating, & pursued ye.

Mamma

the Incision to any method, I said it down as a common rule y.t it wo.d be advisable to tap before y.e radical Operation But when y.e patient is convinced of y.e necessity of it, & the Tumor is not very large, y.e may be dispensed with, & the Surgeon having a furrow in the Trocar i.e. y.e Canula of it, may proceed directly to cut upon it, making both one opn.: In the Case of the preternatural encysted dropsy in y.e Cellul.: membrane between y.e Testicle & Ring of y.e muscles, as the Situation is uncertain, & y.e Spermatic Chord perhaps raised on the Anterior part of the Tumor, we proceed in operating w.th Caution, We examine y.e Chord by y.e feel w.th y.e strong light of a Candle, or w.th y.e Light of the Sun, let in thro' a small chink: & we make y.e Incision when y.e sack is thinnest first dividing y.e Skin y.t you may be the better able to judge of the Situation & in other respects y.e operation is y.e same as where y.e water is within y.e vaginal Coat of y.e swelling of y.e Chord too, & frequency of pulse much y.e same as in y.e operation generally from 80. to 90. in a Minute.

Sarcocele. or Schirrus of the Testicle; This seldom happens in consequence of a swell'd testicle from Gonorrhœa; w.ch is contrary to expectation, as these swellings when they are considerable & remain obstinate, might be expected at last to degenerate — It may be occasioned by an external injury; but more generally occurs with.t any evid.t cause; & commonly begins in y.e body of the Testicle, except when it proceeds from a Venereal Cause, & y.n y.e Epid.y & first swelling & y.e swelling is communicated backwards to the Testicle: This generally proves an obstinate disease, when from an external cause, I have known it yield to a long continued course of y.e mercurial pills; But we shall consider this Subject more particularly when we come to the general extirpation of Tumours, when we shall take y.e manner as an example, as most frequently requiring y.e Operation. In y.e mean time we say if a schirrus of the Testicle be small, & tolerably equal, y.e Patient feels no sharp pains, & is otherwise sound, before undertaking

the Operation, we ought to make a reasonable trial of 76
Medicines, as y^e Cicuta, or Mercury, for the Space of 2. or three
Months, but if the Tumor is large, Pedunculat, attended with
more pain y^n is occasion'd by its weight, & yet if Chord free
from the hardness, tho' perhaps somewhat enlarg'd we
ought to have recourse to the extirpation. Where y^e Tumor
is tolerably equal in its shape, a Surgeon is not too readily
from y^e fear to proceed on the Supposition y^t it may be
owing to water: & the first step sh^d be an Incision upon the
Tumor, as if it was owing to water contain'd in y^e vaginal
Coat, & is only to be carried farther on actually finding the
Testicle in a Schirrous state, & y^n make no addition of cutting,
only y^e Incision is begun in a diff^t place, over y^e Testicle, &
finding it to be schirrous, we carry y^e Incision upwards
along with y^e Chord, supposing we know y^e Testicle to be
Schirrous, we are not to be detain'd from doing y^e Operation
because y^e Chord is considerably enlarg'd in Size: for that
is a necessary consq^ce of y^e increas'd size of the Testicle, &
may take place tho' it be free from any cancerous disposi-
tion; so if there is no pain & least fear we may under-
take y^e Operation, only there will be a greater y^n common
discharge of Blood from y^e vessels of the Chord, as any branch
of the Spermatic Artery being now perhaps as big as the
Thumb is in a wounded person. — The method of performing
the Operation is very simple, unless y^e Skin be thick &
diseas'd, however great the size of the Tumor may be, it is
better not to seperate any portion of it, for it contracts very
readily, & if any consid^le part is remov'd; y^e Cicatrice tying
down y^e Skin is apt to straiten y^e other Testicle.
In like manner I said nothing of seperating any portion
of the Skin in y^e Hydrocele, where there is still less reason
to do it, for a principal use of the vaginal Coat is to allow
y^e Testicle to slide in: w^ch is of use to guard it ag^t Injury, &
now y^t it is depriv'd of y^t y^e Skin in some measure supplies
its place, so y^t it being loose after y^e Cure, is of real use to the

Patient. But if we find ye Skin adhering, if it is thickned and discolor'd & in a diseased State, we cut out ye by making two Incisions, one on each side ye part, but instead of making the Incision of an oval form, we bring both ends to a angle, ye first stroke is to divide ye Skin ye whole way from ye acing of the muscle to the bottom of the Tumor, & if ye Tumor is considerable ascending towards ye Ring, we begin about a finger breadth, above, above ye Ring, & by stretching the Chord, and feeling with ye finger, we are readily led to the beginning of ye Ring, I begin ye Incision with ye Skin being pinch'd up wch causes me to miss ye proper place, & am in no danger of wounding any thing underneath; nxt I continue the Incision downwards, to ye very bottom of the Tumor, nxt we divide ye Coll. Subst. a little, causing ye Cord distinctly in view, but it is not necessary to leave a great deal of flesh in seperating ye sides of the Cord, as we can raise it fully We nxt secure ye principal vessels of the Chord yt may Bleed: some have contrivd a Tourniquet, to be fix'd on the os pubis in ye Time of the oper: but it embarasses ye Surg: & is ready to shift its place according to the posture of the Body. We use a crook'd needle follow'd by a very large thread. We are directed to leave ye vas deferens, because the Ancients have call'd it a nerve, wch we can readily do, it running upon ye back of the Chord: But I generally find a consid: branch of an Artery running along it wch we thereby leave out, so we rather take it up, in passing ye Ligature behind ye Cord; now if ye Cord is small ye tying it in ye manner is ye easiest way of securing ye bleeding vessels during ye whole Ope, & it saves ye sticking of ye vessels; & it's not necessary to make ye Ligature very tight, wch may occasion pain & the swelling of the Chord, water collecting above ye Ligature in it Cells, because ye vessels are too much bruis'd, & we make a second knot yt we can slack or at pleasure. — The nxt of the operation is a simple piece of dissection, wch is readily done provided the Surgeon be

tolerably assisted, we must cut the Gland without dissecting
the Testicle before we venture to cut it, w.ch we may safely do, y.
principal vessels being already secured, we divide it a finger
breadth above beneath the Ligature, that y.e Gland may not
shrink too much, & pulling down y.e Tumor, we cut y.e Cellular
Substance whereon we meet with resistance, the Assistant
drawing the Skin at y.e side of y.e Tumor — If we find any con=
=siderable vessels bleed, instead of y.e assistant pulling his
finger upon it to stop it till y.e operation is over, we immediately tie
it, there on acct of y.e loose Cellular Substance, it is easy to take
out any of y.e vessels with a small pair of Forceps. Whereas if
we delay y.e tying y.e bleeding ends y.e orifice & the patient grows
faint, we y.e y.e bleeding ceases, but in an hour or two y.e vessels
break out with violence & y.e patient may lose a considerable
Quantity of Blood & y.e dressings must be changed. —
We must lay a little dry Lint within y.e wound, without
replacing y.e sides of the Skin, w.ch are ready to join and an
Abscess to form beneath; but after we have seen y.e Cavity
filled up w.th granulating flesh we then heal the Skin. —
Next I shall enquire y.e y.e Gland is very large, & y.e we can
either not grasp the vessels sufficiently by tying y.e whole,
or if we can do that, y.e we compress y.e vessels in such a man=
=ner & the nerves as to produce a violent Inflam.n In y.e Case
the manner of using the Ligature may be different. —
We consider it as a Tourniquet, & make upon it a running
knot only, & after y.e dissection is finished we untie it,
but leave it & take up the branches y.e bleedingly, & we
will generally find two or 3. branches y.e need to be tied: for
two principal ones run to the Testicle & to y.e Epididimis,
we draw 'em out with y.e forceps, a Tenaculum & tie 'em
or if we cant readily say hold of y.e mouth of the bleeding, we carry
a small crooked needle around y.e mouth of it in y.e common
way, But we leave y.e end till y.e first dressing y.e in case a
Branch has been omitted, or y.e y.e Ligature slips, y.e bleeding

may be prevented. — Having explained these operations
at we next proceed to consider — Hernia. improperly so
called Ruptures. — We might define a Hernia a dis-
location of the Bowels, & the Abdominal Bowels are y.most
subject to the Complaint, from the nature of the containing
parts as well as from y. mobility & slipperiness of y. contained
A Hernia may happen in a variety of diff.t places: whenever
large Chinks or defects or movements into y.seat of the
Cavity of the Abdomen, they carry along with 'em a quantity
of loose Cellular Substance, to allow of their free play &
motion, in y. diff.t postures of the body, so the Bowels may
be pushd upwards along the Oesophagus, or along y. Vena
or Venal Cava into y. Thorax, Instances of y.t are to be
met with, but they can.t easily be distinguish'd from out of
the reach of an Operation. — Next Hernia may happen
any where in the sides of the Abdomen, especially where y.
Bellies of y. musculi transversalis are situated, & y. muscular
fibres having a close connexion, so as to allow of their ready
motion, & y. peritoneum may be thrust out between the
Interstices of the muscular fibres — nay they may occur in
y. Tendons of the muscles, as dissecting a body some years
ago I found a Sack in y. middle of the Linea Alba.
At the Lower part of the pubis, we can suppose a Hernia to
occur when y. Sciatic nerve goes out, & we have a Hernia
Ischiadic when y. bowels slipped behind, or they may push
thro' the Foramen Ischiadicum, of wch we have a No. of examples
in y. memoirs of the French Academy of Surgeons & in
one or two Cases the Operation was performed.
But the most common places, are y. rings of the muscles
of the Abdomen, where y. Spermatic Cord passes, & y. round
Ligam.t in y. female, or behind y.t ring at y. lower edge of
the external oblique when y. viscera pass down to the
Thigh: hence arise not only an Inguinal Hernia, but
but a femoral one, close on y. Top of the Thigh; & thod-

or what is nam'd the Crural; a third Species remains the Umbilical ——— Now of these 3 kinds the Inguinal Hernia, meaning the Annular, y.ª one that's y.ª Ring is more frequent than y.ª umbilical, crural, or Femoral, & the Two last more frequent y.n y.ª umbilical — Next if we are to compare the two Sexes, it is found y.t in y.ª male y.ª Inguinal Hernia happens more frequently, y.n in the female, as the Spermatic Chord is large & the Cellul. Subst.ce looser than the round Ligament, But the Crural also frequently as y.ª Tendon of the external obliquus longe Aponeur in y.ª Female, from y.ª Laxity of the pubis, as y.ª bowels more readily pressing down & pushing out before. ———

The Inguinal & Femoral Hernia are not only more frequ.t y.n the Umbilical, but more frequ.ly acquire y.ª operation, as y.ª Umbilical Hernia from y.ª hardness of y.ª ring frequently contracts adhesions w.ch make it more dangerous to attempt an operation, nay I am readily determined y.ª Bowels y.t will most readily fall out, y.n the Turns of y.ª Intestinum Ileum, y.ª mesentery long shining as we go downwards, & y.t besides y.ª end of y.ª Ileum being nearer to y.ª ring, y.ª mesentery is longer; next y.t the Omentum may be forced down with the Intestine, & we are led to another circumstance y.t y.ª omentum may carry along with it y.ª large Hepatic Arch of the Colon, also the great sack of the Colon may readily fall down, y.n y.ª weight of y.ª Faeces pushing it gradually lower down, bringing it nearer to y.ª rings of the muscles, as life advances, so that elderly people are particularly subject to this Complaint. The name of Rupture implies y.t y.ª Intestinum is burst.d it is possible accid.y but it is generally found entire, there is indeed some difficulty in determining if it is always entire as y.ª Bowels may fall into y.ª Cellul.r Subst.ce continued from y.ª Intestinum, w.ch puts on the appearance of a sack — We are in danger of confounding Hernia w.th Hydrocele, or Sarcocele, or with some swelling in y.ª Spermatic Chord.

Declination

But in the Hernia the Tumor comes on suddenly,
from some violence, y.e patient has felt an uneasiness, it
is moveable in changing the Situation, & we find it leading
downwards from the Ring along the Chord; y.e it is fixed by a
supervening Inflam.n y.e Surgeon cries to judges by the feel, wch
is diff.t from y.e hardness & inequality of a Schirrus Testicle, as
also from the smoothness & Tension, in the Hydrocele, there is
a pain in y.e Alimentary Canal, y.e pat.t is sick, has an Inclination
to vomit, is faint, has a degree of fever: we can further distin-
guish whether y.e swelling knowing to the Alimentary Canal or
Omentum: the Alimentary Canal has a greater Tension, &
we can distinguish the Tumor of the Air, shifting from one
part to another: when it is the Omentum, we feel an unequal
soft mass, & here it is not so necessary to have immediate re-
course to y.e Operation, nor is there such danger from wounding
the Omentum, so y.e Surgeon may proceed with Confidence:
If the disease is owing to accid.t we endeavour to replace them
as quickly as possible & are not to delay till we have perhaps
bled y.e patient, applyd fomentations &c. to prevent y.e Inflam.n
We put the body in a proper posture, laying it horizontally, &
raising the Thighs a little to relax the parts, y.n the Surgeon
applies his hand to the Tumor, & works with his fingers till he
perhaps gets the part wch came out last reduced, & continuing y.e
pressure y.e rest follows: & repeated gentle efforts will sometimes
succeed when a stronger push will be found to fail, & y.e not
succeed, we might vary the situation of the body, & make y.e pelvis
the highest part of the Abdomen, y.e y.e weight of the Bowels
may draw the part in: tho' an abdomen is full with Air, y.e
weight of the Bowels will not have the same effect, as in a
dead body & we may further attempt to shake & agitate y.e body.
Let a strong person take the legs of y.e patient over his shoulder
with his face to his back, & raising himself suddenly give

a sufficient check to the patients body. If these attempts fail we have recourse to y^e Antiseptick method, we V.S. freely placing y^e patient in a sitting posture, opening y^e vein largely, & slacking the Ligature quickly, in short taking any measure to bring on a faint, & when this is done we repeat all our former measures, when y^e pressure of the Abdominal muscles & Diaphragm is in a great measure taken off as also the Spasmodic affection of the Intestines — 2^d. we still fail we may have recourse to fomentations, these have been supposed to acrify the Bile — On the contrary y^e applic^n of Ice has been recommended — But such applic^ns are highly dangerous as they increase y^e Inflam^n &c. Dr. Hales has found y^e fomentations or y^e warm bath, don't acrify y^e fluids more y^n they are acrified by the Heat of the body above 1/8. part, so we apply warm substances particularly the warm bath: 3^d. These still fail we endeavour to promote the gen^l motion of the Bowels by giving a brisk purgative as Calomel & Jallap, or by bringing on that kind of motion by an Injection & I have known y^e prove effectual when a variety of other measures had failed.

Many have allegd y^e convd^g effects have been obtained by throwing in y^e smoke of Tobacco; tho' I have not seen any remarkable effects from it, & the irritation of it is not so great as might be supposed — But as y^e has been much talkd of I have contrivd an Apparatus for it. It consists of a Box in w^ch the Tobacco is to be fixd, with a double stop Cock, with one entry w^ch is fitted to the Box, & two outlets, to one of w^ch is fixd a long flexible pipe, with a large Injection pipe at y^e end of it, & to the other there is fixd a Syringe, so as a smoke in this way get out to the room a head may be fitted to y^e Box y^e stop Cock & flexible pipe fitted to it, & the Syringe fitted to y^e other end of the Box, & y^e Syringe & pipe may be used for a person giving himself an Injection w^ch is a practice much usd in France, & they have a more convenient machine w^ch I shew you for that purpose.

Lecture 91st

From last meeting I endeavoured to explain, 1st. place where Hernia will be generally found 2d. manner of distinguishing the disease 3d manner of treatment for reducing 1st. Bowels & preventing Inflam.n there being withheld to 2nd a Strangulation 1st the Surg.n proceeds to an operation & 1st Time perfor for doing it can't be exactly ascertained, as it must vary according to the nature of the Accd. the quantity of the Bowels, the kind of there 1st Constitution of the patient and the Symptoms: they will continue sometimes for several days with.t any degree of mortification taking place while at other Times a mortification will supervene in less than 24. hours: But upon the whole the French who performed the Oper.n more 1st are generally do, are more successful 1st in operating perfection, & 1st 1st management of 1st operation affords wd. occasion — For shewing 1st diff.t Steps of the Operation we shall choose the Inguinal Hernia for a general example: the pat.t is laid Horizontally, 1st shoulders a little raised, & 1st knees, & supported by an assistant, by wch. we relax the parts somewhat. the Surgeon places himself before the patient between his knees; He makes an Incision with 1st convex dissecting Scalpel, with a light wooden handle, first cutting 1st Integuments from a little above the ring to the bottom of 1st Tumor without raising 1st Skin double, then cutting 1st Cellular Substance we bring in view 1st membrane containing 1st bowels, viz. the Peritonæum pushed outwards, so far as dissection goes the peritonæum has been found constantly double & 1st dilatation readily takes place here, as 1st peritonæum is more loose at this place 1st in any other in order to allow of 1st free distention of the Viscera Herniaria; If the disease is of long standing we find 1st appearance of a double sack, 1st Cellular Substance being condensed on 1st outside, or with.t making 1st distinction of two sacks, 1st Sack will be a great deal thicker 1st when it is recent. This being laid in view Surgeons agree 1st 1st next step ought to be the cutting into 1st sack: but as 1st admission of 1st air

into the Cavity of the Abdomen is attended with gt. danger unless a consid. portion of y. omentum is pushed down into w.th y. Bowels and twisted on, as y.t we perceive a quantity of dark colord water of a fœtid smell, unless there is a fluctuation, or reason to believe y.t if. bowels are already mortify.d, if y. case is recent it is better to relieve y. strangulation by cutting y. Ring; y. further y.t as y. very neck of y. Hernial Sack is apt to thicken, & make a Ring around y. Intestine, we scratch w.th y. Knife upon y. neck of y. sack till y. ring is broke with.t going into y. Intestine & then we make an attempt to reduce y. Intestine with.t y. sack w.ch before y. disease has continued 48. hours gen.ly draws gently to the neighbouring parts, working on in piecemeal The best Instrum.t is y.t recommended by Pott & y. common knife with a blunt back & point, or rather we use y. straight Knife with y. blunt point, & are guided by fingers introduced into y. Ring — But suppose water collected & we must make an opening into y. sack with y. common scalpel, that is not sufficiently cautious here, trusting to y. Quantity of water, for tells us y.t we may make y. Incision, with little danger, but in y. horizontal situation y. water being heaviest by y. Intestine will readily be at y. fore part, & it is very difficult to open the Sack without wounding the Intestine, now we are to make a slight scratch only till we make y. sack as thin as a piece of Gold beaters leaf, & y.n introducing a probe we make a slit upon it so as to introduce y. point of y. fore finger, & using y. direction we lay the Sack open, first cutting in one direction & y.n in another — I have shewn on preparation, where y. case of Omentum was found at y. anterior part of the Sack, w.ch tho' it is a very rare occurrence may happen, as y. testes may be turned forwards, we ought therefore to examine before we make y. Incision, & we can distinguish y. Blood vessels by y. bulk & color; & y. case of Omentum by y. feel, after y. Spermatic Cord comes out, & hangs loose, y. Bowels may alter their situation & be pushed down behind y. Cord, & suppose y.t that the

whole of y^e^ sack is laid open with safety and ease), Jan^y^ 1st
not to suppose y^t^ y^e^ sack is small, & y^t^ y^e^ Bowels of course
are highly irritated, & an inflam^n^ produced w^ch^ thickens the
Coats & produces at y^e^ same time a degree of adhesion
of y^e^ bowels, or Epiploon of y^e^ after y^e^ Surgeon has laid y^e^ sack
bare, instead of a pellucid membrane resembling y^e^ natural
peritoneum there is an opaque substance thro' w^ch^ we can
discover severall turns of y^e^ Intestine adhering to the sack:
very in making an Incision thro' y^e^ sack we are every moment
in danger of plunging into y^e^ Cavity of y^e^ Intestine, for y^e^
sack in May be 1/8. Inch thick, it is very difficult to distinguish
y^e^ one from y^e^ other: In y^e^ case it will be useful to make
an Incision into y^e^ Cavity of y^e^ Abdomen above & into =
=ducing y^e^ probe between y^e^ sack & Intestine we cut upon
y^e^ point of it, so get into y^e^ Cavity of y^e^ hernial sack
with^t^ wounding the Intestine — But to return to y^e^ most
common Case, when y^e^ sack is laid open w^th^ ease, we must
consider y^e^ proper Treatment of y^e^ bowels, & afterwards of
the stricture. — If im^t^ after opening y^e^ sack y^e^ Surg^n^ shall
dilate y^e^ ring & y^e^ bowels might fall back into y^e^ Cavity of
y^e^ Abdomen in an improper state, we first examine the
Bowels folding out y^e^ Omentum, & handling it tenderly w^th^
our fingers dipt in Oil, also y^e^ Colon & Convolutions, y^t^ it is
not mortified, & does not entangle any part of y^e^ Intestine.
Suppose it is mortified, till of late Years, it has been a com
=mon practice, from y^e^ fear of bringing on a dangerous Hem
=orrhagy, to make Ligatures upon y^e^ Omentum, & to cut it;
But y^s^ draws y^e^ omentum together, & is in danger of producing
diseases; for tho' y^e^ Omentum resembles y^e^ substances
Call^d^ Substance, w^ch^ possesses no very high degree of sensibility;
Yet we conclude y^t^ wounds in it are not dangerous, gather
from Analogy y^e^ experim^ts^ One or two persons prevailed on
M^r^ Cheselden to relieve them of a vast load of Omentum
tho' there was no discovering it, y^e^ pat^t^ died after y^e^ operation
I do not mean to conclude y^t^ y^e^ danger was entirely owing to
the rude management of the Omentum, but it might proceed

from y.t in a great measure, Hernia ex omento shew y.t a great part of y. Omentum may be cut off, without even taking up y. principal vessels, Celsus imitated those who recommend making an Incision in y. round part; It is only supply'd with an innate branches from y. Gastric Arteries, & if y. Incision is made near y. edge of y. vessels are very minute, & y. bleeding very inconsid.ble we may allow y. vessels to remain exposed to y. air a few minutes, wh. contributes greatly to y. coagulation of y. blood. — We must examine y. Intestine, see y.t there is no adhesion or strangulation if there are slight adhesions to y. parietes portions of y. sack we may remove them making it a rule to encroach upon y. sack as there is no danger from cutting off wh. y. Intestine a thin layer of y. Sack, if y. Gut appears mortified we are directed to retain it in y. sack, as proving fatal if it is reduced, but we must have y. clearest proof of mortification before we leave it, this prudent Surg.n in such circumstances will begin y. operation, as when there is evident blackness, a Separation of one Skin from another an Emphysema from Air, generated in conseq.ce of putrefaction instead of retaining y. Gut in y. sack, we ought certainly to replace it, as the chance of recovery is from the gut recovering its situation y. natural warmth of y. Abdomen & exclusion from y. Air, so as y. only chance is from y. a replaced y. Gut, we ought to make it a gen.l rule to reduce unless it is evidently mortified — If however y. adhesions are convid.ble y. Surg.n must leave it in the sack, but were in such a case y. Surg.n shd. attempt to reduce it, & it will not be necessary to open any turn of y. Intestine from its adhesion; there is no reason why Intestine adhering shd. not perform their office better within y. Abdomen y.n with it, so if we can detach y. outer part of y. Intestine from the Sack, separating portions of y. Sack, we do it to replace the whole mass, with.t attempting to disjoin the several turns

And we are only to leave the Intestine where y^e Adhesion is so consid^ble y^t y^e Surg^n can't with safety attempt the Seperation where y^e parts are evidently mortify'd, & have an Opening into the Cavity; in this Case y^e introduction of y^e mortify'd portion wd be attended with fatal Symptoms, Supposeing y^e Surg^n finds it advisable to attempt y^e Reduction, we are next to free the Ring from y^e stricture, Various Instruments have been proposed for doing y^t The French use the Bistouri Cache: Le Dran proposes a Bellied Instrum^t having y^e point of the Knife Edged in a Sheath w^ch is introduced as a blunt probe Some again propose the Scissaws. But all these are to be set aside in preference to the finger & y^e straight knife, w^ch I shall shew to the Convexe, as there is too much space between the edge of y^e Knife and Sack, wherein the Intestine may fall in between em. We make y^e dilatation upwards, a little outwards whereby we divide fewer of the Tendinous fibres, & prevent y^e Sack from w^ch the Bowels had descended, directing y^e Edge of the Knife halfway between y^e pubis & the anterior Spina Ilia, and before we introduce y^e bowels, we ought to examine y^e ring, y^t the Opening be perfectly free, into the Cavity of y^e Abdomen, lest y^e opposite side of the Ring have contracted Adhesions, & y^e Surg^n reduce y^e Intestine at the opposite side of the ring, so that the Adhesion comes to strangulate y^e Intestine: we have an Instance of y^t in the memoirs of the Academy of Surgery.

I shall shew the manner of managing y^e Navel in opening y^e Intestine in ascites & shall come to explain the Gastronaphia.

I have not objected to the common rule of cutting y^e Ring with y^e Knife, at y^e same Time it is evid^t y^t this is seldom necessary, for having opened the Sack we introduce y^e Bowels piece meal, & the Opening is seldom so small but y^t every part can be reduced. But tho' it may be alledg'd, y^t by slackening y^e parts, the patient will be more subject to a return of the Disease yet on the whole y^e danger of this, is not so great, because in consequence of the Incision granulating flesh is produced, w^ch in a great measure fills up the Herniary sack, & supports it against its descent, it is less in danger of being strangulated.

So after we have examin'd the Bowels, & w.ch dividing y.e
Ring and there is no danger attending y.e making the Incision
freely, or of wounding y.e Vas deferens or Spermatic Vessels as has been alle-
ag'd ——— We do so in a slight manner, the Frenchmen have
Now told by Dr Verschuir y.t he saw y.e operation done on
18. different patients not one of w.ch recover'd y.t it was
done early. — Their management was invariably this:
They ordered a Clyst by way of a Balsamic medicine: dipt in
some resinous substance, y.e point of it was then thrust in
y.e Cavity of the Abdomen, & confin'd there by a Bandage
now if we were to make an opening in y.e belly of a wound
Animal, & introduce such a substance we sh. generally
kill y.e Animal. ——— We draw together y.e Skin with one or
two stitches to support y.e Tegumente in y.e preternatu-
-ral position, & to exclude the Air: if there are any parts to be dis-
-charg'd we make y.e stitches very loose, including only y.e
Tegumente. We then lay some dry Lint over y.e wound,
& this is cover'd w.th a compress. — The British Chirurgical me-
-thod is highly necessary when the Bowels are inflam'd,
& must be still more so here, where y.e part is out of
y.e natural place, after y.e wound is heal'd, as the parts
are loose, it will be proper to apply a Truss. ———
Almost every circumstance as taking to y.e Species, applies to
The Crural Hernia. We need only to be instructed in the
manner of varying the Incision. In this former when y.e Ingui-
-nal Glands are swell'd, a Bubo may be mistaken for a Hernia,
and what is worse a Hernia for a Bubo, & fatal having much
y.e same. But from y.e sickness, pain, constipation, vomiting
& the accid.t producing it we commonly make y.e distinction
& Dare, afraid of wounding y.e Epigastric Artery, coming
off from y.e femoral Artery, direct to make y.e Incision in-
-wards. — Start again, afraid of cutting the Spermatic
Chord, direct to make it outwards, towards the Spinal
process of the Os Ilium; as we can take up the Artery w.th
the needle. — But as it comes from so large a Trunk w.ch
Blood might be lost, and to avoid both, we cut perpend

ilar to the Incision of the external oblique, only we do not make a large Incision, but introduce y^e^ Knife betwixt the Tendon, & cut with it like a Saw, working backwards & forwards till we find y^e^ recti tendines taken off. The 3. common species of Hernia is y^e^ Umbilical — Is from y^e^ great thickness of the Tendon of y^e^ Linea alba yields slowly, & y^e^ divarications slowly, so y^e^ Coats of y^e^ Intestine are not apt to contract Adhesions, we generally can do more y^n^ take off y^e^ prepuce without attempting to reduce y^e^ Intestine, & as there is no evident new a Delay in the way, y^e^ only aim is to make the Incision where we best can with y^e^ greatest Ease & safety, so as to shun the opposite side of the Tumor. —

In order to explain something in the Hernia Ventralis supposes a wound made into the Abdomen.

The Gastroraphia. — A Wound of this sort will be more frequent with the Ancients, who used chiefly to be wounded in the Belly, suppose a portion of the small & great Guts, Caul &c. the Omentum without y^e^ Abdomen, & in some measure strangulated by the Lips of the wound partly from y^e^ skin distending them, & partly from an Inflammation about the wound. We cut in the round part of y^e^ Omentum, examine y^e^ several turns of the Intestines. Suppose y^e^ no part is discolord, but y^t^ it is proper to attempt y^e^ reduction, & have said y^t^ an Incision of y^e^ mouth of the Sack is not necessary on any occasion, & that y^e^ Surg^n^ may frequently introduce y^e^ hand &c without making any opening into y^e^ Abdomen introducing 'em piece meal with the point of the fingers dipt in oil, & beginning with y^e^ portion y^t^ fell out last. Next suppose y^t^ y^e^ Gut is wounded, it may be in two ways longitudinal or transverse; In either way; or suppose y^e^ portion mortified, it is said y^t^ not one person of 100. will recover, But if there is any chance as one to 1000 it is worth while to study y^e^ most probable method of Cure. — If a wound is longitudinal he Does not propose to introduce a N^o^ of threads at a small distance & then twist 'em together. But for y^e^ reasons formerly given uses three of Glover stitches making the wounds stitches nearly a quarter of an Inch distance

from one another, We then replace y^e Intestine but keep this portion at y^e wound of the containing parts by passing y^e needle thro' y^e skin, to give y^e chance of the Intestine growing to the wound: & after the space of a week or two we draw out y^e thread w^ch is easily done, Suppose the wound transverse; or w^ch is the same thing, y^t a mortified piece has fallen out, it is recommended to keep y^e appearance of the gut in the wound, y^t the faculent matter may be discharg^d at the wound, & in this situation some surgeons have carried for several years Some have recommended y^t instead of this we shd attempt to join y^e two ends of the Intestine to each other, & for y^e purpose they introduce a bit of Trachea, of some Animal perhaps, w^ch acts in a short time, & in y^e mean time the turns of the Intestine adhere, But we can readily draw one part of the Intestine within y^e other, first we ascertain the end next to the Stomach, by giving the patient some liquid Aliment, & observing where it is discharg^d, next we take y^e undermost end, & w^th a common needle & thread, enter the thread from y^e outside to the inside, y^n we put our finger into y^e other end of y^e Intestine, entering y^e needle from within outwards, & applying y^t to the other portion, & can draw the one within y^e other: & supposing Gangrene made in y^e circumference of the Intestine, we apply an accurately fit in some few Instances, the ends have been found to form a new growth, & y^e patient to recover.

Lecture 22^nd.

Having explained the treatment in the Gastrorraphia, it only remains y^t we determine y^e kind of suture y^t may be proper: Authors for y^e most part have recommended y^e Quilt or Jag suture; But if y^e Bowels have not been wounded, & y^e is no matter y^t needs a discharge, we had better use y^e common interrupted suture with y^e Jag, cautiously avoiding y^e entering y^e needle within y^e Abdomen, not merely but we wound the Bowels but to prevent y^e needle & thread from irritating the peritoneum: we introduce y^e needle from within outwards thro' y^e Skin & muscles, & perhaps we may be enstructed in y^e Suture of y^e Integuments: entering y^e thread near to each other

than is commonly directed, for if they are scaped at an inch (1662
distance some turns of the Intestine will protrude in the strangul=
=ated & the cause of death: but we make the Glovers stitch pretty
close: & rather we have a number of threads, left any should be
open or acquire an alteration, wch we may have it in our power
to alter if just with=drawing the whole, & place ye point of ye
needle upon ye point of my finger, in order to defend it, and
pressing back ye bowels with ye other hand, I bring out ye needle
at a moderate distance from ye side of the wound: & I pass all
ye needles in ye way before I begin to tie them, at ye bend of
one of my fingers, wch I pull ye sides together & make a common
knot — But if ye Intestine have been wounded, or ye portion
of the Omentum have been cut away, & there is any discharge
of blood from ye Abdomen, we may extend ye lips of ye wound
with ye forceps vulsella: & leave a small portion open at ye bottom
some have recommended wch we do not only omit a part of ye Suture
but introduce a tent partly to keep ye bowels from getting out
& partly to prevent any concretion of the sides: but as ye vulsel.
may prove hurtful, I wd. trust to a compress of lint wet=
=ted: & there is no great danger of protrusion, because from
ye wound of ye Intestine it will subside greatly — But if after
ye Operation we are to treat a Herniary Sack, we make the
stitches but loose; because ye principal wound being under
the Ring, the Intestine is not so readily thrust out, as when
the Wound is directly into the Cavity of the Abdomen, besides
if we meant to fill up the Herniary Sack in ye process of the
Cure, a granulation forms from ye sides of it, and closes to=
=gether the opposite sides, & so draws ye Tegumenta closer
might disappoint nature in her process, & wd. not leave room
for ye discharge of purulent matter, over ye Suture we apply a
Compress, & secure all with ye T. Bandage.

The next disease I shall treat of is the — Fistula Ani.
By wch Surgeons understand not always, a sinuous ulcer
with callous edges, communicating wth the Cavity of the

Intestinum Rectum, but in a vague way they comprehend all Abscesses or collections of matter about the Extremity of the Intest. Rectum, altho' y.e abscess can't be found to have any communication w.th y.e Cavity of y.e Gut, this wid.s not y.e Contents of the Rectum, y.e unequal distention of y.e bowel, costiveness, accidents of various kinds from Situation &c. where it is a remarkable way to inflam.n & consequently suppur.n the suppur.n evidently forms in the common Cellular Substance, & from y.e remarkable thickness of the Integum.ts about y.e Anus, partly natur.l partly occasioned by pressure, y.e matter readily spreads, especially y.t the Cellular membrane is very loose, has a vast quantity of Adipose follicles connected w.th the Cellular membrane, so it ought to be acute in Surgery y.t as soon as we discover y.e formation of matter in y.e place, we ought to give it a discharge by an Incision. We are directed to the place by y.e pain y.e patient feels on pressure, & from y.e hardness, or redness, if it is on one side of the Gut, in one of the Buttocks y.e patient feels a throbbing pain w.ch is increas'd by pressure on the Integuments, & when y.e finger is introduced within y.e Rectum especially if the Surgeon discovers hardness he ought to make an Incision on the hard part for the matter spreading in the Cellular Substance irritates the Rectum & very often has made its way into it long before there is any ravion of y.e Integuments, for y.e Incision is hardly taken off, y.e Inflam.n subsides, and y.e Integuments are indolently, & y.e Intestine now having y.e matter apply.d to both sides of its Coats, comes to partake of y.e disease to a very consid.le extent. — For y.e most part of the Rectum is indeed a little higher y.n y.e Edge of the Sphincter, for above y.t y.e Cell.r Subst.ce is lower & from y.e next Situation the matter falls down on y.e part on y.e outside, & supply.

y.t y.e disease begins from within from added matter in y.
Alimentary Canal, y.e Contraction of the Sphincter collects
y.e matter chiefly at y.e upper side: so y.e communication is
gen.ly abt an Inch, or at most and Inch and a half from
y.e edge of the Gut: there are however in many instances where y.e
motion goes much higher: when y.e external Tegumentes
are affected for y.e most part these give way in one partic.r
Spot, but in other Cases we find two or more Lateral Fis-
tula, yet all of these communicate with a single hole of the
Intestine, just as Rabe.d of y.e Fistula in perinæo. —
Medicines of whatever nature have little effect inwardly
, whilst there is a want of a free discharge in y.e most fav-
ourable direction at the bottom, if y.t is given, sometimes
y.e Fistula heal up spontaneously, or when medicines
of no avail are given, an Abscess of Rectum forms: but if y.e
Intestine is eroded & communic.s into its Cavity, in 19. Cases
of 20. y.e fistula remains, & is very inconvenient to y.e patt.
& very often matter begins to collect again afresh inflam.
is excited, & y.e matter extends along y.e Cellul. membrane;
while y.e Tegum.ts contracting below prev.t y.e freedom of the
discharge so upon y.e whole I have no doubt y.t after y.e disease
is fairly established, we ought to proceed to the Cure by a single
Operation, especially as an Incision of the fistula along
with it of the Intestine. Rect. near to its extremity, is not difficult
to execute, nor highly dangerous, nay y.e incision heals
nearly as readily here as in any other part of the body, of
equal length, & depth. I find that I have long neg-
lected in a bad habit of Body, y.e matter has spread upwards,
is very fetid &c. even after an Incision has been made, & can
by no means be expected by any operation y.e patient
can be cured, y.e probability is rather y.t he will sink under
y.e discharge. But even in these Circumstances I have
seen several Instances where, y.e free discharge made y.e
patient better for some time: for examining the patient

we use a common probe, having laid y^e patient much
in y^e posture of y^e subject, with the legs drawn a little
asunder, y^e probe is introduced straight, as if y^e direction
of the fistula require it, somewhat bended, & while y^e probe
is introduced we ought at y^e same time to have a finger
within y^e gut w^ch guides y^e Instrum^t & prevents any
mistake, for y^e point of the probe may enter into y^e cellular
substance upwards, & y^e Surgeon may imagine y^e fistula
long when it is very short: If it makes no way then we
can't follow it with a probe, or determine whether there is
one or more communications between y^e Fistula & Rectum
In y^e fistula of the groin down, y^e disease beginning in
y^e urethra, & extending outw^ds we are almost certain y^t
there is only one hole: but it is otherwise in y^e Anus:
So by injecting a little milk, or blowing in at y^e fistula
some Air, we trace all y^e communications, and we may
distinguish from y^e feel y^e coats of the Gut growing hard
at y^e opening, Altho' it is not larger y^n to allow a probe to
enter, we can distinguish it by y^e hardness around y^e
hollow in y^e middle y^e flesh of the finger sinking in —
If we find y^t y^e probe & injected liquors, dont pass into the
Intestine, I can see no reason for making y^e incomplete Fistula
a complete one by making an opening into the Gut: In w^ch
Instances where y^e opening has not been traced, Surgeons
have made an Incision beneath, & have told in y^e Cure;
we have been under a necessity of making an Incision into
the Coat of the Gut: so they have laid it down as a general
rule to do this: If the Coat of the Gut is diseased it must be
included: but if it is sound we do no more y^n make a large
Incision in y^e Integuments, to see if nature is disposed to fill
up the Abscess & fistula from y^e bottom, w^th shows y^e extent of
the fistula known there are two methods of treating it —
One recommended on the Authority of Le Dran, and in w^ch
he has been usually copied without the propriety of the
method being at all considered

He advises that

The whole diseased portion is to be extirpated, ye. we are to extirpate ye. fistula & ye. Bottom of the Gut along with it: to do ye. he takes a piece of Silver ye. is very flexible, & sharp pointed, he enters this by the fistula, to ye. opposite part of it, so if the sharp point catches ye. parts he introduces a common dissecting: The professed end of the probe upon this into ye. cavity of the Gut higher ye. ye. opening, ye. he may include ye. whole Circle of the hole, ye. cuts ye. Gut all round, having done this, he catches hold of the end of it with his fingers introduced into the Rectum, & brings it out at ye. Anus, ye. holding the two extremities of the probe, with ye. knife he cuts it & extirpates the whole, now this is a most unnecessary, cruel & dangerous Operation; & proceeded not on practice but theory, and on a theory wch. is now proved to be false: Then is here the danger of wounding a number of vessels, ye. bad effects from a straitening of the Gut, in stopping ye. feculent matter &. and no person will insist on its being necessary: If we can shew ye. Le Dran was mistaken in ye. the only laying open ye. fistula wo. not prove a Cure. He thought ye. edges were callous, & ye. there was something ye. wo. not granulate: & therefore ye. if ye. Incision was not allowed, Escharotics wo. be necessary in order to destroy the callus: But in most cases it is found in practice, in all cases indeed where a Cure in any way is to be expected, ye. ye. dividing open the Fistula along with ye. Gut, so as to throw 'em into one general Opening is sufficient. — So do ye. if ye. opening be near to the Sphincter of ye. Anus we use a Kid Cistory for cutting it open or we may use Le Dran's Instrument for dilating rings in Hernia &. as wch. is rarior we employ a knife with a Button, or a Knife recommended by Scott, who invented an ye. simple Incision being sufficient: & you'll find an Instrument described by Heister still more convenient, ye. probe-pointed, we enter the probe point from without inwds. or from within outwds. according to ye. direction & nature of ye. opening. If there is a considerable Abscess ye. first step is to open ye. & introduce ye. probe into it, ye. Surgeon

1766

introducing the finger into y^e Anus to take hold of y^e point of y^e probe, & draw it out, he must then make y^e Incision, making only one, & as many stitches as is necessary: But if y^e fistula is deeper, we take a straight knife with a probe point & guide it thro' y^e fistula w^th y^e common direction into y^e Gut, to prevent y^e wounding of the opposite side of the Gut, we may introduce a bit of wood hollow'd, & put upon it, as in y^e case of the Gorget, but y^e wood does not blunt y^e point so much. — But tho' we can thus make y^e Incision higher, I wo^d not venture to go very high, as 4. or 5. Inches, as towards the posterior part we are in danger of wounding y^e large Arteries y^t come from y^e inferior mesenterick, whereby we may occasion a dangerous Hemorrhagy. so we wo^d make y^e oper^n by giving a prudish large below, & opening as far as can be done with safety to y^e Sinus upwards, & the rest may perhaps heal afterwards. Having made y^e proper Incision we dress slightly, there is a particular method in dressing necessary: if we were merely to lay on y^e Dressing a piece of Lint, y^e purulent matter wo^d get into it again we cram y^e wound too much, we prevent the Granulation, give pain, & y^e patient becomes feverish. If y^e Sinus runs high it is necessary to prevent y^e sides of the wound from meeting together, & at y^e same time to hinder y^e purulent matter from entering between y^e dressing & the wound, by laying Lint at y^e bottom of the wound, then roll upon y^e putting it in softly with y^e finger. The patient's belly is to be kept in a middle state, if a Diarrhoea is brought on it must be check'd by Opium; if costive it is proper to procure one motion of the Belly every day by giving a gentle Laxative as Lenitive Electuary. & when y^e disease does not reach more y^n an Inch above y^e Sphincter, we will complete y^e Cure in y^e space of a Month or thereabouts in large Abscesses we must give time in proportion. — Next shall mention y^e Treatment when y^e natural passages are impervious or wrong directed. We have instances where all y^e passages have been shut not excepting y^e mouth, which is a proof y^t we can be nourish'd

with[t] swallowing. We meet with y[e] Hymen so compleate & entire as to close the Orifice of y[e] vagina, instead of being dispos[d] upon y[e] edges & portion just chiefly, & some have lost their Lives by concealing y[e] circumstance, & where too many pounds of blood have been collected, ab[t] y[e] time of y[e] menstrual flux began. If y[e] complaint is understood, the cure is very simple, we either make a circular Incision or a Crucial one with y[e] Knife or Lancet. — If y[e] Skin is continued over the Anus y[e] mark of y[e] place wh[r] y[e] operation is to be very simple. But where y[e] Skin is not the least vestige of the Anus, & y[e] rectum has perhaps terminated into y[e] vesica Urinaria, or perhaps that there is a blind sack at y[e] bottom, y[e] operation is more difficult. In a Case of y[e] kind w[ch] I was called to, y[e] Surgeon was guided from drawing y[e] middle between y[e] two Rectia, & directed by the point of y[e] Os Coccygis. The Incision was made to the depth of an Inch without any appearance of faculent matter, we did not chuse to proceed further with[t] assistance, afterwards we proceeded in the same manner till we came so deep as to feel with y[e] finger the prostate gland, y[e] from y[e] upwards within y[e] os Coccygis. Still there was no appearance of feces. we then took a common sharp pointed probe shaping it within y[e] os Coccygis, & withdrawing it now & then, & examining y[e] point to see if any of the Meconium co[d] be discovered: at length we observ[d] y[e] we y[e] passed the Canula of a Trocar upon y[e] probe, & withdrawing y[e] probe, introduc[d] y[e] perforator, with w[ch] we enlarg[d] y[e] opening till y[e] meconium was discharg[d] freely, & having enlarg[d] the Incision sufficiently, a bit of Lint was put in to prevent the opening, the Child continued for 3 weeks to discharge y[e] yellow stools; but a swelling appear[d] ab[t] the throat, y[e] mouth became aphthous & the Child dyed, had it survived we wo[d] have introduc[d] a piece of Spunge tent gradually, to dilate the opening. — Next the Urethra is sometimes mistaken, I have known it and ab[t] y[e] Anus behind y[e]

spasmus of them. In y^e^ case y^e^ urine is discharg^d^ sideways and y^e^ semen cannot be thrown out in y^e^ proper direction; so after the Child is somewhat advanced and can give some assistance, it will be proper to continue the urethra thro' the Glans, with a sharp pointed Instrument; y^n^ to introduce a hollow tube of silver, as thin as possible, & to heal y^e^ part upon it: In y^e^ mean time if y^e^ Child have any difficulty in passing y^e^ water y^e^ hole in the side of y^e^ urethra may be enlarged. The nostrils are sometimes shut, as by the small pox: we cut the Skin finely with a Lancet, & introduce till the Sides heal, a piece of Bougie, of a proper size, & the Child in the meantime may breathe thro' y^e^ Mouth.

Lecture 93.

We shall next consider the treatment in y^e^ different species of **Dropsy**. The water may be collected in y^e^ common Cellular membrane, or in shut sacks, such as y^e^ peritoneum.

The first kind is call'd Leucophlegmatia, because y^e^ swelling appears white, pitted & tense as in an Instan^e^ in many gen. Anasarca. And y^e^ name is perfectly proper, because we are by no means to conceive, as many seem to do, y^t^ y^e^ water is confin'd to the Cellular membrane immediately under the Skin. We are to imagine y^t^ y^e^ water has insinuated into y^e^ Interstices, not only of y^e^ general Bellies of y^e^ muscles, but into the Cell^r^ membrane connecting every fibre of a muscle to another, hence it finds its way to the deepest and most interior parts of the body; Then if we observe a considerable distention of the Skin of the thorax, we may suppose y^t^ y^e^ water has penetrated thro' y^e^ Interstices of y^e^ Intercostal muscles, has got between them & the outer side of the pleura, and following y^e^ connecting cellular membrane we are led to the mediastinum, w^ch^ may be considerably thickened & loaded w^th^ water, In like manner in y^e^ Abdomen y^e^ water penetrates behind y^e^ peritoneum, y^n^ into the doublings of all its processes, & as y^e^ Cellular membrane in y^e^ mesentery is looser it reaches as far as y^e^ Coats of the Intestines: If y^e^ exact

vast is examin'd it will not be found, as is generally conceiv'd in the fatty Cells, for these are entirely shut. That notion has crept in from the wasting of the fat in exhausted &c. Marasmus, as if the place was supply'd by water. But I have examin'd the fat with a microscope, & found their natural follicles distended with their natural Oil. The connexion is only this, that the cause of dropsy are apt to waste the fat, whether after it comes to supply the place of the oil future experim.ts must determine. But we may find water in lodg'd in the connecting Cellular Substance, & not in the Adipose Bags. — The natural seats are well known, there is an human effus'd upon the surface of the Arachnoid Coat, or innermost of the dura mater, so water may collect here: & this may fall down to the very bottom of the Spinal marrow, or surprising that the Spinal marrow is alone affected, & that the collection of water is confin'd enough, it may ly round all the brain is compressed by it, or it may be lodg'd in the Ventricles, which all communicate, & may be consider'd as having one Cavity, & the water confin'd to the Brain & Cerebellum, so that there may be two species of Hydrocephalus, an internal & external. We have a variety of the first species, call'd Spina Bifida, at the lower end of the Spine, perhaps there may have been a natural want, but chiefly it is a dropsy, whereby a connexion, or communic.n of parts have been intercepted, next we may reckon the Eye to form a natural Cyst, & that sometimes becomes dropsical, In the Chest we find 3 principal Cavities, the Cavities of the two pleuræ, & of the pericardium, In the Abdomen there is one General Cavity, unless perhaps we except the natural ovaries, we call Ova in the female: & with the Abdomen in the male the Sack of the Vaginal Coat. — Besides experience shews that the water is confin'd sometimes in preternatural sacks, as that there is a 3d. Species, that may be call'd preternatural encysted Dropsy, there we meet with vesicles in the Kidneys, & in the spermatic Cord: we meet with them under the Skin: & there is no part of the body in which they may

not form: Now in order to judge tolerably of y^e^ manner of treating any of the species of dropsy, we will look back to the General Causes y^t^ may produce it. And it is evident y^t^ Dropsy may proceed from an increase of exhalation: too much may be exhaled, y^e^ inhalant vessels professing altogether, or nearly their natural powers. Next we can conceive y^t^ exhalation is not greater y^n^ in health, but y^t^ y^e^ inhalation is diminished. & as a 3^d^ genⁿ. cause we may suppose y^t^ y^e^ inhalant vessels have been wounded or burst: To examples of any one of these really existing may be produced.

If the Secretion of y^e^ urine in y^e^ Kidneys be interrupted, especially if the interruption come on gradually, and at last is total, we frequently observe an effusion to take place & in general we obs. in dropsical Cases y^t^ y^e^ Skin is dry, & it is difficult to bring on a sweat. If we find y^n^ in one instance y^t^ an interruption of the secretion of urine, can occasion an effusion, a want of the natural perspiration may in other Cases have the effect: Here chiefly an increase of exhalation from y^e^ thin humours retained in the blood is to be accused. But next it has been repeatedly obs^d^ y^t^ after a person has been exhausted by a long discharge of Blood, from an accid^t^ perhaps; a tendency to Dropsy has shewn itself: as if for some time y^e^ blood of y^e^ person has not had so much in it of y^e^ Glutinous principle as is sufficient to prevent y^e^ too great effusion, y^e^ Lymphatics part preventing y^e^ effusion of the Serosity by y^e^ intimate connexion betwixt them in the Course of Circulation. — Next we observe y^t^ whenever pressure is made upon y^e^ returning vessels, y^e^ veins of any kind, we suppose y^e^ red alone affected there is an effusion; & as it has appeared probable y^t^ y^e^ whole of the Absorption is performed by y^e^ Lymphatic System, in such cases we must acct. for y^e^ dropsical swelling by supposing an increase of exhalation, y^t^ y^e^ existence being made in the branches of y^e^ vessels returning to the

Heart, y.d pulse is increas.d in the Arterial vessels which
in Whale &c. y.e Ascitious of the Liver have been found a very
common cause of Dropsy, of the Abdomen, & y.t before the
Bulk of the Liver was so much increas.d as to distend
-nably by its pressure y.e Thoracic duct, in such a case the
disease is not occasion.d by a want of Inhalation, but from
an excess of exhalation. As the cause of an acute pleurisy
is a relaxat.n in whatever way it is produc.d, y.e solids of
the body, independant of mechanic.l stoppage, thus in par
-alytic cases, if y.e vessels are too much relax.d by nervous
influence being interrupted, then is a degree of swelling, &
softness, wh.ch we can't aut.t for on any other supposition, &
if a person is weakened by a fever, & recovers his strength,
but y.e in the Interval there are Oedematous swellings, par
-ticularly in the Limbs, we aut.t for it y.e from y.e weakness &
relaxation of the Solids, perhaps joined to this cause a
fault in the fluids, & then may be a increase of exhal
-ation, in some cases depending on y.e fluids, in others
on the Solids, & in a 3.d upon mechanical purpose; y.e solids
& fluids remaining the same as in health. — When we
attend to the Effects of diminished absorption, various
causes may contribute to this. Thus we have observ.d
of the Branches of the Lymph.ts vessels, are necessary to
promote their contents, as y.t they possess a tardy living &
muscular power: and when a stroke of a palsy destroys
y.e Tone of y.e Arterial System, it may likewise deprive the
power of the inhalent vessels, & render'm unfit for rec
-eiving & pushing on their contents; so in y.e case a swell
-ing is produc.d, from a smaller quantity y.n usual return.g
to the heart, y.e quantity of fluid extravasated being supposed
to be the same. And suppose upon y.e Arterial System can
have y.e effect; if the Bowels are swell.d as in a Scirrhous
State, by assisting y.e red vessels y.e exhalation is increas.d,
& y.e inhalation is diminished from y.e pressure on the
valvular Lymphatics, thus a swelling begins in y.e belly

from y^e^ vicinity of the Liver, & continues long before the
dropsical disposition shews itself in y^e^ lower extremities;
but at length y^e^ Liver enlarging & pressing on the Thoracic
duct: & also y^e^ water contained in the Sac of y^e^ peritoneum
have this effect, & the Lymphatic Glands are swelled such
a dropsy will happen still more readily: so when the
glands of the Axilla are enlarged from Cancer y^e^ whole
Arm underneath is swelled, & y^e^ same is true as regards
ag^t^ y^e^ absorption being performed by the Branches of y^e^
red veins, for were this Cause they wo^d^ at length be able
to consume y^e^ whole matter effused; I also mentioned a
Rupture of Lymphatics, but tho' rarely take place
We find in Lower, an instance of a gut^s^ of the Scrotum being
effused into the Cavity of the Thorax, from a Rupture of y^e^
Thoracic duct, & what happens in y^e^ Trunk may occur
in the Branches. After observing so far, in general it
will appear as a consequ^t^ of mechanic^l^ pressure upon
any particular branch of y^e^ Portic System, that however to dropsy
in the part, a difficulty of y^e^ Circul^n^ thro' y^e^ Lungs will disa-
pose to Dropsy over y^e^ whole Body, suppose y^e^ Lungs
to be obstructed; or y^t^ there is an obstruction in y^e^ beginning
in y^e^ beginning of the Aorta, y^e^ will have y^e^ same effect in
the whole Portic System, y^t^ a Tumor pressing on any branch
can be supposed to act in y^t^ branch. — Now reviewing these
several gen^l^ Causes of Dropsy; & under them heads almost
all these may be reduced, nothing is more evid^t^ y^t^ y^t^ they
are very opposite, so y^t^ there can be no gen^l^ remedy for the
Disease, but y^t^ the method of cure, must vary accord^g^
to the Cause, may perhaps we shall be led further to shew
y^t^ Physicians are in their general treatment, have too much
overlooked y^e^ Causes & attended chiefly to the effects, &
y^t^ therefore y^e^ common treatm^t^ of the Dropsy is not so
successful as it might be: for we find it laid down as
a general Rule y^t^ a dropsical person shall drink very
sparingly, from whatever Cause the dropsy proceeds, a

great quantity of Liquor thrown in, will incrase y.e swell-
ing: but if y.e water shall have y.e effect of lessening y.e Cause
the patient may receive more advantage y.n but by it: —
Then suppose y.e hardness & swelling to affect the vessels
mechanically, y.e drinking mineral waters will cure the
disease more effectually y.n any medicine when y.e drink is
given very sparingly; We have instances of persons who
by going to mineral waters have rec.d a compleat Cure —
In like manner if a person is disposd to Anasarca, the
most posture in incrase y.e swelling in his feet, by incrase y.e
Column of the blood in the Arteries, whereby y.e effusion
is greater, & the Absorption more difficult, so must is rec-
ommended in the recumbent posture; while exercise
might contribute remarkably to the Cure. We may also
another Error, w.ch is perhaps still worse, y.t in their gen.l
practice Physicians are too apt to incrase discharges
w.ch are not natural to the body; sharp purgatives are
given & continued for a length of time, in order to drain
off awaleing Liquor by stool, now suppose we shall succeed
in removing y.e effect, unless y.e Cause is continued the
disease will return, so we ought rather to direct y.e watery
Liquor to those Organs y.t are the natural outlets for it;
as by giving Squills & mercury in small doses, &
rather checking y.e effects they have by stool. ——
If the effusion is general we stand y.e greater chance of
obtaining a Cure, if y.e disease does not proceed from
some rooted cause in y.e Heart & Lungs: but when the
water is collected in a parti.r Cyst we shall especially
fail. — Suppose y.t we have endeavourd to keep the
Cause in view, & y.t remedies fail; we are under a
necessity of having recourse to a Surgical Operation
Wherein y.e patient suffers extreme misery: And if the
water is collected in a deep Cyst, y.e distention affects y.e
Bowels in a dangerous way, or where it is collected
under y.e Skin a Gangrene is produced which proves fatal

But the Surgeon does no more than palliate the complaint with very few exceptions, as in the Hydrocele of the vaginal Coat: if we find that by drawing off the water in that case; when the Coat is so small, it is only palliative; when it is collected in the Cavity of the peritoneum the disease is kept in any shape. In like manner in Anasarca; the water is brought from a distance; & no change made in the disposition of the patient with respect to the disease, or the only view of the Operation being radical, is when we join medicines; as when we have taken off the pressure in Ascites, we put the patient on a course of Diuretic medicines, these will succeed better than when the Abdomen is distended, with there no more in it, but by the water pressed upon the Kidneys; hindering both the Secretion & excretion of the Urine.

The prognosis must vary according to the place in which the water is collected by the Constitution of the Patient & cause of the disease Now let us begin to proceed to the Operation first of all in

Anasarca. — The water being in the common Cellular vessels of that part of which freely communicate fallen by its weight to the lowest part; as supposing the Leg is affected: it becomes of a conical shape, the greatest Quantity undermost: therefore the Surgeon, considering the situation in which the body is to remain, makes his puncture at the lowermost part: Generally near to the foot: about 3 Inches or in that part: commences the Scalpel & make a considerable incision, with 3 or 4 Inches. It will not be easy to say with what intention, nor do they seem to have considered the Intention; they seemed to have applyed what happens in the Hydrocele to the Anasarca: but a puncture smaller than is commonly practised will be sufficient for the purpose, a very small opening will discharge a great quantity of water; nay if the disease has made considerable progress, the Quantity is very great & the danger of mortification such, that I would propose, instead of beginning with the lower part that we should begin in the higher part of the member: as in the Thigh first

After emptying the neighbouring parts, make them lower down: for if y^e^ whole of the water is forced thro' any one opening the sides of it instantly, y^e^ parts evacuate, & occasion mortification & death perhaps, so y^t^ we cant be too cautious in undertaking even punctures in Anasarca.

We make 'em with y^e^ common or with a larger Lancet avoiding y^e^ larger veins, & likewise we ought to have some view of y^e^ nerves w^ch^ accompany y^e^ subcutaneous veins: After the puncture is made in y^e^ skin, it is proper to enlarge y^e^ Lancet sideways & to cut y^e^ cellular substance, y^e^ part of which condensing, hinders y^e^ free efflux of y^e^ water: we bring y^e^ watery parts thro' y^e^ incision, & we make 2. or 3. or more punctures in diff^t^ parts of the Leg. Besides we endeavour to bring down y^e^ water by gentle pressure & friction, w^ch^ gives a degree of vigor, makes y^e^ parts contract better; & not yield so easily to the after collection, it is also necessary to employ bandages to support y^e^ part, as the parts emptied y^e^ leg may be all'd in flannel, or any thing of its elasticity, & y^e^ may be frequently taken off and applyed agⁿ. We continue y^e^ medicines y^t^ most fit for removing y^e^ cause, & recommend to the patient exercise; & then is a part^r^ kind of exercise w^ch^ we may employ here viz^t^. Vomit, w^ch^ squeezes out the water, besides, y^e^ spasm y^e^ different exertions & giving a stimulus to y^e^ Absorption the water is forced from y^e^ Cellular Membrane in y^e^ dropsical Bowels, from y^e^ mediastinum, & ventricles: so y^e^ effect of vomiting is to be repeated frequently & when the whole of the bottle to make a small puncture thro' y^e^ skin close a little above it to repeat y^e^ operation, y^t^ to prevent y^e^ inconvenience of a mortification by any one considerable Incision. — It shall not suppose the water is collected in a hunchback, & shall take y^e^ collection within y^e^ Abdomen for our example, the **Ascites**. when y^e^ Abdomen is swelled like a Bladder. — We distinguish a dropsical swelling from by the feel, by observing a fluctuation & not having reason to suppose y^t^ there is collected blood or purulent matter within y^e^ Cavity, y^e^ fluctuation is distinguished by laying one hand on one side of the Belly, &

1776.

striking with y^e other hand, on the other side, & when we make the stroke with 2 fingers, at once we feel y^e fluctuation more sensibly. — The posture of the patient, must vary according to the degree of distention, if there is little water collected is scarcely undulates: nor do we feel it if y^e Navel is very much distended y^e Teguments not yielding to the stroke: so where y^e quantity is not very consid^le it is best felt whilst the patient stands before us, but if the quan^ty is consid^le it is best felt whilst whilst y^e patient is in Bed. Our chief attention ourselves to the feel in avoiding prevon, to prevent our falling into a mistake — Next we ch^e have view y^e seat of water in the Peritonæum, & not in any particular Bowel, we vary y^e method of cure considerably — Thus it may be in any of the natural ova in women, or y^e water may be collected be^tween the Stomach & Omenta, in y^e cavity to y^e l^t y^e foramen of Winslow leads, y^e foramen being what perhaps, there we distinguish y^e place, not so much from y^e feel in one position, as from attending to the Posture of y^e diseased manner in which y^e water was found — 2^dly if the patient found y^e water to vary according to the position: if in the Ova, we may have observ^d it as a circumscribed Tumour before it occupied the whole — Next we propose we are satisfyed y^t it is collected within y^e peritoneum, & we determine to perform y^e operation, we are next to find out y^e exact place, w^ch must depend upon the seat of the Bowels. Sur^geons say it down as a general Rule, y^t we ch^e perform y^e Operation rather on y^e left y^e the right side, y^e Viscera not only being frequently diseased, but seeming to the edge of the Sternum it may be in danger of being drenched: But we must likewise attend to the Spleen w^ch changes its place very remarkably; & you will see a Case in M^r Barry^s treatise on Dropsy, where it weighed 26 ℔ & there was reason to believe y^t the point of the Trocar had entered it. — Upon the whole we are to examine the perineal bowels carefully & suspect y^e nothing is to be

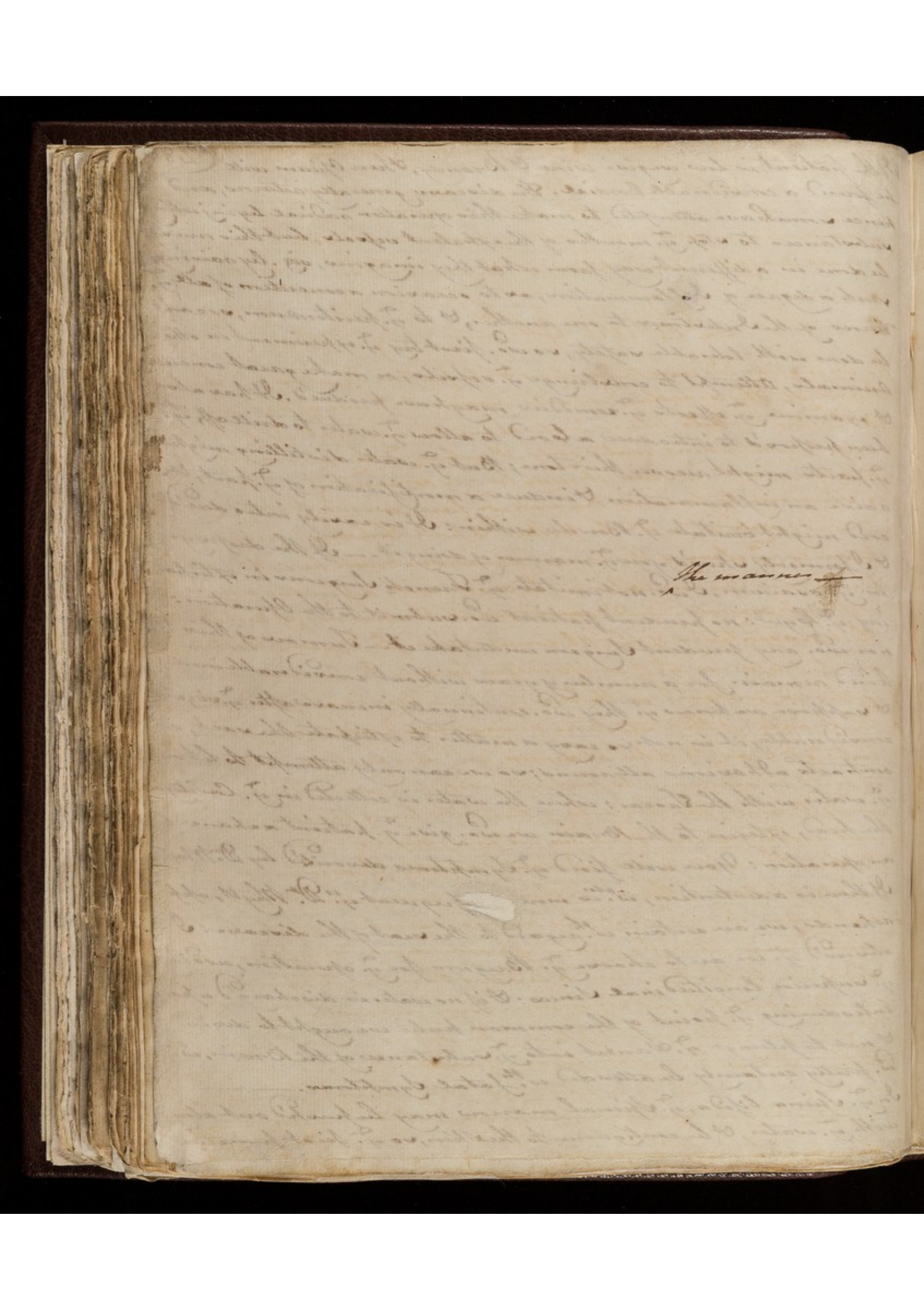
distinguished, we perform the operation rather on the left side, about halfway between the joint of the anterior spinae processes of the Ileum & Umbilicus, which is a rule that never varies: & then we are at a sufficient distance from the said Bowels, & from the Arteries running behind the Rectus muscle: & then too the intestines float less, & there is a space left between the muscular & peritoneum — The Assistants considering the operation & with great reason, as very dangerous, they did not attend to the danger that accompanies an evacuation when the water is let out, the danger of fainting; next they wanted the Instrument that we now use, the Trocar, they did not like the water fully drawn off. They used a double edged Lancet or Knife: & perhaps afterwards put in some pipe not fitted to the hole: the Air was admitted, & the water not fully drawn off, because the patient fainted: and the Air mixing with the water remained putrid: & they had no method of bandaging after the operation. But now we are able to remedy all these difficulties, with the Canula, we can draw off the whole water without admitting much Air: & we are provided with Bandages, in the application of which we are chiefly indebted to Dr. Mead. —

How I shall now describe my Bandage in the Indian Quilted waistcoat, with opening before when we intend to make the Paracentesis, & it is drawn together with Laces & buckles. — Supposing the Belly considerably distended & the patient does not submit to the operation & shall therefore receive relief from the wearing a Bandage may like a fitting Belt: In one Case when I attended, the patient being in danger of fainting, we had recourse to a couple of Stout girths, & we drew off 120. English pints of water, in two hours, the patient was sensible of the relief, & she frequently called to pull for she was going: and on stopping the water with the finger, & drawing the Belt the disposition to faint went off. — The common Idea of the cause of fainting is that the Blood runs down into the Vena in too great quantity, & does not go in

sufficient quantity to the head, & yt it is apt to stagnate
in ye Vena Cava: but it also stagnates in the Lungs, the
Diaphragm, is in ye same situation, wth ye Abdominal viscera,
& hangs loose, so we are to continue in time of ye Operr
and after it as much pressure as was made by the water.—
Mr Sharp directs ye operr to be done in a sitting posture, but
if a person from V. C. is dispos'd to faint we can't do better yn
lay laying him in a horizontal posture. Besides ye water
can be more thoroughly discharg'd in this way, laying the
patient to one side, ye puncture becomes the lowest part.—
The manner of doing ye operation is perfectly simple: The
Instruments are a common Lancet, Trocar & common probe
pointed and longer yn the Trocar, most Surgeons make the
puncture with the Trocar only, but not without great pain
& danger of pricking the Skin in, & wounding ye Bowels
so it is better to cut a hole in the Skin to allow the Trocar
to enter, & the Trocar is work'd like a drill, till we find
a want of resistence.— When ye water come at length to
almost entirely discharg'd, ye turns of the Intestine or
Omentum are apt to come in the way, hence the use of
the probe, & we ought to make it a rule to thrust ye probe,
least it slip from ye fingers, wch might occasion ye death
of the patient.— If ye patient grows faint notwithstanding all our Care, there is no necessity of drawing
off the whole water from ye fear of its corrupting: this if
ye patient is able to bear it, if not, better to draw off the whole;
then placing a finger on each side in order to give a little pain
we withdraw ye Canula, & aptly a piece of patch.—
Sometimes from ye great thinness of the Teguments there
is afterwards an oozing out of the water, wch excoriates ye
tegumente.— In this case we wd next time enter, the
Trocar slanting, between ye skin & muscles. Over the
patch we aptly a compress, & it will be of advantage to
wet it with a solution of Sacch. Saturni, or ardent Spirits
or some such Astringent, and stimulating Liquor.

If the patient is low we give wine & Brandy, then Opium will be found a considerable Cordial. The disease generally returns, and hence we must have attempted to make this operation radical by injecting substances to stop y^e^ mouths of the exhalent vessels, but this must be done in a different way from what they imagine, viz^t^. by raising such a degree of Inflammation, as to occasion a connection of all y^e^ turns of the Intestines to one another, & to y^e^ peritoneum, we can't be done with tolerable safety, we^e^ we^e^. first try y^e^ experiment in other Animals, attempt to constringe y^e^ vessels, or make great efforts & examine y^e^ effects y^e^ remedies may have produced. It has also been proposed to introduce a Cord to allow y^e^ water to drill off y^e^ y^e^ parts might recover their tone; But y^e^ water distilling might raise an inflammation & induce a mortification of y^e^ part, & y^e^ cord might imitate y^e^ Bowels within: It is easily introduced & I formerly shew'd you y^e^ manner of doing it. — If the dropsy is in y^e^ ovarium, we^e^. not imitate y^e^ French Surgeons in effecting y^e^ Cyst: no prudent patient we^e^. submit to the Operation: nor we^e^. any prudent Surgeon undertake it. — Tumors of this kind remain for a number of years without considerable increase & suppose we know y^t^ they we^e^. continually increase after y^e^ size is considerable, it is not so easy a matter to extirpate the sack, it contracts adhesions all round; so we can only attempt to let out y^e^ water with the Trocar: where the water is collected in y^e^ Cavity of the head, exterior to the Brain we we^e^. give y^e^ patient a chance by an operation: You will find y^e^ Symptoms described by Dr. Whytt. If there is a distention, w^ch^ is more frequent y^s^ Dr. Whytt, appr=ehends, we are certain w^th^ regard to the seat of the disease: I observed y^t^ we are to choose y^e^ Bregma for y^e^ operation, avoiding y^e^ superior longitudinal Sinus: If no water is discharged upon introducing y^e^ point of the common probe we ought to desist, & not to plunge y^e^ Lancet into y^e^ substance of the Brain, w^ch^ we^e^. pretty certainly be attended w^th^ fatal Symptoms. —

In y^e^ Spina bifida, y^e^ Spinal marrow may be pushed out along with y^e^ water, & be contiguous to the skin, we^e^ y^e^ first puncture



may be perhaps in the spinal marrow, but suppose we can avoid this, we observe y.t y.e taking of the prepuce has a bad effect where y.e skin is eroded, & the disease breaks of itself, y.e patient soon declines from the want of preserving circulation of y.e Air. generally dies after the rupture in the space of 8. or 10. days.

Lecture 9.th

We were considering the dropsy & its proper Treatment. In the Case of Hydrocele Injected against y.e use of the Seton, or Set.t of the Testicle being included in the vaginal Coat, Both a sack containing water only, & where y.e Surgeon must avoid y.e appearance of scar, it may be very convenient. — Suppose a Tumour to form in the neck, or face, we wo.d also chuse this only it will be proper to pull the Cord frequently towards y.e close of the Cure, otherwise it will be entangled by the new Granulations, be drawn with difficulty and not without danger. — I concluded with shewing of performing the paracentesis of the Abdomen with the Trocar, But we are not to suppose y.t that operation is only to be done where water is contained in the Cavity. — There is a possibility y.t the Coats of the Intestine being eroded air may get out into y.e Cavity of the Abdomen, and give such a distention, y.t it will be necessary to perforate with the Trocar, wch may give considerable relief, the Coats of the Gutts being consumed y.e belly will readily recur, However we may suppose in some Cases y.e Operation will prove radical; as after Dysentery when a small portion of the inner Coat has been eroded, & y.e remaining Coat burst by an effort: by giving a discharge to the Air, y.e wound may close by means of some degree of Inflammation excited, & the patient receive a lasting Cure. — If Blood or pus is collected we proceed in y.e more common method by Incision. I have referred to the last place y.e Treatment of water collected within y.e Cavities of the pleura, Causes of one wanting in y.e complaint if evident marks of a pulmonation, 2.dly.t more attention is necessary to particular circumstances, from the nature of

of the Bowels & manner of Respiration we must follow a
singular method of cure; & y^t operation may be also needed on
other accounts, as for y^e effusion of Air, of blood, & of matter, & as
many things in treating y^e different Species collected within
y^e pleura are common, so we may consider'em all together.
You'll remember what I said with regard to the Lungs in
respiration y^t they are to be consider'd as meerly passive
Organs, excepting a degree of elasticity & some small degree
of muscular power, when we expire, but in Inspiration
they are altogether passive, & follow y^e motions of the Thorax:
the Air entering by the Trachea, & pressing on their inner side
But when the Air has access to the outer side as well as the
inner, y^e Lungs can't follow y^e motions of the Thorax, or
suppose a large wound made thro' the Skin & muscles
of both sides; the Lungs collapse, as when we open a dead
Body: so such a free admission of the Air will prove fatal to
the Animal. If the wound is made on one side the Animal
survives, because y^e other side takes in somewhat from the
air y^t is necessary, & makes the necessary discharge, or circul-
-ates y^e blood in such a manner, as to preserve life, from an
instinct of nature, when y^e animal is about to expire, it
constricts the Glottis, so y^t the Air is hurled from the wound
side to the other, & the lungs of the affected side are dilated
whilst those of the wound side are contracted, & in this way
life can be continued, but upon the whole any opening
into the pleura is attended with danger, w^ch increases in
proportion to the size of the Opening, tho' we are not to say
with Vanswieten y^t if the hole is larger y^n the Glottis, the
Animal can't move the Lungs, for it may be larger & yet
the respiration be continued. — Let us now consider the

Paracentesis. of the Thorax & first in consequence of Air
effused into it, w^ch may happen in 3 general ways. —
By a sudden effort, or suppressed Coughing, the membrane of
the Lungs may burst, tho' that happens but seldom, because
the outer membrane is not put to the full stretch when the

incertum causæ

Lungs are distended, & the containing parts give it a support just as when we inclose a thin Bladder, within a firm substance we may kick it about as we please without being able to burst the Bladder. Therefore y.e rupture of the Lungs happens rarely. We find however examples of it. I saw one with Dr. Meckle in 1757. at Berlin, of which he has since given an account; upon opening the Abdomen we observed y.e Diaphragm was convex towards it, & he suppos'd y.e Cavity of the Thorax was filled with water, but instead of water there issued out a great blast of Air upon opening into the Thorax, & examining the Lungs on y.e side they were squeez'd together at y.e top of the Thorax to the size of ones fist, & almost as hard as any of the other solid viscera; & upon blowing Air into the Trachea they cd. not be dilated, y.e case suggested to me y.e Idea w.ch I have since proposed constantly in this place of letting of Air by tapping. — The 1.st case is the one I now mention, where from a rupture of the Lungs y.e Air gets into the Cavity of the pleura, when the Thorax is enlarg'd, & we make the effort of inspiration; but in expiring the rupture may be slanting, & the sides shut together, just as the end of the ductus Choledochus or of the Ureter are shut, hence in every after inspiration, some more is drawn in till the air is accumulated in considerable Quantity; Now we may form another supposition, y.e the Animal finding an Anxiety makes a struggle, w.ch is of as we where y.e wound is in y.e side, & the air is forc'd from the sound side with such force into the wounded side, as to be condens'd in a great degree between y.e Lungs and side, Hence from a very small hole in the Lungs the whole substance of one side may be more compress'd than by a large incision made thro' the muscles of pleura. — But the membrane covering y.e lungs only is not alone subject to rupture, but the pleura may give way at the same instant, without supposing any previous disease and erosion, I met with a case where this happend in a violent fit of Coughing to a person about 60. years of age, y.e patient was siz'd with a sharp pain in the side, dim.d afterwards found an uneasiness in the breathing, & the side began to swell, in the space of a few hours the Air had occ.d over y.e

Hoarse, to the Arms, neck, head and as low as the bottom of the Trunk, the feel was unlike y.t of an edema for there was a noise, a crackling, as when, we press a dry bladder filled with Air, & other persons co. hear the noise. Recurred case & found afterwards with Mr. Hamilton, when an operation was directed to be done, & there was no reason to presume any excision of the Lungs, there was no expectoration of matter: & I turned along Bougie round in the Thorax without perceiving any, & on this Mr. Hamilton resolved another case y.t had occurred to him and where y.e rupture was more evidently without any previous disease. — A Girl in time of labor attempted to stifle her cries, y.t she might not be heard, & found something give way: soon after her voice grew weak, a swelling began in the side & spread over y.e body, y.e breathing came to be greatly affected, the patient was obliged to sit upright leaning forwards, y.e pulse was quick, feeble & intermitting, the face was evidently flushed, & the Vessels full of blood: next we can suppose y.t when a fracture of a rib may happen, the point of the rib may be thrust inwards thro' y.e pleura, & into the substance of the Lungs, in this case the Air will first get between the Lungs and pleura. — but after the pleura is filled & the air condensed, perhaps rarefied by the heat of the body, to w.ch it is now exposed for a long time y.r in respiration it will go thro' y.e pleura into the Cellular membrane or substance of Intercostal muscles, & under the Skin, & so over the whole body as water is dispersed, & y.t that it was easy to point of several cases recorded by Authors, y.e thing has often happened & the swelling been absorbed but y.e Surgeons have been negligent in describing the Case from not understanding y.e nature of it & the manner of giving relief; we will next imagine y.t such an effusion will happen frequently in excisions of the Lungs, when they are in an ulcerous state, & in such cases I have remarked air discharged w.th matter, & I have seen excisions on the surface of the Lungs, when they were not connected to the pleura, so y.t Air had entered, but the hole had been so large, y.t it was not condensed, by many of patients the excisions the Lungs had been supported mechanically

and the pressure of the Air not had any bad effect — now tho' sometimes this happens yet it is a rare case because y^d. inflammation y^t. produces the Effusion generally glues one part to another, suppose a matter going from y^e. middle of the spongy substance outwards before there any communication w^th. y^d. Cavity of the pleura, the Lungs are bro^t. to adhere to the pleura. ——

Wherefore we see y^e. possibility of an effusion of air in various ways, & y^d. danger w^ch. may be occasiond by it, we ought to consider the proper manner of giving relief, w^ch. be obvious and simple. Some have spoke of making incisions, but we are by no means to follow this direction. It may happen y^t. the Surgeon have y^e. strongest reason to suspect Air with^t. being absolutely certain. A patient has broke a rib perhaps, & soon after an effusion is found on one side of the thorax, but perhaps there is no external swelling, for y^e. Air may escape from the Lungs but not get thro' y^d. wound in the pleura, w^ch. may be oblique, & the sides pressing against each other prevent the outlet: or after a violent fit of coughing y^e. patient may be seiz'd w^th. such an oppression, & no reason to imagine a discharge of blood the Cause: In such Cases we suppose the collection of Air w^th. a high degree of probability only, & therefore tho' we w^d. hazard y^e. making a small puncture, we w^d. not think of making an incision. One of the smallest trocars may be entrd. into the Chest, keeping near to the wounded place, or judging from y^e. feel of the patient, as if after a sudden fit of Coughing he felt a pain in a particular spot, we w^d. use the Trocar like a Drill & leaving the Canula upon withdrawing the Trocar we see whether the Air escapes, & if we are mistaken y^e. patient sustains no material Injury. — Next suppose we know beyond doubt that the Air is accumulated, from there being an Emphysema beginning from the Side, when here the Trocar is y^e. proper Instrum^t. If there any advantage to be got from an incision w^ch. says the patient open to manifest danger, we can maintain the opening as long as is necessary, we can withdraw the

Canula as soon as the patient has obtaind relief, & we can by sucking at the Instrumt. extract all the Air between the lungs & pleura. — When as from an Incision it is impossible to exe-cute any one of these intentions, & the Air freely admitted into the deep Cavities of the body never fails to produce a consid.le degree of inflam.n as when it is let into the Abdomen, and tho' here the danger may not be equal, it will be consid.le and by incision the lungs collapse, & may contract such adhesions as to prevent their being expanded so as to fill the Cavity of the Thorax, We wd. therefore first make an Incision thro' the skin into y.e Cellular substance, & it is possible y.t y.e weight be sufficient to relieve y.e Lungs from y.e oppression, & to prevent the progress of the disease. But after some minutes if y.e gives little relief, we carry the incision deeper: & if still the oppression continues, we make a perforation into the Cavity of y.e Thorax. The perforation is to be made, in a very slanting direction, & the Trocar work'd like a drill, till from y.e want of resistance we it is within the Cavity: for in such cases the oppression in the Breathing, proves y.t there is not an adhesion of the lungs: otherwise there wd. be no room for the Air to lessen their bulk, so we enter the Instrumt. with tolerable safety, & I have seen a Candle blown out & lighted again 3. or 4. diff.t Times with y.e continued blast of air rushing out with violence, as from a machine contriv'd for condensing the Air, & y.e is followd with immediate relief, y.e pulse becomes less frequent & fuller, & the patient can now lie with ease: As the swelling is confin'd in other parts, punctures may be made in different places, and pressure made on the Cellular substance to push out as much of the Air as possible, but it will generally remain a long time & may say the foundation of other diseases: for if you inject some bile into the Cell.r Substance of an animal, you'll kill it in a few hours. — When we find y.t the patient can bear y.e Canula stopp'd for some time, which may be done with a cork fitted to it, without uneasiness we may conclude y.t y.e holes

shut by an Inflam.n of its sides & may withdraw y.e Canula,
to prevent the Canula from doing injury, we may have an-
other with a probe point, & a slit in the middle, it made so as
to enter thro' the other, & withdrawing the other y.e may be allowd
to remain, by means of compresses we fit the Canula to the hole,
and secure all by means of a strap, or sh.d the hard metal injure
the Lungs, a flexible Canula, a bit of Bougie, or plaister, cover.d
a piece of wire may answer. — But y.e operation may be necess
ary, for water & pus, & also for blood. — M.r Sharp has argued
a great opening in the Thorax when blood is extravasated, but
y.e reasoning is not conclusive. He tells us y.t whilst a vessel is
bleeding, we had better keep the Thorax shut, just as we stop y.e
bleeding of the nose, & allow y.e blood to congeal in the mouth
of the vessels, now if in y.t way, a small quantity only would
congeal about y.e place of the Lungs wounded, it might be prop.d
but from the Spongy nature of the Lungs, & from the pleura &
membrane within being freely wounded, y.e blood will run
between y.e Lungs and pleura, so if from the circumstances of y.e
wound &c. a consid.le branch appears to be wounded, we wo.
rather propose y.t y.e wound in the Thorax sh.d be somewhat
dilated, for in this way the bleeding will stop equally soon,
& we may avoid y.e danger of the blood collecting and clotting
within the Thorax, for to imagine with D.r Boerhaave, y.t we can
dissolve it, by injections into the Thorax is in vain, let us first
find an innocent substance y.t will have this effect without y.e
the body, & if the blood is clotted, it is better to make an Incision
y.e to trust to an after absorption, we do not find y.t such large
Quantities can be readily absorbed. — Lastly suppose water
collected. - from a variety of Circumstances combind we distinguish
y.t & in most cases only with a high degree of probability. —
We know it from observing y.t y.e patient has not labourd
under an Inflam.n & such symptoms follow. it as indicate
a suppuration; for often the discovery of the Thorax succeeds a
certain degree of Inflam.n Peripneumony no doubt disposes to

Dropsy of the Thorax, but if the Symptoms of Suppuration
have not succeeded the Inflam.n if the patient is observed dis-
-posed to dropsical Complaints; passes his urine scantily, if the
skin is pale, if he has edematous swellings in the feet, & at y.
same time has some difficulty, in breathing, w.ch is increased in
a gradual manner, & generally as it increases is attended
with a dry Cough, if the pulse is quicker than natural, but
small, & w.th some degree of intermission, or in some degree
irregular; if the patient does not sleep sound, but is frequently
disturbed, & is oblig'd to watch in an erect posture, or on chang-
-ing y.r posture from erect to horizontal the breathing is op-
-pressed: because in the erect posture the Diaphragm is push.d
down by the weight of the water, & the Thorax mechanically
enlarg'd, & there is a more immediate pressure from the re-
-umbent posture on the larger vessels, these Symptoms afford
a high degree of probability, y.t y.e water is effus'd in y.e Cavity
of the Thorax. But we are only absolutely certain from the
undulation being found, & I know y.t in certain cases it can
be distinguished tho' not in all for in some cases y.e Lungs
are without adhesions, y.e water changes its place and a
crowd.le impulse is given, but in other Cases there are partial
concretions, w.ch fix the Lungs, & then we are not sensible of it.
One other Symptom may be added, the perceptio Thoracicis, y.t
on striking the Thorax it does not give y.e natural hollow
sound from containing Air, w.ch in thin persons may be a
real distinction. — The Medicines in general fail in
Dropsy, at least in the encysted kind, we have recourse to
Operation; as patients generally die of the disease Lung.s no
generally avoid an operation lest they in cure blame; & when
it is owing to ossifications about the heart &c. there is no
possibility of success, but where there has been only some
slight previous Inflam.n perhaps the dropsy may be cur-
-able, there we also y.t y.e Hydrocele affects the vaginal Coat
of the Testicle when there is no schirrus or partic.r hardness
of the neighbouring parts, & we find the disease curable. —

And as the Lungs frequently grow to the sides of the Thorax by above Cellular substance yt. allow all necessary play, no very dangerous consequences will follow. —
Perhaps it is rather preferable to use the Trocar than to make the incision. I dont see any great advantage from yt. Incision generally the water is fluid, tho' sometimes clotted stuff is mixd of considerable hardness, but generally it is more fluid than in the Dropsy of the peritoneum: & therefore an Incision may be necessary. — By the Incision there is this danger yt. ye Lungs, wch. have been pressd into a small volume, now acted upon by the pressure of the Atmosphere; & remaining contracted; they may be covrd by yt. membrane the Inflamn. produces; and glued to the side, & exack remain, wt. the distention of the Lungs is not able to fill, whereas by drawing off the water by the Trocar, & there is no admission of Air, no inflamn. excited, & perhaps from the Operation & some little irritation an adhesion may form so the Trocar is preferable in doing the Operation. — The last case is yt. of matter collected within the Thorax, particularly within yt. Cavity of the pleura. — We make the distinction here with more difficulty, yn. in the former case; for if there is water in the Chest we suppose it is in the pleura, but the matter may be collected within the substance of the Lungs. — We distinguish the formation of matter from a variety of concurring circumstances, yt. previous Inflamn. the signs of suppuration the fever present with thirst, a degree of cough, wt. expectoration: Shivering, Colliquative Sweats, & an oppression when the patient is laid on the sound side; if he lies on yt. affected side the sound side dilates freely; & continues freely life with tolerable ease, but when he lies on the sound side, yt. weight of the body confines yt. & the diseasd part confines it more by pressing on the mediastinum: So from these marks we conclude yt. matter has succeeded yt. Inflamn. — But it remains to determine yt. it is in the Cavity of the

Pleura. Now there are seven circumstances to guide us here some of them are certain, others probable. — We have also perhaps an extension of the Thorax, one side is more enlarg'd with the signs of suppuration, yet y^e^ patient has not brought up matter, in which case we can hardly imagine the suppuration with in the Lungs, otherwise it wo. have made its way into the Trachea Arteria, next when the suppuration affects one particular part most; we also some thickening of the Tegumenta; That has been a frequent Guide even where the original Inflam^n^. is in the contain'd parts. we may perhaps distinguish it by the stroke, y^e^ matter giving it y^e^ same sensation as water: Lastly we judge by y^e^ fluctuat^n^. Now y^t^. in some Cases can be felt Thus — In 3. diff^t^. ones of this kind I have seen, y^e^ fact was this; when y^e^ patient chang'd his posture slowly nothing cou^d^. be distinguish'd, but if he bended forwards backwards, suddenly, or aside-ways with a sudden jirk, or when a person stand. behind & moving the shoulders shakes the body, we hear a noise wch^h^. is to be distinguish'd at y^e^ breadth of an ordinary room, and on laying the hand on the side, the matter is found to glide under it, just as when you fill a bottle with water half full & dash it, the stroke of the water is felt by y^e^ hand, & the exact extent can be determin'd by laying the hand on different places, so we join the feel to the hearing, & not trust merely to the sound, wch^h^. may mislead us. — I met wth^h^. a curious instance of this some years ago. A Gentleman who attended here after hearing the symptoms described took the suspicion of his having a dropsy in the part, & endeavour'd to distinguish the fluctuation; & wrote his relations he was dying: when he laid himself on the bed, he readily produc'd y^e^ noise, we cou^d^. hear the quashing of y^e^ water distinctly: but as he was otherwise in good health, I suspected that it must

lowing to some other cause), & at length on questioning him I understood, y^t. he cd. only produce the noise after taking a Drink; But he had also consider'd this circumstance, and suppos'd y^t. at other Times the Stomach was too empty to affect the water. —— The rule is to operate nearly at the middle of the place where the fluctuation is observ'd. —— As to y^e. manner of the operation it is perfectly simple, the patient is not to sit erect, lest he be apt to faint, & if y^e. oper^n. is done alⁿ. the middle of the Thorax, we can't empty the under part, but laying y^e. patient in Bed, we turn him sideways to make room for the incision, y^n. we lay him over on that side & the only rule is to proceed cautiously when you come near to the Lungs keeping near to the upper side of the rib, and we ought to pay no attention to the course of their muscular fibres on the outside of the Thorax, but to give a free discharge. If I were to choose a place it wd. be in the middle of y^e. Thorax, half way between the fore & back part, avoiding the thicker muscles plac'd higher in the Thorax; & the cutting any part of the Diaphragm by going too low, as it may be adhering to the ribs. — Having cut into the pleura I raise y^e. Intercostal muscles, thrusting a director into the Cellular Substance, & cut as much of these as may seem necessary to make a free opening, I next scratch a small hole in y^e. pleura, & introduce y^e. director within y^e. Thorax, & as y^e. pleura is quite transparent, I can distinctly y^n. no part of the Lungs is in y^e. way, so make an opening large enough to admit y^e. finger & tho' such an opening in a sound Animal is highly dangerous yet in the case of suppur^n. the Lungs are as much oppress'd by the matter before the Operation, as by the Air after it, & there are generally partial adhesions, so y^t. the Lungs will follow the motions of the ribs, so y^t. every drop of the water can be drawn off with safety, & the patient be relieved instead

of being oppressed, But where a vast quantity has been collected, an oppression may come on, for the pressure being now taken of the Lungs, y^e blood may now accumulate in them. — We stop the hole with dressings, laying over a piece of soft Rag over the Orifice; That the dressings may not get into the Cavity of the Thorax; I secure all with a Bandage & straps. — But I wo. also further that even where the matter is collected in the Lungs if we can hit the proper time, an Incision made into the Abscess wo. give the patient a better chance of a cure, as the matter wo. be discharged with the violent effort in expectoration, for we obs. y^t an ordinary abscess heals difficultly if there is an opening at the Top, & suppose a person discharges matter by the Trachea; throwing it off in such quantity, as shews y^t it comes from a sac & suppose we can ascertain y^e place by the alternative pain & cough, then think it a probable attempt to make an incis. we wo. cut thro' the Pleura & if no matter is to be distinguished we wo. desist, but if the Lungs are condensed on the Surface, the Operation may give relief. ——

Lecture 95.th ——

Having explained y^e manner of treating Scirrhous Tumors, we proceed to consider the treatment of other Species of Tumours & I shall begin w.th shewing y^e appearance of them in morbid Structures. Atheromata, containing a pultaceous matter like grain boiled & eaten with water, these taken from the Head & called Talpa. Steatomata, Cysts of fatty Substances, when they are assembling a Tortoise, named Testudines. — Schirri, a Schirrous cancerous Tumors of the mamma: Schirri of the Parotid Glands. — Cancer in the Lip of the Uvula. — Sarcomata, different from Scirrhus & Steatom, and called Polypi. Before I enter upon the treatment of these kinds of tumours, w.th acquire total

extirpation. I think it may be of use to say somewhat of the manner of opening Abscesses, where in consequence of Inflamation purulent matter is collected; Because Surgeons disagree in their directions concerning 'em. — If we can trace the Abscess from Scrophula, &c. it is small; because in such Tumors be committed to nature, or at the utmost the Skin softened by a common poultice, till it breaks, & heals perhaps more readily y.n when an Incision is made, so it will be prudent to lay it down as a Rule to avoid meddling with 'em; they heal slowly & are not like to gain credit to the Surgeon he may incur much blame. But if such Tumors instead of making their way outwards, increase under y.e skin, spreading on all sides, it is of consequence, y.t the matter be let out, as the Absorption of the matter will bring on Hectic Fever & waste y.e patient, so if a fluctuation is distinguishable & the Tumor increasing we perform an Operation. — Next suppose y.t from any common Cause, an Inflam.n is excited, y.t ends in an Abscess, & y.t this is now of very considerable bulk. Some Surg.ns propose y.t a portion of the Skin sh.d be cut out, others lay a Train of Caustic y.e whole length of the Tumor, some make an Incision longitudinally. But all of these Severities are to be avoided, & the best method is to pass a large cord thro' the Abscess, giving a free discharge. to do this we may take the crooked Trocar of Heister, or we may employ the flat Canula as the Lancet cuts more easily, y.n the Trocar, or we may make make with a Lancet, a hole at the upper part, & pass a common probe thro' with the Cord, & pushing the skin out at y.e proper place below, we cut upon the point of the probe, If by means of the Cord y.e matter does not get out readily enough, & y.e Skin on the fore part does not collapse to the parts below, but still remains prominent, it may be necessary to make an Incision, & to cut out the Cord; by introducing y.e finger as a grooved probe, & using y.e streight knife, w.th the blunt or sharp point. — Next we consider y.e management

of these Tumors yt. acquire total, or partial extirpation or the destruction of the whole substance, & begin with yt. most simple Case the Atheromata. These excepting, as to the Contents resemble the preternatural encysted Dropsy, & such are to be treated in the same manner, an other term is employ'd to express a Tumor not essentially different the Meliceris. where the matter is like honey, & we have find most frequently the humor contain'd in different Cells, sometimes resembling those of a Honey Comb. These as in the preternat. encysted Dropsy, either a Internal remedies have little effect, & we must cure by an operation, we make an Incision lengthways in the skin, or where the Tumor is very large we make a cruciat Incision, or it may be advisable to remove a portion of the Integuments; but in general these are to be altogether saved. When we are directed to dissect out the Tumor entire, but let it be a constant rule to cut into the Tumor to empty it of its contents, & yt. we can dispose it with more ease. — If there is no large vessel of Consequence yt. Surgeon hesitates paine in removing it altogether, & there is no danger of yt. disease returning, but if any part of these be organs of consequence it is enough to remove a portion of it, & by allowing access to the Air, the Bag is either seperated, or the Sack fills up with granulations from it. — In the Talpa in the Head, yt. Bag immediately containing the Liquor has a loose connexion with the Cellular substance, so yt. frequently we may turn it out with the finger, with. the use of the Knife. But frequently the skin is divided on the Top of the Tumor in which case we cut out an oval portion of it. —

Another term is employ'd by Surgeons to express a complaint of the same general nature with those spoken of, namely Ganglion, by wch. they mean a moveable Tumor, connected wth. a Tendon, with. explaining how it happens, yt. these Tumors are commonly found close upon the Tendons, but the reason is obvious, the Tendons move in longitudinal Bursa

mucous, wch are within ye sheaths of all our Tendons, & ye
matter intended by nature to lubricate the Tendons, but the
communication is frequently intercepted in diffr parts of the
sheaths, This tumors of ye kind we may pass a crooked needle
& seton, but if the tumor has acquird a harder consistence, it
will be better not to attempt an operation, because ye subcutan-
eous nerves running down, are connected with the Tumor, so
might occasion pain & dangerous Inflamt: perhaps wh respect
to Surgery the preternatural incysted Dropsy, the Atheroma, the
Meliceris, & Ganglion may be considerd as one kind of Tumor.
But the Steatom, is totally distinct from these, it has no
other covering but what any Tumour of the same size growing
in the Cellular substance acquires, & ye Cyst is the common Cellul.
Tube compacted, like the covering of the peritoneum over ye
Herniary Cyst, neither are we to imagine yt a single bag of
fat is concernd in the formation, for I find yt it has the same
regular Organization as the round fat, & in some I have
discd ye ye follicles are rather more minute; but I am certain
yt in very Steatom there are millions of follicles, all shut, &
these are collected into Lobes by the common Cellr Substance
entring every where, so ye Steatom is a luxuriant growth
of the fat: in certain places of the body; the consistence of the
Steatom varies very much, in some the Tumor is softer
than the natural fat of the body, hence Surgeons are apt to
mistake a Steatom for a Tumor containing a fluid. there
appears to be a fluctuation, it yields on pressure & recoils
again with a degree of elasticity. — I know there are some
who have the Idea, yt into tumors of various kinds Air is
secreted from ye blood, & yt it is the Air yt gives this kind of
feel, but I am convinced ye contrary except where there is gangrene
& Emphysema produced in ye manner, or a communication
opens with some of the Cavities yt evidently contain Air
drawn from the Atmosphere, as the Lungs, & alimentary
Canal, we are not subject to Emphysema. — The appearance
of fluctuation depends upon the softness, & why wh: not ail.

contain'd in Bags that are elastic give a fluctuation, as well as Water? the membrane being elastic yield to the pressure; & the pressure being remov'd, it recoils, so we will be cautious in determining the nature of Tumors, We judge better of Steatom, by feeling y^t it is unequal & Lobular, & for the most part when the Membrane is not much distended, it does not readily recoil upon pressure — Another Kind of Tumor is the Sarcoma, y^e name is apply'd by some to the harder kinds of Steatoms, by others to Schirri of the Glandes, so the Schirrus of the Testicle is call'd Sarcocele, or Sarcoma of the Testicle, But we ought to apply it to those excrescences wch do not readily form in the Glandes, do not degenerate into Cancer, & wch do not contain fat; but look like a portion of flesh, tho' the Comparison is not very proper, as we don't find fibres of the Muscles, but from y^e red color we find y^t many red vessels enter into y^e Compos^n. Another Kind of solid Tumor is the Scirrhus. by wch I would mean a hard tumor, generally in its beginning with^t much pain, but after it has enlarg'd, it begins to grow unequal & is attended with pain, is commonly seated in glandes, & if it ulcerates, it degenerates into a Cancer, or the ulcer is perhaps incurable. Now with reg. to all the 3. last kind of Tum^rs mention'd. — The Steatom. Sarcoma. & Schirrus remedies have little effect: none so far as I have seen have discuss'd a Steatom, may they have rather the effect of enlarging it, as y^e rubbing with Ointments, & applying plates of lead to restrain its growth: these by the irritation increase it: & in like manner when us'd to repress Ganglia, y^e pressure not being equally apply'd, y^e sides are squeez'd outwards, & thereby are more affected y^e the Arteries, so y^t y^e effusion from y^e Arteries is increased. the Steatom however tho' it gradually enlarge seldom degenerates into an ulcer a Tumor of a bad kind: tho'

sometimes it does so, & have seen some instances where large Steatoma, or chiefly steatomatous masses, but with a mix-ture of a reddish matter, hard, the Surface unequal: & where after-wards an ulcer appeard, of a cancerous nature, Upon the whole therefore I think it wd. that as soon as the Surgeon satisfies him-self of the presence of a Steatom, he ought to extirpate it; for by merely increasing; y^d. operation is more difficult, while it swells outwards, its roots sink deeper, & it is connected with nerves and vessels of importance. And if the operation is done early the chance is 1000. to one, y^t. there will be no return of the complaint: tho' in a very few Instances I have seen 'em grow up again. With reg^d. to y^e Sarcoma. The danger of y^t. where a fat is mix'd is nearly y^e same with that of y^e. Steatom of very long standing, & their surface un-equal. The prognosis is doubtful; & we are not to undertake the Operation with^t. proper warning. In other Cases, as these to wch. we apply the name of Polypi in the Throat, or vagina, or y^e. excres-cences we call Condylomatoidal in the Rectum, will come to be treated on fully afterwards. Next then let us consider y^e. Surgical treatment of Schirrus, & y^t. degenerating or already changd into Cancer. I shall take y^e. most common, & one of the most dangerous examples of Schirri: that in the Mamma. — The Schirrus in the Mamma. frequently is produc'd by external accidents, next women are expos'd to it in nursing, tho' it is rare even where a violent inflam^n. has appeard, with great hardness, y^t. y^e. hardness grows Schirrus: I have seen one or two where Schirrus could certainly be traced from y^t. cause, but in other cases two times my Fathers observations on large Tumors, I have apply'd y^e. common Emollient Poultice with relief; & in a few weeks, or months at farthest the Tumor was entirely discussd. —

We find the schirrus more frequently growing in a gradual

manner at the turn of life, when y.e menstrual flux has become irregular, or ceas'd altogether, then the Inflam.n seems rather to follow the schirrus, at first there are no marks of discoloring, & very little pain, & it is y.e size of a Walnut perhaps before the patient accidentally discovers it. — Now in order to judge of the necessity of a Surgical operation, we ought to attend to y.e nature progress & the effect of remedies. — Suppose a schirrus proceeding from y.e last mention'd cause, at the turn of life, if nothing is done the Tumor generally enlarges in a gradual way, or more particularly perhaps in the space of 6. months it grows to the size of an Egg, in double y.e time to the size of the fist, or towards it: in some few it remains for a number of Years without increase, but these Examples are rare, By remedies applyd outwardly, or medicines given inwardly, we seldom succeed, in discussing Schirri. I have seen in all 8. or 10. Examples, where tumors in y.e breast; of y.e size of a common egg were discussed whilst y.e patient was us.g Cicuta or a small Quantity of mercury, and in one case y.e vinaigre quatty found to do no service, it was pursued further till y.e mouth was affected, But I suppose we may venture to alledge y.t whatever the cause may have been, if the tumor has continued 4. or 6. Months we shall fail of removing it by medicines in 19. of 20. Patients, As the Schirrus enlarges it becomes more unequal; then gives generally shooting pains, still later we observe swellings of the Conglobate Glands, between the Breast & Axilla; at length y.e skin is discolord, grows to y.e tumor, an ulcer forms, the matter is very corrosive, sometimes y.e branches of y.e larger vessels are corroded & a convuls.e Hæmorrhagy takes place, after a Schirrus comes to break, or to Cancer, y.e patient survives in Misery not above the space of 6. or gen.ly at y.e most 12. mo.ths, rare Now let us from the whole try to determine y.e one third of pa.ts

to determine y.e expediency of performing or avoiding the
Surgical Operation. Many dissuade us from operating, & I am
under: a difficulty in proposing a contrary opinion, & my Father
mentions in the medical Essays 60. cases where the Operation
was done & not above 5. of the whole No. remain'd well a few
years after the operation. But besides y.t y.e patients generally
conceal their Complaint till they are brot. to the last Extremity,
till there is an open Cancer; Surgery in y.e Period was not so
gen.ly understood in Britain, Operations were only practised
in the Capitals. The Surgeons tampered w.th their patients
till they were past all hopes of cure, then sent 'em to Town;
& I am well convinced y.t the prospect of cure is more favour.ble
than has been by many represented. I have kept a regul.r acc.t
of the Cases, where every circumstance was known; since
1767. 15. persons of fashion have had y.e mamma extirpated:
besides one or two very lately: & I find there has been no return
of the Complaint in two thirds of y.t number. I have had nine
other cases of open Cancer, & of these but one can be said to
have had any return: two of these were of the Lip, one of the
Tongue, 3. schirro-cancerous tumors of y.e parotid Gland &.
So I am much disposed to allege, y.t as soon as a schirrus
is found in the breast, after a moderate trial of medicines,
of Cicuta, & a small proportion of mercury, one, or both: con-
-fining the patient to a proper diet, with frequent moder-
-ate exercise, & forming perhaps a drain, as a Cord in the
Side; if after a trial of 2. or 3. months the disease remains
in y.e same state, or seems to increase, we proceed to the
Operation. For what Objections can we raise against it,
can we suppose the patient will be worse, for having re-
-mov'd a diseased mass, w.ch can be of no real use to the

patients Constitution. And the danger attending the Operation, may be wholly overlook'd: the Terror of mind, & the apprehension they are under, is worse than any operat.n you can propose. — Suppose the Schirrus has ulcerated & grown cancerous, if nothing is done the disease will certainly prove fatal & be attended with the utmost misery — I never saw a single Case of an ulcerated Cancer cured by medicines. I saw one Case after the Schirrus had ulcerated & run some time, the whole mass mortified & dropt out, & y.e Skin closed without a return; but I never saw y.e discharge mended by the use of any medicines. — Are we to admit y.e objection y.t when the disease returns it is w.th greater violence? I see this is alledg'd in a vague way, but I see proof of it from no body, & in the Cases I have seen, y.e appearances were just as common, neither better nor worse. — So where a cancerous Tumor or Ulcer can be extirpated with safety, we ought to have immediate recourse to the Operation, & let us attempt a remedy in such cases, as from their situation cannot be removed. — The Surgeon first assures himself of the possibility of doing the Oper.n by examin.g y.e connexions y.e Tumor may have. He stretches out y.e Arm in order to extend the Pectoral muscle, if it then moves y.e tumor upon y.e muscle; if it moves we are sure y.t y.e Cellular substance is not diseased & y.t the Operation may be made with ease, but when upon slackening y.e Arm y.e Tumor can be mov'd on y.e muscle, we may still operate; for I have seen a pretty large portions of y.e pectoral muscle remov'd w.th out any bad consequences follow.g & Albinus was mistaken in imagining y.t a wound of y.e muscle was attended, w.th great danger. Next we examine y.e Axilla, if y.e Glands of y.t may be well'd can be

easily removed; We are not to consider a swelling of ye Glands as an absolute exception to ye Operation, especially if we admit the rule ye a Cancer shd be removed: it will only lead to the improper prognosis, ye ye matter or mass which appears indolent, or is called a Schirrus; has begun to change into Cancer: whenever there is a knot; tho' it is no bigger than a Stone bean betwixt the Breast & Axilla, matter has begun to form, & it is become Schirro-cancerous. But if the swelled Glands are so large & high situated, ye we can't take 'em out, it will be better to decline the oper.n" — For tho' we subdue sometimes, they never fail to inoculate the blood with a cancerous taint; but for the most part they increase to a most enormous size in some cases. — The Operation is a plain piece of dissection. The patient ought to be placed upon a low Chair, & the Surgeon on a higher seat before her; An assisting Surgeon places himself behind the patient wh. an arm over each shoulder, to stretch the skin as the Surgeon cuts; & to compress ye mouths of bleeding vessels till ye Surg.n can take 'em up. The first stroke of the operation is ye Circular division of the skin: & I wo. propose if ye breast is small, not bigger ye.n the fist, tho' the Schirrus is not above ye size of a walnut, ye we shd extirpate the whole: because we can't by the feel determine ye extent exactly; & the cinque ye. part more from leaving any part, is not to be balanced by ye great.r pain but we may however save the skin wch is not discoloured, nor thickened & solides on the Breast: it is seldom ye we need to remove a consid.ble portion of it: Surgeons gen.ly err in remov.g too much of the Skin in ye time of the Operation, they begin at the root of the Breast, & ye skin retracting enlarges ye wound; but whatever portion we remove, we determine ye Glands, each an Incision shd be made. We then

before we go deeper, & we cut it in the whole Circle, before we begin to seperate the Tumor, after wch we will raise y^e Tumor away from y^e parts with ease, without unnecessarily encroaching upon the pectoral muscle, & we ever meet wth considble vessels of the Skin, or imm^a under it, especially if the woman has given Suck; now it will be right to take up these first; for if we wait till the Tumor is removd the patient grows faint, y^e bleeding stops & they are aptt to break out again afterw^ds ——— The Skin does possess somewhat of a muscular power, draws together more in y^e living Body y^n after Death tho' equally warm. — I use the common Scalpel, it is always long enough; if by drawg it the whole length we can get to y^e depth we intend. Suppose there is a bit of Skin y^t has a bad appearance we bring y^t into y^e Circle, & we divide along wth y^e Skin y^e Cellular Substance. The Surgeon takes hold of the vessel with a pair of Forceps, & ties a thread about it, or if it shrinks in he uses y^e common crooked needle. I must begin to seperate y^e breast. And I go on directly lay the part & likewise lay the Eye. tite Iron the Cell^r Subst^ce loose behind y^e Gland, & behind y^e Cell^r Subst. There is a Deg^ree of fat loose, in order to allow y^e Mamma to avoid Injuries: Now we can readily seperate y^e whole mass from y^e pectoral muscle: but if any part of y^e tumor adheres to the muscle, we must encroach upon the Muscle. When we get below y^e Edge of the pectoral muscle we come to the vessels sent off by the Axilla, & we secure these, as we do also those on the opposite sides, y^e branches sent off from y^e internal mammary. Next I examine the Glands if any of these are hard, we make the Incision straight thro' the skin, & we can go the full depth into the Axilla, & whenever we are doubtful with regard to the state of these Glands, such an Incision shd be made. We then turn

skin together, & dress in y^e^ most simple manner. It will be proper to keep an Issue in the part, for weeks. y^t^ a Cancer never returns whilst y^e^ wound discharges freely, wch may be for y^e^ space of 2 months. So my father always advisd y^e^ keeping a part of y^e^ wound open, as wth a Blister, or Issue. If y^e^ disease returns it will be more likely in y^t^ part, & the Surgeon may be blamd for never allowing the part to heal: but I think he ought to disregard this. If a patient part of the breast has remaind, but the airgue issue wh. irritate y^e^ remaining part we wd. put in action under the part, or make a blister, issue, or pea issue in the Arm of the same or of the opposite side. In the Case of schirrus of the mamma, I have said y^t^ y^e^ pat^t^ had a better Chance by an operation y^n^ with^t^ it, but I hope it is understood y^t^ all parts diseasd must be entirely removd. Nay if the pat^t^ complains of violent pains like y^e^ rheumatic there is danger of a return, as these proceed from a Cancerous Indisposition. — Having now explaind the operations proper to the Abdomen & Thorax we now proceed to the operations done upon the neck &. 1^st^ of Bronchotomy. or Trachotomy. by wch you are to understand an Incision in y^e^ Trachea Arteria. — From what you know of y^e^ parts covering it, & of y^e^ manner of respiration, it will be obvious y^t^ y^e^ operation may be performd wthout any considerable degree of danger: The principal one is the Bleeding from y^e^ vessels y^t^ enter the middle of y^e^ Thyroid Gland; wch is situated across the Trachea over it's first Rings, not over y^e^ Thyroid Cartilage, & y^e^ respiration may be continued nearly as well, as thro' the Glottis; as in both Cases they are passive, & unproving y^t^ they are in any measure active, y^e^ activity, is not injured by y^e^ operation. Let us therefore next consider, y^e^ diff^t^ Cases in wch the Operation may be advisable & necessary. — If in deglutition a particle

slipe under the Epiglottis, it may stop in the passage, not meerly from the straitness of the passage, & partic^r. shape from y^e. figure of the Ligaments of the Larynx, but an involuntary contraction will be produced in the muscles, & if, as I have prov'd, we have y^e. power of shutting the Glottis by a muscular contraction, entirely so as to stop either inspir^n. or exspir^n. it must be evid^t. y^t. if any small body falls into the Glottis, y^e. muscles may be apply'd so closely, as to intercept y^e. passage of the Air. Cases have occurr'd of y^e. kind in this place, as one of a child suffocated by a pea, & another of a pat^t. in the Infirmary choaked by a bit of meat sticking in y^e. Glottis, & w^ch. was found on opening the body, dying before relief cd. be got. Next we find in Authors Examples when large Bodies past into the mouth, have slipt back into the pharynx, & by pressing on the Back of the Larynx, have prodac'd suffocation, but y^t. happens very rarely from y^e. yielding nature of the Larynx, & the resistance the Cartilages make to pressure.

Next we wo^d. suppose ourselves m^ch. expos'd to^a. danger w^ch. Experience proves happens very seldom. Suffocation from a thickening of the membrane of the Larynx. The membrane of the nose, tho' it is closely glued to the bones, in aboryza, swells so as almost to intercept the passage of the Air, & the membrane of y^e. Trachea is a contin^n. of this, or of the same nature, so imagine y^t. it wo^d. be expos'd to the same swelling: & in a few Cases no doubt this takes place, I shew'd formerly when considering y^e. disease of the Lungs a priori^n. where the Larynx had been much swell'd & inflam'd, & the patient was supposed to have dy'd of a peripn. but on dissecting the body, the Disease was found confin'd to the Larynx, & w^ch. other cases wo^d. have occurr'd when the Cause cd. be more evidently trac'd, as where there was a necessity of performing y^e. oper^n. in consequ^ce. of swelling from the Lues Venerea

And I have seen an ulcer of a corroding nature, spread from the top of the Sternum up to the throat, & wch at length throat and an suffocation, & occasioned the operation to be done, & y. Patt. continued relieved 6. or 8. months tho' there was still a discharge of matter, & he dyed hectic after the space of a year. — Next we suppose y. wch. be in danger of suffoc.n from a swelling of the neighbouring parts particularly the Tonsils, wch swell readily on catching cold, & I have seen y. swelling such, y.t y. Surgeon was under a necessity of making incisions into the Tonsils to let out matter; & supposing that we are not able to lessen 'em by incision we may be under necessity of making an opening below. —
We still see the necessity of y.s more clearly; if an excrescence grows on the throat, as a Carcoma, I shew'd you an example of y.s at the size of an egg, taken from behind, y.e vel. Spend.s Palato & in the German transactions we have examples when from y. complaint the Patt. has been suffocated. Next I shew you a case when an immense polypus grew from y. top of y. Oesophagus of wch you have an acct in the last volume of the Physic.l Essays it was thrown from the Oesophagi; & Pharynx into y. mouth as low as the Chin. The Oesoph.s was stopped, so before y. Surgeon meddled with it I advised y.m to make a small hole in the Trachea. This case plainly proves y. advantage there may be in extirpating such tumors depending in the throat. —
One further supposition remains y.t the Trachea may be compressed by Tumors situated at the side of it, Particularly in the Bronchocele, by wch Surg.s understand a swelling of y. Thyroid Gland. And Mr. Sharp supposes y.t y.s is the only case in wch Bronchotomy can be of use: but from what we have said he is evidently mistaken. nay it will seldom be proper here, & from the small pipe he recommends, he probably never performed

it, because it is not long enough to enter in a wounded state for life, in this disease, when y^e^ distance is considerable: the oper^n^ may be performed with ease & safety. — The patient is placed in a low seat, leaning backwards, If any substance have stuck in the Trachea, we are not to mind the wound stupor, but to cut in as speedily as possible w^th^ any Instrument at hand for a person cannot be without breathing in^r^ more y^n^ the space of half a minute. But supposing the Surg^n^ has time, he begins the Oper^n^ with a common Scalpel, making a longitudinal Incision thro' the teguments, for if we make it across the Trachea, the Trachea being very moveable y^e^ incision into it wo^d^ get above or below the transverse incision of the teguments. We begin it over the cricoid Cartilage, & from that go downwards for the length of an Inch, we are under a necessity of cutting thro' the Sterno-Hyoidæi muscles, we only separate them, we now bring into view the Thyroid Gland, y^e^ middle part of it is thin, as it consists of two large lobes joined by a middle thin portion. now we scarcely can avoid this Gland, when the neck is very long we may get beneath it, but in gen^l^ a portion of it, will be cut, & as we are unacquainted w^th^ the use altogether, we are apt to suppose y^t^ no other danger arises from y^e^ division of it y^n^ the bleeding, as it is very vascular, y^e^ superior & inferior Laryngeal Arteries uniting here. We next bring into view the Coats of the Trachea, & we ought w^th^ y^e^ Knife to dissect away the Cellular Substance or any other part y^t^ adhere to the Trachea when we intend to cut it; y^t^ nothing may remain in finishing y^e^ Operation, but the thin coat of the Trachea, for if after we open, y^e^ Trachea there is any considerable blood y^t^ occasions great inconvenience to y^e^ patient by exciting a convulsive Cough, therefore we ought wait till the Bleeding

has entirely ceas'd: If there is any internal Inflam.n we allow the Arteries to bleed freely, & yt may save yd Pat.t from the operation, but if there is no suspicion of yt kind, we take up the larger Arteries by the needle, & lay gentle stypticks upon &c. & lint we stop the smaller. we now proceed to make an incision into yd Trachea, wch we do transversely, on act.t of yd Cartilages & might finish yd oper.n w.th the same instrum.t yd knife, but it is easier done w.th a sharp large Lancet, yd orifice flies open so yt it readily receives yd point of my finger, & is convey'd by wider yt yd Glottis, & there is no difficulty of the space filling up afterwards. — Dr Haller wo. persuade us yt an irritation of the Trachea does not produce any very remarkable uneasiness nor excite coughing, & he supposes yt yd coughing proceeds from an irritation of the Larynx, but I have obs.d yt when any matter drops in, coughing was excited, & I have try'd the experim.t w.th a probe, & touch.g yd back, or side of the Trachea, the pat.t was thrown into coughing. Perhaps 4th. after the oper.n it will not be necessary to introduce a Tube to preserve the opening, but in a few days when the Inflame is quite abated, hence in time of the Cure there is a necessity of being provided with a proper Pipe, so large yt yd pat.t may draw a sufficient quantity of air thro' it, & yt will not be readily stopp'd by the slime & matter of the Trachea, to prevent our being oblig'd to take out yd Pipe frequently it is made double, & the inner Pipe draws out easily, so yt leaving yd outer one always in the Trachea, we take out the inner, clean it, and replace it. To secure this Pipe, & support yd end of it from rubbing agt the back of the Trachea, I have caused a machine to be made wch answers very well; it consists of a semicircle thrown over the Trachea, so as not to press upon it, & it is fixed by yd neck

like a common stock, If y.d patient feels an inclin.n to cough he can draw back y.e pipe with the hand till the cough ceases, & the opening being opposite he replaces it readily: The Tegumento in a few days close around the pipe, & the passage becomes almost fistulous: but when y.e pipe is no longer necessary, if the opening closes with difficulty, it is only necessary to touch y.e inner sides of the skin w.th a Bit of Caustic to make 'em raw. — Next the operation for Bronchocele. or the extirpation of y.e thyroid Gland From looking into the works of Surgeons, one wo. imagine y.t this might be done w.th tolerable safety; but we are not to undertake it with.t a great many cautions. The Inhabitants of Mountainous Countries as of the Alps, seem partic.y disposd to the disease; at least the swellings to w.ch they are subject are very frequently in this Gland: & even in this Island it is not uncommon; I may have seen 10. or 12. examples of it. — It is pretended y.t burnt sponge has a convid.e effect in discussing the Bronchocele: but I have known it tryd with.t y.e smallest advantage, nay the swellings of this Gland resist the most powerful mediciness: I have given Cicuta for sev.l months & afterw.ds a Course of Quicksilver pills, till y.e Gums were sore, w.th very little change, only it did not seem disposd to increase for y.e space of 2. or 3. Years. Sometimes it increases suddenly, & there have been many instances of persons being suffocated by it. the late Dr Gregory told me of one Case in his practice: & Dr Cullen has met with Another. As we find y.e growth so uncertain we shd not propose the extirpation when small; when large & somewhat may be necessary, on acct of y.e pressure made on y.e Trachea, but even in this extremity, I wd not extirpate y.e whole Gland, because by this time the lobes have pushd back on y.e Carotid Artery, & a swelling has entangled y.e 8.th pair of nerves

and the intercostal, so if the Gland, notwithstand. y^e use of medicines, is disposd to increase, but is not so large as to push back to the place of the Carotid Artery or nerves, it may be possible to extirpate it: but if it is of a consid.^le bulk, we wo. only attempt to take off as much as strangulates the Trachea: & we may use freedom with it with.^t being afraid of its degenerating into a Cancer, I have seen suppurations in it, & tho you had an ugly look, but resembling Scrophula more than Cancer, so we may extirpate the middle, & this may occasion the rest to subside, & the operation is a plain piece of dissection, only you will find a good deal of bleeding, & as soon as any vessel springs, it is proper to secure it; otherwise y^e effusion of blood will be consid.^le Another complaint to mention'd as requiring Operation & is uniformly describ'd, y^e cutting y^e Sterno=mastoid muscle for the Wry=neck. we wo. imagine y^t it has been done often: but if it has, it has been with.^t necessity, I do not recollect a case where it is proper; I have seen a contraction of one of the maseter muscles, continuing upwards of a year, & treated in vain, & the Sterno=mastoid may be affected in the same way. But when y^e head is drawn aside, then muscles are affected, may after some time y^e bones are alterd in their shape, so tho' y^e Incision was made the Patient wo. receive little advantage from it; so we may have it in view, as a thing y^t may need to be done sometimes, but very rarely In doing it we are not to imitate Sharps method: after cutting y^e Skin, & laying the muscle in view to thrust in the probe Bazor, w.^th the sharp point, the Jugular vein is immed.^ly beneath y^e muscle & we cant judge exactly of y^e depth necessary: we either don't cut it entirely, or going too deep we include the vein: so it is safer to raise the fibres of the muscle upon the director, & to divide these: finishing upon the outerside: then we place y^e head in the proper

posture to prevent the parts of y.e muscle from being reunited till the ends fill up by granulations. —— There is another contraction of the skin from being burnt, if Emollient Applic.ns as oil &c. do no service, we make an incision into it: A good case of this kind you will find in Gooch. —— Passing upwards from the neck we begin to describe y.e operations on the Face, Throat &c. Regains of vision. first the Hare-lip. by w.ch you are to understand a fissure in the Lip, whether natural or made by accid.t The division is almost always in the upper lip: I once saw a Child born with this disease in the under lip, & yet it no easy matter to explain this: we find two Bones in the upper Jaw y.t seldom grow together, in the under Jaw we find 2 original pieces, but there is no division originally in the softer parts. In some cases the velum pendulum palate is affected in the same manner, In a few there is an opening thro' the Lip, thro' the velum, & between y.e two superior maxillary Bones. But the most common is the fissure in the upper lip sometimes two, & then it is called the Labium Leporinum, as there is most of the appearance of two fissures in the Lion & Cat kind. The complaint can only be cured by an operation: If a Child is born with the Compl.t we are directed to operate immed.y but if the Child can suck we wo.d delay the oper.n if not perform it immediately, It is plain y.t for ordinary the Child will not be able to suck, because the Lips can't be drawn close enough to make the void within the mouth: But in a few cases the lips are glued down by callul.s Substance w.ch is no loss, y.t they can bring y.e opposite sides to meet so as to suck. We place the pat.t in a low Chair before us, we first saturate the Lips from any unnatural adhesion with the Gum, w.th a crooked Bistory having a sharp point, & we carry this

Incision a little higher than the Angle where the two sides meet, because the next step of the oper.n is the rendering y.e whole side raw y.t they may grow together, & to be sure of this we ought to cut out the Skin lining the two sides joind at the angle. To do y.t some make y.e Incision w.th y.e Knife, sliding in a bit of probe & cutting upon it: but tho' I wo. discard Scissars from Operations especially where any consid.le Thickness is to be divided, yet I know y.t the scissars do the operation more exactly than the Knife, only they sh.d be made strong as y.r usual, & the Blades short. The Surgeon, in cutting the right side places his thumb within, & the forefinger on the outerside, wiping the Lips dry, to cut away the left side he stands at the right side a little behind the patient & puts the forefinger into the mouth, & I wo. prefer the hand to the assistance of any forceps, w.ch pinch y.e Lip, & give pain, so we make the Incision up to the Corner, & bring y.e two portions cut united, by dividing the Angle, & thus we have the state of the wound fit for growing together, & supposing y.e sides can be brot to unite we are sure of forming a Cure If there are two natural openings, & the piece small, we may cut it out all together, as if there was one opening only. But if the piece is large, we do the oper.n on each side, & if the Lips are not very loose, we ought to finish one cure before we begin the other, as we can't stretch the parts on both sides at once. Next we unite the Lips, some have used only the uniting Bandage, & it has succeeded in a few cases, but it is with a rogue, & we fail in as many cases as we succeed: From the Loss of Substance we don't succeed so well a 2.d time: I wo. trust to plaisters laid on the cheeks & ty.d together, more than to bandage, but the Suture is certainly the best manner of cure: some prefer y.e common interrupted Suture but it has no wid.e advantage, It is a mistake that

a Thread will give less pain y.n a needle, w.ch being round is not so ready to cut the Lips, Having tyd the Thread then is not apt to draw the sides close together without passing new Sutures. We use therefore needles of silver or Gold; but w.th steel points to pass readily thro': after y.e needles are passd; Sharp directs to cut 'em off, but it is much better to have the Steel point to take off, or to have it fixd in with y.e turn of a Screw: otherwise they are liable to drop off, unless they are rubbd with Bees wax. I have made 'em thicker y.n common, a thick pin giving less pain, not cutting the Lips so much. The putting 'em in requires great nicety: we lay the sides together accurately, parti.y the red part of y.e Lips: as the smallest deformity is distinguishable in the Eye, & beginning w.th placing y.e lower parts, we pass our first needle thro' at the very edge of the red part of the Lip, y.t there may be no fissure left; the 2.nd is to be passd very near the upper end: that you may not leave a fistula; & two in many cases will be sufficient, but we had better make one too many y.n one too few, & therefore in general 3. needles will make the best cure, & we introduce the 3. exactly half between y.e other two. & now I take off the points: We next draw y.e Lips of the wound together with a thread, and we may either have a thread for each pin, or make one serve for all. But I wo. rather apply a thread for each, y.t we may alter any part at pleasure, & we are to begin drawing y.e threads in the same order, y.t we applyd the needles, by the crossing, y.e Threads, I press together the sides of the Lip; filling up the space exactly: & having a sufficl. No. of turns; I then tie them & cut off what may be superfluous, & thus we have formd what is called the twisted Suture. When there is a consid.e retraction, we make an additional incision, by applying two broad pieces of plaister, one to each cheek, with a small bit y.t comes over the Lips, & making sides in'so we compel them

together. — Le Dran advises to take out the pins in two or 3. days, but we leave em till the Lips are sufficiently united wch may perhaps require the Space of a Week. — Now these directions will apply to a fissure in any other part, I have seen a division of the upper Eyelid, & I directed a few threads to be passed thro', the pins wod have hurt the Ball of the Eye. — If the velum pendulum palato is divided, in some few cases when there is no contraction, it may be possible to make a cure, but when the retraction is considble it will not be easily done. —

It is likewise evident of after extirpating a cancer of the Lip, we may join the opposite sides in this manner. Old persons are subject to this complaint, the Lips of the Teeth disprove to it, ye Lip falling inwards is hurt between the Jaws, or turnd outwards & exposed to the Air, now ye very Circumstance enables us to join ye sides together, & we may frequently succeed so well yt we can't discover any deformity. —

Lecture 9th

We have explaind the operation necessary in consequence of Cancer in the Lip, yt where the portion is small & the Lips loose: instead of cutting out only the diseasd portion, perhaps of a round shape, we bring the two sides to meet in an angle; by wch every part of the raw wound can be made close. — But the Lip is frequently affected in a manner resembling a cancer, particularly from a venereal cause, & yet is curable by Mercury. — When there is no other appearance of venereal taint, it may first break out in the Lip, just as we see it frequently break out in the Throat. We now proceed deeper in ye Mouth to a No of Operations wch from their frequency & advantage to the Patt much merit our attention. — I begin with shewing you the

Instrum.t named Speculum Oris, for opening the mouth, without allowing the patient to shut it, & another wch is an improvm.t by wch whilst the Jaws are held asunder, y.e Tongue is held down. But tho' by these Instrum.ts we can command the Jaws, it is impossible to fix the Tongue against the will of the patient, & if the patient chooses to submit we can manage with.t 'em: In a few cases however they may be of some little advantage. Suppose it is necessary to scarify or lance the Throat, the common Lancet wo.d be in danger of hurting the Tongue &. & the patient might start against his will, so we use a Lancet conducted by a Canula, wch too has a spring y.t throws back the Lancet: and my Father has added a pin to the Stalk upon wch the Lancet is screw'd, for regulating the depth of the Incision, & we may use a Spatula or any piece of flat metal for holding down y.e Tongue: the lancing the Throat, will be found useful in diff.t cases, as where y.e Amygdale swell so as to prevent deglutition & seem to endanger suffocation. Both Dr. Black Sen.r & Dr. Adair were subject to a sore Throat, & after scarifying it, y.e swelling determin'd to extend the cure: but in most patients, y.e remedy is worse y.n y.e disease, & I wo.d not recommend it in general practice, but if the Throat is disposed to swell mch it may be useful. — Next it is convenient when a suppur.n has begun, for letting out the pus, & preventing the corroding matter to spread & destroy y.e part. for as soon as we discover a suppur.n in the Amygdale we ought to plunge a Lancet in: And in y.e malign.t Sore Throat it sometimes happens y.t the velum pendulum palati mortifies: & scarific.n is necessary to promote y.e suppur.n Next suppose y.e Frenum Linguæ is too short in ch.n wch prevents their sucking: the cannot waft y.e tongue sufficiently about the nipple, & it may also prevent 'em from pronouncing

Barnaba

some of the letters, as the hard C. or G. will require y. Tongue
to be raised higher back in the mouth, so y. they use the T. D.
in place of 'em: A Sister of a family who pronounced the Letters
in y. way, was married to a Physician in Town, he prevail'd
upon her to have the Frenum cut and since y. She pronounces
the Letters properly. The operation is best executed by a pair of
Scissars, covered with a bit of slip metal: or we may use the
common probe pointed Scissars. An Assistant stands be-
hind the Child, & fixes the Jaw with his hands, &c. His fore-
fingers raises the Tongue to stretch the frenum, y. n. y. Lingua
applies the Instrument between the Tongue & y. mouth of y.
inferior Maxillary bone on either side of the frenum. ——
Petit observes y. when y. Incision is made too deep, or is nat-
urally too long y. Tongue is sometimes inverted into y. mouth
drawn into the throat, & fixed there by a convulsive action
of the muscular fibres so as to occasion suffocation: he tells us
y. he has repeatedly drawn it from the throat, & has seen
some expire w. th y. Tongue in y. situation: so we may have
y. in view as a possible case. — Next suppose y. a swelling
is formed under the Tongue, y. Rana. or Ranales, such a
swelling as occasions an alteration of the voice y. patient
croaks like a Frog: this happens in a species of Angina
named y. Mumps, where the swelling is external. But
what I mean is a Chronical swelling under the Tongue,
in general affecting y. inferior maxillary Gland on one side
only, in a few on both sides, & a fluctuation is felt between y.
Gland and Tongue. When the matter is let out it is not
purulent but resembles the glair of an Egg, & in quality
Saliva deprived of its thinner parts. — The manner of treat-
ing the disease is the same with the other Species of encysted
Dropsy, by an incision to irritate y. inner side of y. Cyst:
so as to occasion a contraction: & I have seen y. cure the

the patient. But since, I have found out what is the common & almost constant cause of the disorder, viz. Stones in the duct of the inferior maxillary Glands: I've met with 12. Examples of y.t kind, some of w.ch had given uneasiness to the patient for 5. or 6. years, & they had been subject to very consid.le swellings. We generally find the Stones at the mouth of the ducts, all the ducts of the Glands being contracted at their openings: but in some cases I have found'm an Inch from their orifice; So in the case of such a swelling, we examine y.e whole length of the duct with the finger, & if we discover the Stone, & can get it out with the Knife, or Lancet, we remove the cause of the disease. The healing of the Duct is prevented by y.e flow of the Saliva, but the orifice contracts, & the food or drink instead of entering the duct, squeezes it together, y.e obliges passage serving the purposes of a valve. Under it there are a N.o of raisings w.ch are the mouths of the Sublingual duct, w.ch we can distinguish w.th the finger, & we ought to avoid y.t Gland in making the Incision, & going farther back there is a consid.le nerve from the 5.th pair running to y.e point of y.e Tongue, & we are to keep y.e stone between us & y.e nerve. ——— Now tho' gen.ly y.e swellings are produc'd by the Stoppage from such a Stone, yet y.e may not be y.e only cause. There may be a distention & rupture of y.e Branches of y.e Salivary duct, wh.t taking out the Stone may not prove a cure. But if y.e Disease continues we are not to make the Incision of it lengthways. We wo.d imagine y.t y.e parotid Gland w.d be equally subject to y.e Complaint, yet I have seen no examples of it, & perhaps it is prevented from the smallness of the duct & its Cylindrical Shape not allowing any such concretion to form; while y.e other duct is large & loose, wh.t the Ptyalism can pass on while a concretion forms in y.e side of y.e duct. But it is more exposed to external Injuries. By an accidental cut it may be divided, or in consequ.ce

of an operation. I attended a Case with Mr. Wood where a Schirrus as large as a walnut had formed affecting one of the Coats of the parotid Gland, & not in the common Cellular Substance. We endeavoured to avoid cutting thro' the Trunk in seperating the Schirrus as far, but were oblig'd to divide it at y.e edge of the Masseter. when the Skin was shutting the Saliva run over the face, Still however not being certain y.t the Trunk was cut, we trusted the Cure to nature: as we cou'd still make an Artificial duct if necessary. When the Skin clos'd the Tumor seem'd to grow, & it had fluctuation, so we concluded y.t it was from the Saliva pour'd out from the cut duct; we therefore slit open the Sack, & now made an Artificial Duct. — That operation has been propos'd long ago by different Authors. Le Dran &c. propose y.e actual Cautery, a hot Iron to be introduc'd obliquely in order to close the sides of the duct. My Father mention'd to an Improvem.t of a Seton wh.h be propos'd & this waited from time to time with some Astringent Substances. We endeavo'd at first y.e Seton, as the ends of so small a pipe cannot be accurately united we must make an artificial passage into the mouth: so we introduce the Seton by means of a Lancet fitted to a handle, w.h an Eye in the point of it, in an oblique direction, bringing it out as near as we can at the natural place. The Seton being entir'd withdraw y.e Instrum.t & tie the two ends of the Cord to each other upon the Cheek; & we move it a little from time to time. — We continued y.e Cord in this manner for ab.t 10. days, & made it of a large size, y.t y.e orifice might be sufficiently large: we then drew it out & introduc'd y.e common Bougie for some days, till y.e sides of the opening were made smooth & round by it. But still we cou.d not in this way complete the Cure, y.e saliva still flows over y.e Cheek, for the inner passage being made slanting it had more ready access this way. We therefore next introduc'd a

a small silver pipe by means of the Bougie, fitted to y.r opening into y.r mouth: & secured it by a double thread brought out & tied over a bit of Lint upon the cheek: the external opening now closed on the thread, & after some time y.r saliva run into the mouth as well as on the other side as y.r in this way we made a compleat cure. — I need scarcely be particular abt the extirpation of y.r parotid Gland for in 2. cases I have cause'd considle portions of it to be extirpated in a scirrous state: & y.r remaining parts of the Gland shrunk from the Inflam.n & no flow of spittle follow'd. Where the whole of the Gland is extirpated, from y.r large communications between y.r Arteries, both their extremities must be secured: & we must expect y.t the patient will have a degree of paralysis in y.t side of y.r face, from the portio dura of the Auditory nerve passing thro' this Gland; & in a case where this operation was done, I did not observe that y.r Eye did or parts of the cheek after we'd I saw had recovered any degree of firmness. — — — We next proceed to the

Operations on the Ear.

And first the perforating the Lobe of the Ear, wch is an operation not commonly in the hands of Surgeons, but wch ought to be in the hands of them: for as it is commonly performed it is a painful operation, & I have seen a considle Erysipelas bus.l on the Side of the face, perhaps a good deal owing to y.r bungling way in wch it is performed: tho' one of the nerves of y.r Ear might have been wounded — I have got an Instrument for the purpose from Dr Lind, it is a small Lancet wch takes out of a Canula, we support the Lobe of the Ear wth a bit of Cork, and choosing y.r proper place, we enter the Lancet, & bring it thro' into the Cork: & taking away the Lancet sticking in the Cork: & draw back the Canula, with a piece of Lead or Gold, wch we keep in till the parts grow callous; or we may take y.r common pin

519.

for the Ear lies. I formerly remarked y.e possibility of seeing to the bottom of the external passage of the Ear w.th the Light of the Sun, provided the Pole of the Ear be drawn backw.d the Light falls over the Surgeons shoulder, & he can see the membrane of the drum distinctly. In this way I've been able certainly to know y.e cause of the patients complaint so may be much assisted in directing the Cure. — The complaints, viz. dullness of hearing & pain, are occasion'd from various circumstances w.ch the Surg.n can remedy: & first y.e dulness is more commonly brot on by way stopping the passage y.n by any other cause. So that y.e first be examin'd. If we disc. y.e wax in the Ear, it will be difficult to force it out surely by Injections: the Surg.n must first take it out with a sharp pointed instrum.t for he is in danger of bursting y.e membrane of the Drum. — So the Injection is merely a way of moistening the wax: and warm water is found to answer y.e purpose of dissolving y.e wax better y.n any other innocent Liquor, as Soap & water, or the Gall of Animals. Suppose any firmer substance to be impacted: as y.e an Insect has got into the Ear, as we can bring the external meatus to be in one streight line, y.e Incisions proposd to be made in it, when it makes ito turn, where y.e Cartilage joins with the Bone are unnecessary. Suppose a peas to stick in the Ear, a pair of forceps may lay hold of it, or what will answer better a screw, when there may not be room to introduce even a small pair of Forceps. In like manner we can reach any Insect, or if it is a breathing Insect we have only to kill it with oil. — Next the Ear is subject to Inflam.n & all its consequences, here all the nerves are upon the stretch from the Annexions of the Membranes to the Bones, w.ch circumstance increases the pain, & renders the cure more

difficult: & if an ulcer forms here, it is constantly irritated by the wax, & by the stagnation of the matter: we assist by washing the Ear frequently to prevent the purulent matter from stagnating, & this may prevent an absolute deafness from taking place, whereas if we neglect this y.d matter may penetrate deeper, and even occasion death. Next in consequ.ce of inflam.n & suppur.n of the Ear there may be a growth of fungous substance: The deafness may not only proceed from an erosion of the parts, but from a growth of flesh. I have examined the Ears of the Child.n under the care of Mr. Braidwood; in some there is an erosion of the Drum, in others a growth of flesh, in its progress there is first a granulation, then a larger mass, then the appearance of polypi hanging out of the Ear, y.e root of w.ch occupies the whole circle of the Meatus. When it has made this progress it is in vain to attempt an Operation: but we may repress it, in its beginning by Astiptic Medicines, & by making a discharge near to the part, as a perpetual Blister &c.e w.ch also may be of service when there is a suppur.n in the Ear. But the deafness may also be owing to the State of the internal parts of the Ear. Unless the Air of the Atmosphere is conveyed to the cavity of y.e Tympanum by y.e Eustachian Tube there is no distinct hearing: so if after the extirpation of a polypus for instance y.e dulness of hearing continues, it is probable y.t y.e end of the Eustachian Tube has been shut by its pressure, y.t a concretion of the sides has taken place, so that there is no current of Air to & fro. Or in the case of bad Colds, where the membrane of the nose is swelled, y.e Inflam.n may be extended to the Eustachian Tube; or a person may be born w.th the Complaint; when a person has a dulness of hearing after a Catarrh, it has been proposed to prevent any disease of y.e Eustachian Tube by means of Injections: & in y.e Philosophic.l

Transactions we have Instances of persons being cur'd in y.
way, I doubt much with reg.to the efficacy but I shall shew y.meth
od of making 'em, It has been propos'd to enter the Tube by the
Mouth; but others more properly direct to enter it by y. nose;
having previously bent the Instrum.t on a skull for the purpose,
directing it towards the Throat, then turning it sideways tow.ds
the ear. we then introduce the forefinger into the mouth, & can
touch the mouth of the Eustachian Tube, with the point of my
finger, so we can direct the point of the Instrum.t into it. But
what are we to expect from this? we might as well cure a
Catarrh by injecting into the nose, a trial however may be
made with.t much uneasiness; but we must chiefly attend to
the possibility of a total stoppage: & to a possible means of re-
moving y.t By means of a Canula, we can enter a sharp
pointed Instrum.t to cut into the Tube, & next we can introduce
a bit of Bougie. And supposing y.t we have made attempts
of this kind with.t success, we may perhaps cure the Pat.t of
the deafness, by making a small hole in y. mastoid proces;
the bulla of w.ch communicate w.h y.d Cavity of y. Tympanum, so y.
Atmospheric air might enter, & in some cases y. might be
worth a Trial. Before we leave y. Complaints of y.t form about
the Throat, we may notice y. method of treating patients when
some substance has stuck in the Oesophagus, a piece of
Meat for instance. Surgeons often im.ly have recourse to a bit
of Whalebone w.h Sponge, to w.ch a piece of thread is ty'd, & with
this they endeavour to force it down: but at first we are to
try to throw it backwards, & if there is any watery liquor
in the Stomach, it may be readily thrown up. But suppose we
fail, if the substance is liable to dissolve by remaining
long exposed to heat & moisture, unless it intercepts the

Patients breathing, we need not be anxious: In such a case I have left a piece of meat alone, & it went down to the Stomach in 24 hours, I suppose half digested. But suppose we can't otherwise get rid of it we force it down with this Instrument w.h we can almost reach the upper orifice of the Stomach. ——

We have a case from Dr. Cleghorn in the Transactions of London where a person had swallowed a feather, & to bring it up he employ'd an Instrum.t with sev.l Loose threads by the twisting of which he entangl'd it, or in place of threads some recommended small wires to be ty'd to the end of a Bit of whalebone but the wires are more apt to hurt the patient. ——

Lecture 97.th

We next proceed to the treatment of Tumors growing ~~in the~~ in the diff.t Cavities, in the Rectum, Nose &c. & to save time we shall treat of them altogether, not only because y.r method of extirpating 'em is similar, but because in texture they resemble each other very much, as the sev.l parts in w.ch they are produc'd, are cover'd w.th nearly the same kind of vascular & mucous membran. There are some few things however special, & more supposed to be so, so we must mention 'em singly, & shall begin with the Hæmorrhoidal Tumors. You'll find y.r reasoning concerning the frequency of the cause of these is by no means well founded: neither have Authors conceiv'd just Ideas of their Texture. ——

1.st they imagine y.t we are subject to Hæmorrhoids from y.r particular course of the Blood here, w.ch is supposed to ascend to the Liver from the Vena portarum, so is more apt to stagnate. But y.r common seat of the Hæmorrhoids is beyond the System of y.r vena portar: y.e vessel at the extremity of the Rectum is particularly affected w.ch receives its blood from the Internal Iliac Artery, & returns it to the Internal Iliac vein: So we must explain the frequency

from the use of the part, y.d nature of the contents: y.d situation of the body, y.d pressure to w.ch the part is subjected, but chiefly from the irritation & unequal distention of the contents. Next they speak of these Tumors, as if the veins were swelled out & became varicose. now I am far from denying y.t veins may be found varicose ab.t the Rectum, perhaps more frequently than in other parts of the Body: but we are by no means to suppose, y.t the large swellings depend upon any considerable degree of varix. From the suddenness of the swelling we must imagine y.t there is an effusion, or extravasation of the blood into the Cellular Substance, or membrane: & on cutting into several tumors of this sort, I have seen clotted blood in y.e Cell.r Substance, but we can't trace any large vessel into it: So we are not to suppose y.t the danger of an Incision here bears any exact proportion to the size of the Tumour, the vessels communicating with it are larger; but we are not to believe y.t we are cutting into a blood vessel, & it is evident that there are excrescences here resembling these that happen elsewhere in the body: the blood when the Skin is tender & irritated, & the blood distends 'em suddenly to a greater degree. So this Idea of varix constituting the principal Bulk of the Tumor is to be rejected: & we are not to conceive this to be owing to a dilatat.n of vessels pouring out blood where they are thinly cover'd, & y.t it is a salutary discharge. We are not therefore as they do in Holland, to congratulate a person when this Disease forms: we might as well congratulate him for having a polypus form'd in the Nose. It is alledg'd y.t the discharge removes Complaints, & y.t y.e stopping of it brings 'em on, but y.e only proves y.t the discharge has become habitual. A Person's constitution may be such, as y.t it prepares more blood y.n is useful: but nature will probably correct this in some other way, & when we consider the danger of the body being

habituated to this discharge, it is certainly proper to 153 5th L.
check it at first, & to remove the cause, for it proceeds from
a portion of the body being diseased, gen.ly at first a small
part, An operation in consequence of Hemorrhoids wh. be com.ly more
frequent than it is, & a great deal of pain & after danger
might be saved. As soon as we have obs.d y.t it is fairly formed
let us try its situation, & attempt to get it out by an oper.n
& the operation is not so painful and dangerous as has been
supposed: it is over in about 3. days, & it does not occasion
after y.t is dangerous to life. Next you have seen polypi,
Sarcomata or fleshy like excrescences, for the name of polypus
is improper, as it supposes y.t there are a number of feet or roots.
Surgeons have taken the name from the Analogy of Polypi
within the heart, when the knot sticking to y.e diff.t muscular
fibres has y.e appearance, or they may have taken the top of a
Sarcoma for the root, wh. branches out into several fangs. ——
In the Rectum & in the vagina y.e tumors are for the most part
red colord, tolerably smooth upon the surface, particularly those wh.
grow within the vagina, wh. are softer y.n the Tumors y.t form
within the Rectum. But both when irritated especially the
Hemorrhoidal Tumors, in elderly people, are in danger of
degenerating into cancer, & opening a comunic.n between
the Rectum & Vagina in women, & bladder in men. next let
us attend to the diff.t kinds of tumors y.t form in the mouth
Besides the swellings of the natural Organs, preserving their
natural Structure, & not changing much in their Color and
consistence, as of the Amygdala &c. We find in the nose several
diff.t appearances, 1.st I shew you within the Antrum maxillare
a bag containing slime, very much resembling y.e wh. is
naturally secreted: so it is probably one of y.e nat.l follicles,

the orifice of wch is shut, & the mucous bag afterwards dilated: but this a singular occurrence. At first for ordinary ye swelling feels softer yn if you suppose the natural membrane merely to be extended with out undergoing any change, the Color is diffr from that of the natural membrane, it is much paler, ye vessels on its surface are not so numerous, as before seen, & when cut into the vessels shrink back between the membranes of a Nr of Cells filled with watery or slimy Liquor. With time ye tumors grow deeper colord & harder, & we obs. a difference of consistency in diffr parts of the same Tumor. When they are redder & softer yn ordinary they are disposd to bleed, to run into Cancer & corrode the bones, but ye appearances may be diffr & the consequ.ces the same. In the throat ye tumors never have that softness, tho' the membrane is similar: from ye R. Ch. beginning it resists ye finger more, & wants ye unimpregnated tetters in the color, feel, & when we cut into it. And what I allodge of the back part of the throat, applies to ye lower parts in the Pharynx & Oesophagus, only the membrane of ye Oesophagus is more dilatable, more soft, & spongy yn the membrane of the Pharynx so the Tumors here, are of a more spongy nature. These Tumors are little chang'd by medicine: Bark, Saline purgatives, Cicuta, mercury &c. have no effect. So we must treat em merely by operation, we must destroy em whether with the Caustic, Knife or Ligature according to their seat. 4ly It is common to employ astring.t substances, & in failing to have recourse to caustic: but from the former I have great doubts if in practice we shall derive much benefit, I've known the softer kinds of polypi washd rec.d months wth strong Solutions of white vitriol, Sacch. Saturn. Alum. Crude Sal. Ammoniac &c. with out any remarkable effect, ye tumor remaining nearly

= Injudiciously

the vame. Next Caustics are for y.e most part injudi-
cial apply'd, & perhaps it is better to reject 'em altogether, for the
caustic is only made to touch the lower part of the Tumor, Before
the Eschar we form throws off, the Tumor is as big as before:
Besides the irritation of the Caustic in broken Constitutions
may be dangerous, and induce Cancer. Apply'd to tender polypus
of the nose, it has had the desir'd effect: but supposing it to be so
large y.t we can only touch the lower part, we shall make very
little progress. — Let us therefore indeavor to extirpate the
whole Tumor, & then destroy the root, whether by Caustic or any
other means. — With regard to the extirpation it is evid.t y.t y.e
Ligature, when it can be apply'd is to be preferr'd to the Knife
or Scissors: nay when we can use these we will generally be
able to apply the Ligature. But it is right to be acquainted w.th
the various kinds of Knives or Scissors w.ch may be employ'd. —
We use a knife with a blunt point, & w.th a gentle Curvature:
& are provided with Scissors of different shapes, straight &
bent diff.t ways: but I have seen an Hemorrhagy produced
by the use of these Instruments w.ch cd. not be restrain'd by
any astring.t Substance, nor even by the Silver Caustic, a
actual Cautery: & y.t obt. be another reason to deter us from
their use. In some cases it may be impracticable to apply
the Ligature: Thus suppose the polypus is rooted deep in
the Cavity of the nose, & y.t the Bulk of it lies with fills the
nostril, & perhaps some of the turns of the Spongy bones come
in the way, in this case we must pull away the polypus w.th
force by the forceps, & we have 'em of very diff.t kinds, what y.e
workmen generally give you, are the most generally useful,
but they are commonly made too weak. Some have propos'd
to cut the ala nasa, but not m.ch is gain'd by that because

the straitend part of the nose is deeper, the straitness is occasiond by the Bone, when the polypus hangs down behind the velum pendulum palati, you recommend it we shd. cut it but that may be avoided, by having the forceps crooked, as I shall shew you another way of treating these, so we may confine our views to this common instrumt. we guide it as far as we can towards its root, at the same time taking hold of the polypus with a pair of small forceps, yt. it may not be pushd back so as to straiten yd. passage, we then grasp it firmly, & give it a twist at the same time, If it breaks about the middle perhaps; the Surgeon applies the forceps a second time. And he shd. do his operation with the Sun shining into the nose: as with the light of the Sun we can see into the top of the nose, & look round the whole Cavity, observing yd. place and manner in which polypi are rooted. After it is broke away, we restrain the Bleeding and destroy the root: but as this is also necessary, after the use of the Ligature, we shall shew the way of doing it afterwards. — Next suppose there is room to use the Ligature, in a Hemorrhoidal tumour without: pose: it sometimes happens yt. the root is smaller yn yd. body: in this case, we tye the thread around the root only, taking care not to include more of the coat of yd. rectum yn is diseasd: But they are generally flat shapd: in yt. Case with the common crooked needle, we bring a double thread thro' the Root while the Tumor is held out from yd. Rectum with another needle pass'd thro' the middle of it: yt. threads are then ty'd upon the two sides nearly in yd. way recommended by Chevelden, for Schirrus Amygdala, & the Surgn may have the two threads of different colors, yt. he may divide 'em with certainty; & to prevent the thread from sliding it will be proper to make yd. Surgeons knot, to grasp yd. thread

twice. Next suppose the case a Schirrus of y^e. Amygdale, and I wd. also lay the Reason that y^r. Complaint is by no means so common as Shevalier and others have alledg'd, an operation in convey. of it will seldom need to be done; in a little time y^e. tumor subsides; & Warner mentions a case when by scarifying the Amygdale the bulk was greatly diminish'd: now w^th. proper medicin & regimen, & y^e. promoting a free perspir.^n by means of a flann^l shirt, w^ch. in the case of polypi w^ch. have a disposition to bleed, as the Sarcomatoidal; is of more convey.^ce. than is commonly apprehended. But suppose I say y^t. a Tumor is found in a deep Cavity, as in the case of Schirrus of the Amygdale, we grasp the thread, & to fix it we make y^e. resistence by pushing a common probe with a ring upon it, w^th. the one thread, beyond the Tumor, while we draw the other thread towards us. — Next suppose y^t. a Ligature can be passed over the Top of the Tumor, & bro.^t to the root, I take a Bit of thread & form a ring, & convey this ring into the throat or Cavity often w^th. a pair of forceps, & by opening these we draw the Knot: but these neither convey the Ligature rightly, nor is there room for opening the forceps to pull the knot: So we prefer a ring contriv'd by Heidanus: as here I shew you one upon y^e. same principles, but better adapted for polypi in the throat, contriv'd by Mr. Dallas. In order to treat y^e. large polypus I shew'd you, the Tumor by the irritation & effort of vomit.^g excited by introducing y^e. Instrum.^t was thrust thro y^e. ring, & pulling the thread he drew back the ring, & thus cut off a large part of the Tumor with convid.^n to the patient for some months tho' the Tumor swelled again and at length killed the patient. —— Now in this case I have since this y^t. we might have done somewhat more: but before I

Spud

with a needle fix^d on a long handle

mention the measures y.t afterwards occurd to me, I shall shew a method in wch Tumors of the throat, can be readily manag'd, when they hang down from the nose, It is founded upon one proposd in the French memoirs by Xavret, who as an Accoucheur, was led to treat of polypi of the vagina & uterus. He employd a piece of Silver Wire, which by means of a double blowpipe join'd together, & pressed down upon the root of the polypus, he might make it twist, or in this way he contwist the wire. He afterwards treated of polypi of the nose, & throat, but says y.t this method can't apply to one, supposg y.t it was be intolerable for a person to bear a double wire passd into the throat. But a method of using it occurrd to me in a partic.r case, of a large Sarcoma growing from the back of the partition of the nose, the root of it was an inch in diameter, & the body of the size of a large hens Egg. The Symptoms were these, y.e patient was sensible of heat and uneasiness in the part, with a degree of stophage, at length this was total, says there was a lofs of smell, he now began to complain of violent Headach, attended wth great drowzinefs, the Tumor pressing on the intern.l Jugular veins, then he had a dullnefs of hearing to a great degree, partic.ly in one ear, the Tumor pressing on the end of the Eustachian tube, then there was a difficulty of swallowing, & the breathing came to be affected, the breathing being so near to the top of the Larynx: & in the German transactions we have an Instance of a person being suffocated from this cause; it was hard to the feel, & yet the patient was so much reduc'd by the lofs of Blood from it, that y.e Surgeon was afraid to undertake y.e operation lest he sh.d die in his hands. We took a piece of wire, a piece of Catzgut will serve equally well, it is abundantly tough, &c. y. oil prevents it from rotting, says it may be worn for many Days, this we passd thro' the nose, & brot it down to y.e back

of the velum pend. palat. between the Vel. & Tumor; & open.
the wire with a finger in the mouth, we push'd it back behind
the Tumor, whilst with the other we drew it up to the root of the
Tumor, & with the Blow pipe straiten'd it. The Tumor separated
in a few days: & I have seen 4. tumors treated in y.e manner
with. any return. In a Case where the uvula had grown into one
of these tumors, was as big as an Egg and the pat. in danger
of suffocation from the Tumor rubbing on the Os hyoides.
I propos'd to pass a piece of Catgut into the mouth, y.n to draw
it forwards & tying it over the Tumor, stopping it close. it sep-
arated in 5. days, & going into the Stomach in the night time,
occasion'd a Diarrhœa. The Edges filled up with flesh, & except
the want of the uvula, there was hardly any visible defect.
Where the whole Tumor is not disengag'd, we touch it w.th Caustic
w.ch we convey to the root by means of the Caustic Conductor
& the finger, and the finger, moving it from one part to
another, & repeating the Operation for sev.l Days, w.ch will
in a great measure prevent the return. We now proceed
to consider the manner of extirpating y.e Tumor deep in the
Oesophagus from the very root, in such a Case, viz. as that
treated by M.r Dallas. By passing a thread into the throat
we provoke vomiting, & can distinguish whether it is on the
fore or back part, so y.t upon the next effort of vomiting we
pull the thread forwards or backwards, bringing it over
the Tumor, & thus it goes down to the very root, & we can
tighten it by passing a flexible Tube down into the throat
thro' the Nose, & thus we might disengage the whole. ——
The last circumstance remaining is to stop y.e bleeding
in the Cavity of the Nose, suppose we first attempt it
with Caustic, w.ch at the same time destroys the Root of

the Tumor, tho' this fail we may use the method of
Le Dran, viz. to stuff the nose, & to prevent much blood
from being discharg'd if the nose can contain, wch can't
exceed a few ounces; we take a bit of Sponge tent, dipt in
some plaistery substance, & introduce it into the back pt
of the nose by means of a piece of Catgut; & another
piece can be intied into the throat: we tye these together,
& the Sponge swelling, plugs up the cavity compleatly.—

Lecture 98th

There is one further Complaint of the Throat & passage down
into the Stomach wch it might be expected I shd speak of viz.

The Constriction of the Oesophagus.

De Haen gives 10 Examples of this Complaint, in his Treatise
De Deglutione Lues: I have seen 6 Instances of it, & in three
of them who died a dissection was made. In the first there was
a Constriction of the Oesophagus, wch appeard like a Ring on
the Outside, & on laying the part open we found the Constriction
increas'd by a fungous substance, like the point of one's thumb,
& wch seem'd to act as a valve, as the pat had the utmost diffi-
culty in swallowing, but found it easier to vomit.—
In the second Case there was a constriction of the Oesophagus
at the Top of it with much swelling. In the 3d Constriction
was near to the Stomach, & their was a great bulk of Carti-
aginous like substance, with fungous matter.—
In the last volume by the College of London we are told by
Dr. Monttley that he has reliev'd persons in this Situation
by a course of Mercury, & it is one of the most probable
Remedies we can employ: But I have try'd it in three
Cases to no manner of purpose.— Perhaps some

assistance might be given by the Surgeon: if y. constriction is near to the beginning of the Oesophagus, w.ch is y. most common place, from the food passing out of the wide pharynx into the Cylindrical Tube; and we can judge from the feel of the Patient by making him swallow some Liquid, & also. how much is retain'd: as we can introduce a flexible Tube, Catheter, or Whale Bone. Now in this Case we might make an Incision at the Side of the Oesophagus: the operation is dangerous, but supposing the Constriction to be insuperable there is no Choice. —— If it is deeper we might perhaps treat the Oesophagus, as we do the urethra when it is constricted by the use of Bougies: were we to pass a Bougie thro' y. mouth it cd. not be supported, but we may pass it thro' the nose, & to it we may connect a Sargue Instrument. a Gallows Tube passd into the Oesophagus, & thro' w.ch Liquid food may be poured into the Stomach. — Perhaps the cases treated w.h Mercury successfully might be owing to some venereal Taint, when sometimes a considd.e difficulty of swallowing takes place. —— We next proceed to the Trepan. — When I formerly demonstrated the several Integuments of the Cranium, I mention'd the danger attending wounds here; so we are now to confine our views to disorders affecting the Cranium, or the Encephalon, the Brain & Cerebellum. And in order to distinguish where operations may be necessary we ought to understand y. various ways in w.ch these parts may be disorder'd. First y. Brain & Cerebellum may suffer in such a manner from concussions as to kill the Patient, & yet upon y. most accurate examin.n of the Head after Death, we are not able to discover any lesion of the Cranium or of its contents: with.t finding any

breaking of the Bone, any bursting of the Vessels, or
Laceration of the Medullary Substance? —— Next we
find Animals kill'd by a stroke of Electricity or Thunder, & yet
there is no consid.e Lesion. We find ourselves at a loss to
understand the possibility of this because we do not
know in what Life consists. But if we add to what I
mention, that persons lay as pale from a height, with the
feet uncovered, have remain'd dissolv'd in their senses
for many years. Or a person knock'd down w.th a Stick
remains insensible for a few minutes, but afterwards
perfectly recovers, & this is more inexplicable than the
insensibility with the recovery, so that we can't doubt
of the possibility of Death from concussion with.t any
discernable Lesion. — But in other Cases of Concussion
the shake, bursts the vessels, & occasions an extrava-
sation. 11 Years ago I examin'd the head of a French
prisoner who was kill'd in trying to make his escape
from the Castle, he pitched on the feet, & there was no lac-
eration of the Tegum.ts but I found blood extravasated
not only upon the Surface of the Brain, but within y.e
Ventricles; And we are inform'd by a Physician in
Holland who has examin'd y.e appearance of the Brain
in Sheep, w.ch are usually kill'd in that Country by a stroke
upon the head: The Skull is not broke with y.e Stroke,
& yet the Integ.ts found blood extravasated w.th in y.e Ventricles
It is wd.e y.t it wo.d be of consq.ce to be able by proper signs
to distinguish, whether the Concussion has produc'd
extravasation or not: because when there is no extrava-
sation, the Trepan wo.d be of no use; whereas in y.e Case
of extravas.n it must be of the greatest service, this has led

some of the French Surgeons to attempt y^{e} distinction,
& they conclude upon the whole, y^{t} if y^{e} Encephalon be affected in the manner I first mentiond, it will be instantaneous but if from extravas^{n} the Symptoms will come on slowly. So they conclude, y^{t} when a person is immediately insensible from a fall, & no wound with^{t} or breaking of y^{e} skull; there is no use for trepanning: & on the contrary they expect benefit from it if the Symptoms of an oppress'd brain come on slowly. — But there is reason to doubt whether such a distinction can be made. My Father met with a case where a person receiv'd a blow 3. miles out of Town, walk'd into Town, & was not insensible, but became so by degrees. The Oper^{n} was proposd but not agreed to: She dy'd. The head was accurately examin'd, but no extravas^{n} or lesion was discoverable: So that a mere concussion may act slowly. Next it is beyond doubt that if by the concussion any large vessel gives way, the Symptoms may come on very suddenly: so we will not be able to distinguish extravas^{n} from Concussion. — But further there is another insuperable difficulty: that both may be complicated: there may be such a concussion as to render the person insensible, but not such as to destroy life, the new effect of the concussion may go off. & y^{e} insensibility from y^{e} cause alone may be momentary: but some of the small vessels may be broke, y^{e} blood ooze out slowly, & a consid^{le} quantity of it collected in time. So Surgeons are to be guided by the Symptoms, & by these only. If a patient is not relieved by V.S. freely, & frequently pursuing the Antiphlogistic method truelly: The Surg^{n} ought, if he has any thing to guide him to the

place of the Blow, to proceed to the Operation.

Next the oper.n is not necessary merely in consequ.ce of blood effus'd: it may be of equal use when matter is collected. & the collection may proceed from an accid.t & yet in a way we do not perhaps with. Examples have been quoted: i. e. a Patient receives a Blow, seems to recover for sev.l weeks, but after some months, begins to have Symptoms of an oppressed Brain, & on dissecting the head, purulent matter is found to be collected: and in one case I have met with there is no reason to doubt y.t a Blow had given occasion to a collection of matter, wch appear'd 20. months after the accident. - i.e. The Pat.t had from the time of the accident constantly felt uneasiness within the head, a dull pain wch was sometimes considerably increas'd, shooting down from y.e head along y.e Spine, occasion.d weakness of y.e Extremities: Epileptic fits follow'd, & these increasing in frequency & violence, were attended w.th Mania. — Matter was found collected at the Basis of the Brain, & it was evidently in a diseas'd state an Inch deep. And Sharp gives Instances where the oper.n was done 3. or 4. months after the accid.t with advantage. So we ought to have this in view, that if in some cases y.e larger vessels threw out such a q.ty of blood, as by its immediate pressure to produce insensibility, in other Cases y.e small vessels may be so injur'd as to run into a state of suppur.n. I apprehend it is only in y.t way y.t we are to explain an observ.n made by Mr. Pott, y.t if we observe after a Blow y.t any part of the Integum.ts of the Head are ecchymatous, we shall gen.ly find y.t y.e dura mater within is in a diseas'd state, y.t where the Integum.ts are so expressed it are puffy, y.e dura mater is in a sloughing State: this

536

however is not from the communicn of vessels, as he imagines, but from the shock being communicated, for I have seen the fore cranium separated with the dura mater being affected; but such a shock as discovers the external tegument is communicated to the internal with a more delicate, & the vessels of which have thinner coats than the internal have. Next we proceed to accidents which more evidently require the Trepan. — In a young subject it is supposed that a portion of the skull may be depressed without a fracture: & I will admit that this is a possible case, tho' it does by no means happen so frequently as many seem to imagine: there is even at that age seldom a depression without a fracture: tho' any effusion into the cellular membrane between the skin & Bone gives the feel of a depression, & from the supposition of the frequency of a depression it has been further supposed, that the skull may be depressed in young Children with any very great Injury: but this is a rare occurrence, for tho' the Brain may suffer great pressure as in the Hydrocephalus, yet where that pressure is made suddenly the case is otherwise. Next in the Adult it is said that if a portion of the skull be depressed, & the Symptoms of depression follow, it is necessary for the Surgn to raise the depressed portion by making a hole & introducing a proper Instrument. — It is ridiculous to suppose that we can do it by applying a plaister: or by fixing a screw; it has no firm hold, nor can we raise the whole by means of a single point we must make a hole and use a elevator. If the blow is given by a sharp pointed Instrument in an Adult, there will be a rent & fissure, & when the skull is so

hurt, it will be proper to perform the Trepan, if there
are any symptoms y.t shew y.e brain to be affected: for gener.ly
there is a degree of extravas.n & if the Trepan is done cautious
-ly & the extravas.n between the Dura mater & Bone: there
is no danger any more from y.e taking out a circular piece,
y.t there is from the rent, y.e air gets in at both: A part of
Skull may be cut out, the dura mater being entire with.t any
dangerous Symptoms follow.g Next suppose y.t besides
merely a rent a piece of the Bone is quite loose, & may be
readily taken out, where all round is sound, then there is
no occasion for the Trepan, as we have as free a discharge
as can be required but if another piece is depress'd beneath
the level of the Skull, & we can't raise the depress'd portion
at the hole that is made, we make a hole at y.e opposite
side, when there is any Corner y.t fixes it. Now these are
the new.e views y.e Surgeon is to have in the Operation: Then
you let me next proceed to consider the steps of it. ——
You know from the Anatomy that there are several places of
the Cranium on wch y.e operat.r cannot be so conveniently
perform'd: but if a Case is urgent & we have no choice,
by proper caution y.e general degree of danger may be much
lessen'd. Here is a piece of Bone y.t was depress'd over y.e
superior longitudenal Sinus, & in such a Case it is safer
to make a new hole, y.n to attempt to pull with forceps, wch
are ready to tear, & disorder y.e substance of the Brain,
Here is a portion of the frontal Bone, of a Boy wch was
remov'd with the whole of one frontal Sinus, & a remov'd
share of the orbiter process, broke by the stroke of a horse
& the person is still alive. We first examine y.e nature
of the fracture: suppose we learn y.t the Patient has

got a stroke at the Temple, most Surgeons as Sharp tell us yt we are to begin with a Circular or Oval Incision but in this way, we separate more of the Teguments yn is necessary, we to begin to search for the fracture by a plain incision in the place, yt is most suspicious, from ye acct of the accidt the appearance of the Teguments, yt feel of the pain &c. And we shd have the whole of the accidt in view before we proceed to further violence. & supposing yt the fracture branches diffr ways, we are led to a center where the stroke was given. If the fracture is in this place we need not be afraid of wounding the Temporal muscle, I have seen consid.e portions of yt removd without any materially bad Symptoms. It has been observd yt a blow on the Temples is often fatal, wch they think is owing to ye tendon being hurt, & yr external nerves being injurd yt are spread over the Skull here, may contribute: but the danger chiefly arises from the thinness & flatness of yr Skull, & the Concussion being more readily communicated to the Brain within. We next make partic.r Room for applying the Instrument. by an Incision somewhat of a circular Kind. & we ought to say the parts bear with freedom, yt yr circular Saw may not rub on ye Tegum.ts in yr Time of the operation. So I dissect off all yr soft parts & take up any vessels yt may be found to bleed with violence, otherwise the blood may insinuate under the dressings, & occasion danger as well as trouble. ——

If a portion of the Bone is depressd, a bit of the sound bone is removd yt we may introduce the Elevator under yr depressd portion. So we mark the place wth yr circular Saw, wch was known to Hippocrates, we then scrape yr

Bone bare, for wth you we am provided wth an Instt
you see here. I am next to apply the Saw: wch was formerly made cylindrical, about Paul's time a conical shape was introduced, as they supposed the Circle was in danger of plunging into the Brain. Of late Sharp & others mention the Circular form as an Improvement. It is abundantly safe, while the Conical form is cutted with more difficulty. That it may describe its Circle, a Centre pin is necessary, till we have sunk wch Saw some little way into Bone, when we take it out with a Key for wch purpose, & to prevent wch pin from being too much blunted, we first make a small hole in the Skull wth this other Instrument: but we must not make the hole wide, otherwise the Saw vacillates. Now whether are we to use wch Trepan, or the Trephine? The latter is recommended by Sharp & other Surgeons of this Island: but wch former is generally used in other Countries, & I am perfectly convinced wch nothing but prepossession & want of experience has led to the use of the Trephine: a quarter of a Circle is all I can describe with the Trephine otherwise with the other I can describe the whole Circle, & we can work with it in the most equal manner, & make the perforation at pleasure, wch it is really easier to take out a piece with wthout wounding wch Tegumento, or membranes with the Trepan. But if any person shall from timidity prefer the Trephine, let him at least begin with the Trepan for ease to himself, & to save time to the patt. With the Trepan we shake the head less, wch in this case of Extravasation of great Consequence —

We are not to hurst, to the bleeding of the Diploe, & to our finding there a want of resistence: for the want of resistence is not remarkable, as we are never entirely cutting the Diploe. some part of the Saw is rubbing upon a Solid, while the rest is on the Pericelli: — As the Blood coming out prevents us from seeing the depth, we sh^d. have a bit of Sponge to take it up: — next we sh^d. have a bit of Quill for taking out the sawings, which catch the Saw: And a hard Brush for wiping y^e. Instr^s. & sh^d. have two heads of the same size y^t. an Assistant may clean one while the Surgeon is working with the other. These Saws are upon the whole now made larger y^n. formerly: but the size is to be determin'd by the view: if it is to raise a depressed portion, the large Size is best: but to give a discharge to extravasated blood a small one is sufficient. Some make the pressure with the head: but is better to do it with the hand as they do not see what is doing. Suppose the Surgeon finds y^t. saw stick he is not by main force to overcome the resistence, but to draw it back again & to disengage some particle of the bone that may have stuck perhaps between y^e. Saw & side of the Bone At the End of the operation we are to be particularly cautious, y^t. a hand not cut the bone unequally, & you remember y^t. y^e. skulls unequal, in some persons it is much thicker y^n. in others, & in different parts there is an inequality. In some persons there is a growth of fungous matter y^t. forms pits, & in all persons there are Arteries y^t. make marks, Now we readily open it: but if we work slowly it yields, and we go thro' the Bone with^t. opening it: so y^t. the Arteries may run upon the surface of the Dura mater with^t. being wounded. — We from time to time try whether the Bone be moveable with the Lever: & when we find it moves easily instead of attempting to cut it entirely through w^t. the saw

I wo. advise to break it off: I see no kind of objection to this, as soon as it vacillates to snap it off: for in experience I have found y. the broken piece will be as smooth, as if we attempt to cut it, for we can't cut the whole round, & we avoid opening the Dura mater wch is a material circumstance. I have tryd the danger of the Trepan on diffr. Animals, in some I opend the Dura Mater, in others I did not, they were all thirsty and hot, none of 'em dangerously ill: but they appeard to be in a certain degree of danger: upon the whole there were in most danger wch had the dura mater wounded; we bring out the bone by employing two Elevators at the same time, for wch one, while y. one side starts out the other is plung'd in. If we dis. any particr. roughness we break it off with an Instrumt. made for the purpos wch has a Cup on the End of it to receive the cuttings, but as this requires to be prest a good way in, instead of the Cup, we sh. only have a thin plate of Metal: however these sharp Edges are not of much moment, as they merely make a part of the hole.

I have happend to do the Operr. over a principal branch of the Artery of the Dura Mater: & if I had finishd the operation wth. y. Saw I might have cut that, & supposed it necessary, to have opend the Dura Mater, I can avoid this Artery, y. wound of wch. wo. have been a matter of no small moment. Next suppose we distinguish blood, or pus, within the dura mater we are advisd to make the opening with a Lancet concald in a bit of Linen Cloth. But we sh. never conceal any of our Instrumts. we sh. use the Lancet avowedly, but wth. y. utmost Caution. to give a freer outlet we may make a Crucial Incision, avoiding any considerable vessel. — Suppose next y. portion of the Bone is depressd, & is to be raisd, we introduce y. Instrumt. last upon the opposite side; but the

Surgeon is merely to pull it up, because tho' the part he uses the Elevator upon, may appear sound, it may be crack'd all round, so may push in another piece, whilst we raise one depressed may sink in, I do recommend another kind of Levator, w.ch is by no means a bad Instrument. It has a rest at a distance from the hole. — If we meet with great resistance, we must examine the depressed portion, & we shall find if it is by no means so, some Bones if it resists, so we disengage this, & if this can be done it will be necessary to make another hole. — Next is it to be a rule, to raise the depressed portions to a level with the rest of the skull, & there to leave 'em? I apprehend we ought to make many exceptions to this, & if we can't lay down any gen.l rule. In Children it may be crack'd all round, & in an Adult, no large piece is uniformly depressed with a fracture, so the Root will give way, & the whole is loose with respect to hard parts: but still from the connexion it has with its w.th the Dura mater & with it with the skin, the part Patient may live, if Circulation may be carried on: so where there is a convid.le adhesion inwards outwards, we wo. let it remain: but if it is moved from its place, so as to loosen this connexion we ought to take it out. We apply the simplest dressings: & are not to use Spirituous medicines w.th Mel. Ros. &c. we apply dry dressings, & we are not to imitate M.r Gooch in making convid.le pressure, w.th the view of depressing the fungous excrescences if may grow up: let us take our chance of 'em: & if they grow, we ought to be well apprized of the Root: If they come from the Dura mater, we may use freedom with 'em: we may venture, as M.r Hill directs to cut 'em off, or to touch 'em with Caustics. But if they are from the substance of the Brain, this may be dangerous: so we wo. try the effect of gentle pressure, we may first try the

effect of a slight pressure with the finger, we may next invade some part of it with a slight touch with Caustics: & thus we go on till with safety we get out the whole, for that Case I mentiond where such a large portion of the os frontis was remov'd, there was a fungous excrescence, w.ch increas'd to the size of an Egg, & hung down to the point of the nose, & the patient had a pain in his head upon touching it with Caustic on the lower part it shrunk a little, & y.e growth of the new bone strangulated it, so y.t it was gone in a few months using y.e Caustic, near the close of the Cure. Here is an Instrum.t contriv'd by Mr. Meckle a Surg.n of this Country, as an Improvem.t on the Trepan, but I do not find of.s it will supply its place. One Circle of the handle makes 8. of the saw, but it does not move tolerably well, according to a Law in Mechanics you know the force is diminished in proportion as the velocity is increas'd, & as the force of y.e common Trepan is no more y.n is necessary, y.e force of this Instrument must be too small. Where a Bone is very soft & little necessary to perforate it, as when the Bones of the Cranium ties are carious it may be done w.th an Instrument of this kind. —

Lecture 99.th

We shall next explain the method of drawing off y.e Circulating humours, we do this, 1.st By Blisters. — These make a consid.le discharge not of the water simply, but mix'd with this there is a great quantity of the coagulable lymph, when the Water is expos'd to a boiling heat it coagulates. So without overflowing y.e Surface of the Skin undergoes any after change, as suppur.n may form, & we appear in a short space of Time: So if we continue to apply the Cantharides, we make a purulent discharge as a Blister. These may be used anywhere in the Body. One of y.e

most convenient place is the Crown of the head, notw.th
standing the inconvenience from the hairs: for in y.e space of
2. Months they wear out almost entirely; & by continuing y.e
irritation there is a growth of a spungous like flesh from y.e sur=
face w.ch has very little pain, so the chief pain is at first.
There is one inconvenience with some persons by. it occasions
swellings of the Conglobate Glands in the neck, especially
towards y.e posterior part; In like manner I have seen swellings
of the Inguinal Glands, when this applic.n was made to y.e
Superior Extremities, & of the axillary Glands when made to y.e
Back. In this Case we will be under a necessity of using
some other substance, as a small quantity of comon Caustic
mixd w.th Basilicon: but we are apt to put in either too much
or too little, so it is better to change the Blister I spoke of for one
made by cutting the Skin, forming a hole in the Skin & part of
a Cod beneath it; If we make a hole in the Skin we are oblig.d
to keep it open by forcing in some substance; for the Skin is
very much disposd to contract; we make the opening w.th y.e Knife
or actual or potential Cautery, or w.th a large Lancet. now in
doing this it is proposd to cut the Skin quite thro' then may be
a proper choice of place. We ought to avoid y.e principal Sub=
=cutaneous nerves or veins. The Best place for the Issue I now
describe will be in the nape of the neck. But I think we ought
to avoid the head, tho Mr. Broomfield proposes to put in Iss=
=ues there: but we are too near to the Bone, & we may produce
Caries in it, in thrusting down substances to preserve y.e open.
or we may this Issue between the Trunk & Pelvis: or we might
do it in the Back, tho' it is difficult to get the Bandage to apply
close enough. And you will find in gen.l y.t y.e Extremities
are the fittest place: In the superior Extremities, under the

Insertion of the Deltoid muscle, avoiding not only the swelling Bellies of the muscles, wch will throw out the Substance & give pain, but the principal subcutaneous veins and nerves In the inferior Extremities, above or immediately beneath the Knee, upon the inner or outerside, but notwithstanding ye course of the Vena Saphena, the innerside is preferable, for on ye outer side the pea is more in danger of irritateing ye Ligaments close upon the Joint, the manner of doing it is this. The common Scalpel is as good as any other Instrument but as most persons bear an aversion to a knife, it is better to use a large Lancet: the Surgn taking the Lancet in ye right hand, with the left supports ye Skin doubled, & an Assistant wch the one hand holds ye member, & wth ye other supports ye skin, & now ye Surgn can't miss to make the Incision in the proper manner, having passed thro' the Lancet he wove it as a knife For preventing the part from closing we use such a foreign substance as by its bulk or swelling a little preserves its room, & wch at the same time gently irritates the part, whether from ye Texture or nature of it, or from the distention occasioned by its swelling, as common Garden Peas, of wch we employ 1. 2. or 3. seldom more ye 3. or in place of these we use what are called Guaspoa Apples, or round pieces of Gentian Root, or Sassafras: we confine these with a proper Compress, wch a slit of Card in it, & we secure all with a Bandage. — Where persons are timorous perhaps, & will not allow an Incisn to be made with the knife, or Lancet, we may form an Issue wth Caustic, we apply a piece of plaister wch a hole in it, not above ½ the Size of the opening we intend to make, we fill up the opening with Caustic, & confine it by another piece of plaister rather smaller ye the first, ye if the Caustic insinuates

between the plaisters it may be discover'd before it does any harm: & we warm the two plaisters y.t they may adhere. This is better than the laying on slips of plaister above one another, w.ch is more troublesome, & unless they are apply'd very accurately the Caustic escapes. — Having form'd the Eschar, we divide it with a Crucial Incision, w.ch is done with'd pain, & thrusting in the pea's by their swelling & invitation they loosen the Eschar so far y.t y.e air gets access & hastens the seperation. In a few Cases as a remedy of greater Efficacy it has been propos'd y.t we sh.d use the hot Iron in place of the Caustic. But I can scarcely state a Case when this will be proper, unless in Apoplexy that we form an issue in the head, & we want by y.e invitation to rouze the patient. But for common use it is to be altogether discarded. — Next suppose we prefer y.e Seton. or Cord, so called because the Ancients used Seta or Bristles: we raise the skin & as before, having first determin'd where we are to introduce & bring out the Lancet, & mark'd the parts w.th Ink, we choose nearly the same places before recommended as the best: but from the nature of the Remedy it is evident y.t we can apply it more gen.lly. The Cord will answer very well upon the Chest, even in lean persons, making it to run parallel with the Ribs: while the pea & Issue wo.d press too deep here & hurt y.e muscles or Rib. Having entered the Lancet he has ready a probe with the Cord, w.ch he introduces before he lets go the skin; otherwise y.e Cellul. membrane may prevent him; & as the pat.t by starting may render y.e passage of the probe difficult. Surgeons use y.e single Instrum.t the Seton needle, w.ch if it is made flat enough in y.e form of a Lancet, does very well. A common cotton will answer tolerably well, but one made with raw silk is rather better as it irritates more & gives a greater discharge: in

We may make it a rule at least at first to cover y.r Lint with ointment, y.t it may slide easily, & we do the same w.th the peas. We do not meddle with either till there is a free suppuration, w.ch may require the space of a week: if y.e discharge is less y.n we wo. choose, we apply the ointment made with Cantharides; but if it occasions swelling of the Conglobate Glands, or brings on Strangury, w.ch it sometimes does, we mix a small quantity of the Caustic with the ointm.t by w.ch we remove any callosity in the sides of the opening. Now what Effects may we suppose to attend the use of the diff.t kinds of Issues? They are certainly all similar in their Operation. Some imagine y.t the pea Issue & the Seton are more powerful than the blister Issue, but in y.e latter y.e discharge is equally free, & the matter discharg'd is y.e same, it is purulent, & the fungous produced by it's out pass, in very great Quant.y of the same nature with that adhering to the Cord. The effects of these remedies are by no means ascertaind by Authors, because it must require very great experience, to pronounce with certainty. My Father who had used Setons & Issues very much had observ'd a remarkable effect from 'em in cases of inveterate headach, in Epilepsy, Hysterical Complaints, Scrophulous Opthalmia, in the Asthma, & in general in Internal Suppurations; He used to mention 2. Instances, where after using an Issue for some time persons have been cured of Asthma, & upon taking it out the Asthma returnd, tho' we are not to imagine y.t this will be a common effect; If we are to be allow'd at all to reason upon 'em, we may expect relief in a variety of Instances. I wo. suppose 1.st where there is an internal Suppuration, & where of Course, the matter by being confin'd is absorb'd in

consid.ble Quantity, & is generally then acted, hurtfull therefore to the Constitution, & by forming an Issue we give a more ready outlet from the general System of Circulation, than it has by the natural excretions; Not but that pus passes thro' the Kidneys, nay we will be able by inspecting the urine to determine whether a Suppuration has form'd in any large Sack within the Body, Next we may presume of an Issue will be of Service where a disease proceeds from a redundancy of the Serous & thinner parts of the Blood: It is admitted on the best Authority from dissections, that there is a distinction of Apoplexy, into Sanguineous & Serous, & where a person is disposed to the later we might expect benefit from Issues. Ba suppose a child in danger of Hydrocephalus, perhaps others of the family have died of the Complaint; Issues by giving a free outlet, may prevent its happening. In like manner in cases of catarrh, as in the peripneumonia, an Issue will be of particr. Service. — nay further it is evident that the whole constitution, the whole System of the Body is affected by Issues, for after a person is habituated to an Issue he takes it out not with. danger. Next I will observe of wherever you form an Issue, the part shrinks in its Bulk, that there is a wasting in the whole Circumference: if it is in the Right arm &c. it is naturally the largest, it grows the smallest tho' the use is little interrupted, so it is evident of as a topical remedy we must value them highly, & we may suppose that they operate not only on the Hydraulic System, but likewise in many cases upon the Sentient: Future & accurate experience can alone point out of particular

cases in which they may be of Service.

We shall next consider the drawing off the red part of the Blood from the vessels, & first from the smaller ones. - That is done by cutting 'em with a Lancet, making a number of Orifices in any place by repeated strokes, or by fixing a number of Lancets together in the same Instrum.t to the number of Ten, we determine the depth of the Incision by the Lid which is moveable: they are struck in by the force of a spring, by pressing down the handle we throw the Lancets in a slanting direct.n & touching the catch, the spring throws 'em back again, & as they rise to be straight they necessarily cut the skin: w.th this Instrument I can venture to scarify in any place almost; for the Lancets are scarcely so long as to cut thro' the true skin & Cellular substance, so as to injure the Subcutaneous veins & nerves, but where there are large we would keep off their course, we promote the flow of blood by washing with water & a Sponge, but we do this more effectually if we take of the pressure of the Air, from the part, w.ch disposes to the Coagulation of the Blood, & we have a Glass, & Syringe intended for y.t purpose; The effect is, supposing them equal in size, the Air in the Glass is divided between it and the Syringe, after the first stroke the one half of it only remains; by the next stroke we exhaust one half of the remainder, so y.t one 4.th part only remains, with the 3. stroke there remains only 1/8. so that by a very few strokes a very small quantity of Air only remains, or we can render the Air thinner by heating it, by throwing some burning substance into the Glass to rarify & expell the air, & clapping the Glass close upon the skin it is immediately extinguished. — But upon the whole the best method is this, before we cut y.e Lancets

let us wash the Skin of the part with a warm Liquor to relax the vessels, then we scarify: this done we have the Glass warmed by putting it among warm water, & we rarify the Air in it farther with a taper introduced into the Glass: for if. throwing in lighted Tow is apt to scar the patient, as he is not aware perhaps if. the Tow ceases to burn as soon as if. Glass is apply'd: or if it is manag'd in a Bungling way the Patient may really be burnt, we then use the Syringe to exhaust the Air a little farther. When the Blood has filld the Glass a little way, tho' a great part of the Air is drawn out, it coagulates, & therefore it sh. be practiced to change the Glass frequently, for there is a coagulation at if. same time taking place at the mouths of the vessels, so every time we shoud wipe the part roughly with wet Sponge.

Instead of the Scarificator many use Leeches, and I do upon the whole imagine that these will be found more frequently to answer the purpose; the Lancet often fails, & does not draw off the Blood freely. This I believe is much owing to the want of practice, the Surgeon does not apply the Instrum.t properly. But Leeches bleed freely, I do not remember to have seen Surgeons think of using a Glass after Leeches: but why not? Let us next cup, & that we may be able to use the Cup with advantage, we put the Leeches into a drinking Glass & confine 'em to a particular place.

Some to make the Leeches bleed propose if. we sh. cut off the end, this may be done, but generally the animal being hurt, quits its hold. To disengage a Leech, we have only to sprinkle on a Grain of Salt, or if they get within if. body, as when apply'd within if. mouth, or to the Rectum, we give the patient a vomit or an Injection of Sea Salt, Now

what use are we to expect from these? What we prefer them, to the opening the larger vessels with the Lancet? First. It will often happen in practice that in Children you cannot find a proper vein, not even the external Jugular wch is remarkably small sometimes, nay even in grown persons the veins frequently divide into a number of branches, & if there is a quantity of fat under the Skin it may be difficult to find the vein, or the patient may have a degree of timidity, wch is often inaccountable, & will allow himself to be cupt, or allow Leeches, tho' he can't bear the thoughts of the Lancet. But besides these cases from necessity, out of choice we apply Leeches in Topical Complaints they draw blood from the Seat of the disease, & perhaps from the Arteries as well as the veins: so in the case of pleurisy, or where the outer surface, as well as the inner side of the Lungs is affected at the same time, and in Rheumatism where the swelling is topical, altho' you may will have more effect than a larger Quantity from larger vessels at a distance. — Next we consider the way of drawing Blood from the large vessels. First from the veins. — It is done with the common Lancet or Flegm, wch is much us'd in Germany, while almost only the Lancet is us'd in this Island. The Fleam as commonly us'd by Farriers is struck with a Hammer: but this is drove by the force of a spring, a small Spring supports the Fleam in its place, and a large one strikes it into the vein, we direct it; & as it were lay hold of the vein by this piece of clip metal, by touching the catch it never fails to strike thro' the skin & vein at once, & we regulate the length at pleasure, by turning

a Screw. Now I think it pretty evident w.ch of these we ought to prefer in different Cases, The Fleam is struck in perpendicularly, the Lancet is entred in a slanting direct.n Therefore we may make the point of the Lancet longer and sharper than the point of the Fleam, or it will cut easier without pressing the fore side of the vein against y.e back of it: Therefore in all Cases when veins are small, or have vitiated behind 'em parts of consequence arteries or nerves, the Lancet is preferable to the Fleam, but on the other hand, if the vein is large, & there is no such danger the Fleam does its Business in an Instant w.th a smart stroke, & the patient can't start, or if he does he is not in danger of being so much hurt, & the opening of the skin is directly over that of the vein, hence if we are to operate upon a large vein as the Jugular, y.e Instrument answers the purpose very well. Now this much being determin'd in gen.l let us suppose we are to bleed in the Arm, w.ch I take for the principle Example, & y.t we prefer the Lancet; we are next to consider y.e different steps necessary in y.e operat.n in w.ch more things are to be attended to than we are generally aware of. 1.st We are to study the posture of the patient, if we mean to prevent his fainting, we lay the body horizontal, the Head low without a pillow, next we make a small orifice in the vein or allow the Blood to run slowly. Lastly we take care in loosening the Ligature not to do it suddenly. If again we mean to bring on faintness, w.ch is of real use in many Cases, as when we want to reduce a fracture or luxation, or Hernia, may perhaps in all Cases of Inflam.n it may be of real Service: in Time of the Vanqu the vessels may adapt themselves to the Contents, & if the

patient recovers, he is not so much exhausted of Blood.
I formerly endeavoid to shew the advantage of drawing blood nearer or farther from the part affected. And in the arm I endeavoid to shew that the largest vein is the median Basilic, avoiding the part cross'd by the Artery. Next we are to make a pression between the part & the heart, y.t the vein may be fully distended, y.t we may see it better, wound it easier, & be in less danger of wounding any thing behind it, & the median Basilic, as being the largest will answer for this end. In the arm we make this pression by applying a Ligature, & a bit of woolen cloth is the best, it has elasticity & will press the part more firmly; before we apply the Ligature let the patients arm be put into the position in w.ch it is to remain in the time of the Bleeding, we lay it on streight ab.t an Inch higher than the place we intend to open, we lay it down streight without puching up the skin, & it is enough that the Ligature go twice about the arm, & we secure it with a running knot, we are to take care however y.t in endeavouring to get the vein to swell, we do not draw the ligature so tight as to stop the Artery, so we shd feel the pulse before we use the Lancet, & so we will never need to change the Ligature. Surgeons sometimes while they tye the Ligature hold y.e Lancet in their mouth: but besides the effect the sight of Lancet may have on the patient, in this way y.e Surg.n is too ready, he may have the Lancet lying about in the Teacup, & it will be proper to wait a little till the vein is properly fill'd. — In the shape of the Lancet Surgeons differ greatly, the most common one is too broad, makes

too large a wound. On the other hand of late some Surg.ns have 'em too narrow, what they call Spear pointed, w.ch is a dangerous weapon for the hands of Surgeons: in general we w.d chuse a middle kind of Shape: or we might in some of 'em have the one side blunt, or the convexity rubbed off, or even made concave. With a lancet of this shape we are less in danger of wounding an Artery, w.ch in general I believe is done by the Shoulder of the Lancet. ——

The Surgeon opens the Lancet so fully as to see it properly, to a little more than a right Angle: as to the holding of it some take it near the hinge, but they have by no means sufficient command of it: others again hold it too near the point. Let us hold it so as to have fully the command of it, & at the same time so as to see the wound we are making. — The Surgeon must place himself his Thumb upon the vein so as to hold it in its place, if it is not fully distended he directs the patient to make some motion with his hand, w.ch throws the blood into the veins, then applies the thumb. For the right arm we employ the right hand, & rather use the left hand for the left arm. But many people operate awkwardly w.th the left, & there is no great fault in letting blood always with the right arm hand: & turning y.e patients arm a little outwardly I can make it face the right hand tolerably well: in like manner if we are doing the operation in the neck, we can constantly use it. ——

We enter the Lancet not altogether in a transverse direction, nor quite perpendicularly but we make the Incision obliqued: & we push it in till we see y.e blood run along the side of it, y.n we dilate y.e open.n a little; but

not by raising the point; instead of this we make the
point the centre of motion, and open the skin a little more
than we do the vein, so that the blood is in no danger of getting
between the skin and vein. If we wish to draw off the blood
suddenly, we make the patient work with the muscles, to
render the passage thro' the vena comites more difficult, & by
the derivation moving Branches to determine the blood to y. orifice
When a sufficient Quantity is drawn we slacken y. Ligat.
& place the thumb on the orifice, & cleansing away y. blood,
we apply the sides together, & make a slight compression
by means of a compress and Bandage, & when we apply
this the arm is to be put in the position it is to lie afterw.
Surgeons generally pull the Bandage too tight, w.h affects
y. subcutaneous veins, & counteracts their Intention: so
generally speaking no Ligature at all is necessary, we
might leave the patient, with.t a Bandage or even compress.
But let it be the common practice to apply it so gently
as to hold on the compress: & in old people when the fat
shrinks, & the Tendons form a hollow: it will be necessary
to have a small compress over the hole; or we bring to-
gether the sides with a piece of sticking plaister, but for
ordinary this puts the orifice, & produces some degree
of suppuration so y.t the healing is more tedious.
If the operation is in the neck, we can't as the French
propose use a Ligature, especially when it is done to
relieve the head: & it will be suff.t to make y. vein swell
by the Surg.n making pressure upon it w.th his thumb below
the part he intends to open, & the head being held back,
he opens as before. But the vein here is not only covered by
the skin, w.h is tougher than in y. arm from being exposed

to the Air, but with the platisma myoides muscle, so we do the operation at two strokes, wch if they are made the one after the other with.t taking away the hand, will not be perceivd by the patient. We next consider the manner of drawing blood from Arteries, & some have proposd the opening them not only in topical Cases, but where the whole constitution is affected: but the opening the veins in such a case will probably have nearly the same effect, And Arteriotomy is to be confind to topical affections. — We cant reach the Arteries in the Trunk, & then will be little advantage in opening them of the Extremities, & imagine we may, so far as experience goes, confine the operation to the Temporal Artery: It may be even unnecessary to shew the method of opening Arteries in certain Experim.ts as proposd by Mr. Butler, he uses Lancets of the shape of wedges, of diff.t sizes, & after the Lancet has laid bare the Artery, we take one of these, & plunge it into the Artery perpendicularly and make in it a Longitudinal Incision or puncture: if the blood clots, we take one of the second Size to enlarge the orifice, & we may have one made blunt to serve as a Conductor. — But if we are to confine the oper.n to the Temporal Artery, we are then to use a common Lancet, or one that has the Convex point rubbd off, y.t we may not cut the back of the Artery. You are directed to the Artery by its stroke, you cannot begin lower than the Zygomatic process: & gen.lly Surgeons take the Artery after it has made its divisions, and we prefer the Anterior branch, because the Teguments are thinner, & there are scarcely any consid.le nerves sticking to it: whereas a nerve is close on the other branch.

The Artery is not to be opend with one stroke; we first cut

the skin, and lay the artery in view, dividing y.e Cellul.r Substance. The opening of the Artery is to be longitudinal, we make a hole in it, with the point of the Lancet, & open it lengthways. With a Sponge we wipe of the Blood from time to time if it is in danger of stopping, after the operation we apply any common compress, or a bit of Agaric, or of very close sponge, with a compress over it, & there is a very neat instrum.t invented by Dr. Butler, it is tyd round the head & under the Chin: & we have it in our power to adapt it more closely by turning a screw, w.ch presses down a cushion upon the Orifice. Now it has been supposd, that we stop the bleeding best by making a gentle pressure, supporting the Bandage merely, but I may allege that for common we stop the Temporal Artery, by squeezing the sides of it together, & I have known instances where the Surgeon found it difficult to stop it any how. The wound closes in a few Days. So I wd. make a convid.e pressure, more than is necessary in Bleeding in the Arm.

Lecture 100.th

Having explaind the way of drawing blood from the vessels, We now proceed to consider the Accidents y.t may attend such operations, & the manner of remedying or curing'em. — R. You remember that I have prov'd y.t y.e dangerous Symptoms w.ch are said to follow the wounds of Tendons, depends upon the wounds of the Subcutaneous Nerves: & have pointed out the proper method of treatment. Next we suppose y.t in opening a vein, the blood has insinuated between the vein and Skin, & is diffus'd in the Cell.r Subst.ce so as to form a Tumor, w.ch Surgeons

and has the stroke of the letter

call Thrombus, either from the Surgeon unwarily shifting his Ligature, or instead of considering the point of the Lancet as the Centre of Motion, from his raising the point of the Lancet & cutting more of the vein than of the Skin. — If you dress the blood begins to insinuate instead of attempting to draw up the Skin, or to dilate the wound in it, so as to bring it opposite to the wound of the Vein, you are to take off the Ligature & make pressure on the vein: & if necessary, perform the operation in the other Arm. If a small quantity only is effus'd that is easy cured, in a short space of time, y^e skin by degrees changes its colour, but if the Quantity is considerable we must make an Incision, otherwise y^e blood corrupts, & produces a great many bad consequences. —

Sometimes a Thrombus gives appearance of Aneurism and may be mistaken for it, when the blood is press'd in upon the Artery communicated to it. But we will generally be able to make the distinction. — In the case of Aneurism if the Tumor is circumscribd, it is smaller at first, for if the opening in the Artery is so free as to allow a large Quantity to escape suddenly that comes to be more diffus'd. Further in the Case of Thrombus, upon bending the patients arm the blood effus'd from the vein receives the stroke of the Artery but slightly, the stroke becomes feeble: in the Aneurism again the stroke of the Artery is nearly equal whether the Arm be streight or bended. —

Next suppose in Dissection the Artery has been wounded formerly abo. us^t if the wound is directly thro' the skin & vein into the Artery, there may be a considerable discharge of blood without any insinuating, & the wound of the

posture; by pressing on the veins, and stopping y.e hole by wch the Artery communicates we remove it entirely. —
There are the diffr.t kinds of Aneurism, we next consider y.e way of managing them by Operation. —
Here treatment includes that of Arteries opend in living Animals on purpose. — The only difference is y.t in the one case we treat a recent wound, in the other one y.t has continu'd in the Artery for some length of Time. — Notwithstand.g a number of detach'd Histories of Aneurism y.t we find, yet the number is not so consid.e nor y.e Experim.ts so accurate, y.t I can speak with that precision I co. wish. Instead of saying what is the best method of treatment, I am to give a History of the methods that have been taken, & leave to future experim.ts to determine y.e best. 1.st There are a few Histories, not in all above 4. or 5. where an Artery was wounded undoubtedly, & the wound cur'd by a pressure made thro' the sound skin: the skin was press'd in upon the opening in the Artery. But in other Cases this has been found impracticable, & it is wid.e so whenever we can't make the Tumor disappear upon pressure. — In such Cases there is a necessity for cutting the Skin, & discharging the clotted blood: of bringing y.e Orifice of the Artery into view, & then applying proper compression. And we have also a few Instances where this has succeeded, we have two Cases by Fouberne, & two by De Haen, & one or two by other Authors. —
After taking off the clotted Blood, a compress was apply'd, & the Substance chosen by Fouberne & De Haen is Agaric, in one piece was apply'd to the orifice, then the powder thrown over it, in another the powder was

first applyd, & afterwards the soled piece: now this substance has softning with a degree of Elasticity, is extremely close & gently astringent, for if a Solution of Steel be pourd on it, it becomes black & forms Ink. Now we apply a small piece to the orifice of the Artery, then larger pieces, & support all by a proper bandage. ——

Here is a Ring of metal wch has been usd for the purpose, & is describd in the last Century by Monr. Bourdelan the compress is excited on the Artery by means of a screw. Or we may rather use the Invention of Platner, wch is a kind of Leather bett wth a screw. But supposing these methods to fail, or ye. the wound of the Artery is large, & perhaps callous, & ye. a consid.le quantity of blood is in danger of being lost, there is one further method of wch we have only one example by Mr. Lambert an ingenious Surgn. in Newcastle, he passd a small pin thro' the Artery, & securd with a thread as in treating the Hare-Lip, & he made a cure in 6. weeks. During the whole time the pulse cd. not be felt, the blood continud to flow thro' the Trunk of the Artery. —But supposing that this method shall also be found impracticable, & ye. ye. patient is in danger of loosing his life with repeated Hæmorrhagies, it only remains ye. we have recourse to the usual method of tying the Artery above & below the place of the wound. —We shall consider all the steps of this operation. 1. ly we apply a Tourniquet to compress the Artery at the inner side of the Biceps muscle. We next make an Incision opposite to the wound of the Artery, wch ought to be of consid.le strength length, between 2. or 3. Inches or more, according to the size of the

Tumour, that the Surgeon may have room to take hold of the Artery & tie it. The Artery runs at the Inside of the Biceps muscle, behind its Aponeurosis, Here too the median Basilic vein runs, & generally speaking there is a necessity for cutting y^e^ vein thro' in the operation, & as when the Aneurism has continued long, y^e^ vein may bleed consid^e^ly it may be necessary to tie it also: — The wound of the Artery is almost always on the fore-part & the blood escapes between the Artery & Skin, so that the Artery is at the back of the Tumor: but in a case y^t^ occurd 3. years ago in the Infirmary the Artery was wounded behind, from the Surg^n^ having the point of the Lancet, so the blood lay between the Artery & bone, & the stroke of the Artery was seen the whole way on y^e^ Surface of the Tumor, w^ch^ was ab^t^ the size of a Turkey Egg, & the wound was large enough to admit a Crow Quill w^th^ thick & callous lips. As this Circumstance therefore may again occur, y^e^ Surg^n^ ought to be cautious in mak^g^ his Incision. — Begin the Incision w^th^ the common Scalpel, as y^e^ Tumor extends more upwards y^n^ downwards for downwards a resistence is made by y^e^ Connexion w^ch^ the Tendinous Aponeurosis has, w^th^ y^e^ muscles of the muscles of the forearm, but upwards the Aponeurosis is looser, & degenerates almost into Cellular Substance This Aponeurosis constitutes for the most part the outer Coat of the Tumor. — We divide thin y^e^ direction of the Artery, w^ch^ is now but. fully in view, with its Vena Comites — The Surgeon perhaps is not absolutely certain of the wound w^ch^ is not readily discovrd in all Cases. We first wipe y^e^ part & slackening the

Tournique never the Blood thrown out wt violence.
at the same time we have a probe &c. See the Steps in
the medical Essays by my Father. Before he wrote it was
the common practice to dissect the whole Tumor round:
Surgeons tho' they knew that it depended upon a wound
of the Artery, proceeded in their manner of operating as
where there was a dilatation of all the Coats, so follow
the Aneurism its whole length, in order to separate it
from all the contiguous parts. But he directs to open
the Tumor lengthways, to take out the clotted blood, &
with a common probe lent to take hold of the Artery, &c.
is a simple way of being sure of the Orifice. Next are
we with usual eminent Surgeons to pass a needle round
the Artery including the neighbouring parts, and with
Thaps to say that taking in the nerves is no great in-
convenience? Surely not, it is certainly proper to avoid
it. A Ligature upon a nerve may be more or less danger-
ous according to the degree of tightness: & most Surg.
draw the Ligature more tight than is necessary, wch
must affect the nerves. And I've mentiond as a Symp-
tom of the Operation a clock'd Jaw, wch might depend
upon including the nerve, in doing wch oper. carefully
So my Father recommends to bend the patients Arm
in order to slacken the Artery, & drawing it out a little
we take hold of it with the Thumb and forefinger of
the left hand, & pass the needle behind it alone inclu-
ding nothing but the Artery and Cell. Substance.
Surgeons have used a needle with a handle, & the Eye
at the point, but this is not so manageable as the

common crooked needle. We use a large thread waxed and prest flat, to make it less liable to cut the Artery. —— Do we trust in the Cure to the blood being conveyd downwards by lateral Branches into the lower part of the Trunk, & that it may ascend from the forearm to the wound, we pass a second Ligature, one on each extremity of the Artery. We only cross the Threads once with the using of Surg.ns knot; as it grasps the Artery closer. but before we tie the Knots, we desire the Assistant to slacken the Tourniquet to see that the Orifice is between the Threads. We then tie near to the hole, & nearer the latter. Surgeons are apt to go too high up, & perhaps may stop the descent of the Blood into some material lateral Branch. Having made a 2d knot, we cut the ends of the Threads close enough to lye within the wound, and only so long as we can take hold of 'em with a pair of forceps in the progress of the Cure: but if they are left too long the dressings may stick to 'em, & they be pull'd away too soon. —— In order to form a prognosis, we slacken the Tourniquet, & try to feel the pulse: & when the Tumor has continued for a consid.le time the lateral branches will be enlarg'd. But tho' even after some hours we do not feel the pulse we are not to despair. Experience has prov'd that a quantity of blood can descend into the Arm, sufficient to maintain it, with.t occasioning pulsation, & it may be some days before we feel the pulse, but if we see some blood running out at the hole we are certain the Cure will succeed, & whether we see the Blood or not, we are to tie the under orifice, as we may run the chance of Hemorrhagy. —— Future advices to include a great deal of the neighbouring parts, & allegd as in 8.

different cases the patient had a Hemorrhagy from the ligature cutting the Artery, when it included nothing but the Artery. But this amounts to no more than that Puteau had tyd the Ligature too tight; imagining with the most of Surgeons y.t more force is necessary to stop an Artery than will be found to be so in practice. And I have known three times the number of this cases when the Ligature was tyd in this manner with success, & add to this the Experience of late years in this Island, where the Artery has been drawn out after an Amputation & tyd with a thread w.ch proved suffic.t We next relax the Tourniquet, & again examine the wound, as we may have cut some lateral branch of the Artery, so we wait a little to see if there is no further bleeding.

Then we apply the dressings very loose, & a bandage that barely confines them; there can be nothing more absurd, then to attempt making pressure to prevent y.e Ligature from being push'd off. We use no such pressure in y.e case of Amputation, & if it is not necessary there, why is it necessary here? we can not make the patient hold his arm constantly against some firm substance, it must be made by some machine y.t has a resistence on the rest of y.e Arm, i.e. y.t comprehends the lateral branches at the same time, so we must be doubtful, whether this a fit method of prevent.g any danger of Hemorrhagy, but as there is no danger we must attempt it, we rather put the arm in a hanging posture to let the blood rush into it, with an increas'd impetus, & instead of adding to the warmth by fomentations, it will be suffic.t to cover the arm with wool or Flannel to keep in y.e natural warmth. We leave the Tourniquet absolutely slack upon the Arm, or let it lye beside y.e patient, having

instructed an Assistant how to manage it, & if it shall
breake open, the Surgeon can renew his Ligature.
Next suppose the case of an Aneurismal varix, are we to
avoid an operation in this case, this have been advis'd:
but I imagine y^t we are by no means to follow y^r advice
We can't as yet reason altogether from facts, but as the
force of the blood in the arteries, is so much greater naturally
than in the veins, thus D^r Hales found y^t the momentum
of the Carotid Artery is 10. times greater y^n in y^e correspond
ing vein in so far as it depends upon the circulating
powers: from the exertion of the muscles indeed pressing on
the veins, the momentum of the Blood, in partic^r Actions
in the veins, may be brought more nearly equal to that in the
arteries: or when the vein is so much enlarg'd as to be called
aneurismal, the same cause continuing to act will probably
enlarge the vein to a much greater degree, & the patient
will have two diseases to struggle with in place of one, the
wound of the artery, & dilatation of the vein, w^ch going upwards
may remain, & then supposing an operation comes to be
needed, it will be found impossible to operate upon y^e vein
Therefore instead of declining the operation we wou^d have recourse
to it w^th double Anxiety I wou^d think it proper to try y^e effect
of compression, w^ch may succeed as well where y^e orifice
leads into the Cavity of the vein, as when it leads into
the Cellular Substance, & supposing y^t not successful, it
will be more easy to pass a pin thro' y^e orifice as is done in
the Hare lip, than where the opening is directly into the
Cell^r Subst^ce — And if the dilatation of y^e vein is considerable
I wou^d not hesitate between the danger attending this
Complaint, & y^t from the operation: especially as we

know that the Trunk may be ty'd, & yet the use of the member at least very soon recover'd. Next what we have said of the wound of the Artery applies nearly to the true dilatation. — Where the dilatation is of the shape of an Ess we must make our Ligatures above & below the place dilated. And the chance of recovery here is less, as a number of the Lateral branches, must be intercepted, as we are under use of a greater length of the Artery. The only further observ^n. I need to make here is, that in the true Aneurism instead of following Surgeons in their tedious dissection of the Cyst, we cut into the Tumor, & having emptyd it of its blood, we can seperate it from its adhesions more readily: we can use the orifice, raise it on the finger and apply the Ligature with the utmost ease without giving the pain of a tedious dissection. ———

The next operation I shall mention scarcely needs any a very particular description, — The Inoculation for y^e. Small pox, as to the operation itself nothing can be more simple, & I find it very unnecessary to enter into the particular account of all the circumstances w^ch. ought to be observ'd with respect to the Disease, as they are so well treated elsewhere in the University. A few things however may be hinted, I mean not to speak of the advantages attending the operation: nor of the Circumstances upon w^ch. these depend. The 1^st. of these is Diet: the second is else-where explain'd. I wo. only mention one Argum^t. w^ch. has been us'd against the practice, & w^ch. has more Influence I believe than the whole put together, w^ch. is that people consider the small pox as a natural Disease, y^t. by the course of nature happens to all persons, y^t. when it comes

in the natural manner it purifies the Constitution; but that when introduc'd by art, & a few pustles only produc'd, this change of the Constitution is imperfect: therefore tho' more recover of the small pox more die of other diseases. But in answer to this it must be evident 1st. that the Small pox was not known in Europe till the 16th Century, 2dly. it was imported into it as the plague has been: 3dly. it is not a natural disease, & there is no reason to believe that if we had wanted navigation, this Island wo. ever have been infected with it. So we might as well think of introducing the plague for amending y. Constitution there is no reason to suppose 4ly. any benefit arises from the disease. Next as to the choice of the Age & Season, with respect to the Age it is better to do it before y. Teeth beg in to cut the Gum, before the Child is six months old, or to delay it till between 2. & 3. years old, when they have got their first set of teeth, we may be determin'd in our choice between these two periods according to ye. situat. of the Child, if in a populous Town & subject to Infect. it ought to be done early, in the Country again where y. disease can be better prevented, it may be longer delay'd; for the matter is not convey'd in the Air, 2dly. Air disposes to our taking the disease, but never alone brings it, it is contagious merely, so if the Child can be kept from Infection I wo. prefer abt. 3. years of Age, for the Child may not be able to suck, the nostrils may be stuff'd up, & the young Child may be subject to convulsions from the Eruption, & more in danger from 'em than from the Disease. — The only rule w.h regard to y. Season is to avoid the very warm months, as from May to

October, tho' even then many have done well enough,
But heat is hurtful, as we must consider it as a putrid
distemper. It does not on the contrary appear y.t y.e coldest
Months are not the best. Previous to the operation it has
been customary, to subject Children to a preparation, but
it appears y.t little of this is necessary. A few doses of physic
& the accustoming the child to a milk and vegetable diet,
and to bear more cold than is usual, that they may be
prepaid for the necessary management during y.e disease.
The Operation is simple, we open a pustule, choosing a
good small pock for the purpose, & we th.k perhaps make
it a rule not to put it in the power of the parents to trace the
Infection, for many disagreeable questions come to be
ask'd w.ch give offence, & the Surg.n infallibly gets blame, as
some one relation will be found to labour under a particular
Disease. We take the matter from a pustule y.t perhaps
is not fully maturated: at least that seems to be y.e best
practice, upon the whole, tho' I am not absolutely certain
of it: & after wetting our Lancet let it be introduc'd as
soon as possible, the practice of the Suttons is to have the
patient in the next room, but if y.e is inconvenient we
may allow the matter to dry, & the Lancet retains its
virtue for at least a consid.le number of Days. But by
keeping it long we may come to be disappointed: some
years ago it was the practice to make an Incision, by
way of Issue, but large openings heal with difficulty:
so some seperate the scarf skin with a bit of plaister:
others enter a Lancet perpendic.ly y.e day on a thread dipt
in the variolous matter. But the best manner is to insert
the variolous poison into one place by 2. or 3. punctures

one of the most convenient places is abt the Bottom of the Deltoid muscle, the Childs arm can be easily held, & the Surgeon makes the punctures conveniently. — He uses one of the sharp pointed Lancets, & enters it with the Side Laid to the patients arm, & as soon as he discovers y^e Chd to start a little or cry, he is sure y^t he is sure that he has gone deep, & having thus entred y^e Lancet under the Skin, with the other hand he presses down the skin upon it, to rub off the variolous matter: & if it has dry'd on the Lancet we ought to soften it with the breath, or the Steam of warm water we may make 3. punctures in the same place.

From y^t time to the eruption & during the whole course of the disease, beyond all doubt we are indebted to Sutton for proving the advantages of purging, w^th y^e cold regimen, cool air, & likewise cold Liquors beyond doubt are of the utmost consequence only I think I may allledge y^t generally matters are carried to extremes. We ought before we see the nature of the Eruption to pursue the cool Regimen steadily: but after the Eruption, & y^t perhaps there are not more y^n 2. a 3. dozen pustles, if we continue y^e great degree of cold we are in danger of doing y^e patt more hurt then benefit: y^e disease is generally trifling when the N^o is so very small; so their is no danger occasion for running that risque. It may be a question whether the previous use of mercury: or the giving Opium or Musk abt y^e time we expect the Eruption, may have some effect in preventing Convulsions: I mention mercury along w^th Musk & Opium, from the effect it has in the Tetanus.

When they come on in what manner are we to manage? I do not find y^t y^e is determined to our Satisfaction. I

apprehend the great secret is to attend to the circumstances of the patient, if oppressed with heat, & pulse quick we are by all means to use both cold air & drink, but if on the other hand the child grows evidently cold, & pulse vacillates, we see the color leave the Lips, & Eyes, the pursuing that cold method may be attended with dangerous consequences: & in this case the readiest resource is y.t w.ch is most commonly had recourse to, the dipping the childs feet, or the greater part of the body into warm water. We also give Injections w.ch have an effect by the warmth & the discharge they make, for we have not Time to have the full effect from Blisters, tho' we apply them w.th a view of preventing a return. — We next proceed to.

Amputation.

It w.d be endless to explain all the diff.t complaints w.ch may require Amputation: I wo: only mention a few things in w.ch Surgeons differ in their practice. I was long ago to allege that Surgeons had recourse to amputation in sev.l cases when it ought to be avoided: partic.ly in compound fractures when the bone is broke and protruded: & Surg.n finding it not easy to replace the bone has recource to amputation. But in such a case it will only be necessary to cut off a portion of the bone, if there is no reason to suspect y.t the soft parts are irrecoverably bruis'd. — Since that time Bilgar, one of the principal Surg.ns to the King of Prussia, has wrote on the Inefficacy of Amputation in Gangrene from external accidents, & y.t we ought to delay the operation till nature has pointed out y.e place of operation. But this rule is by no means well found-ed, & we are to follow different methods according to the

circumstances of the place. If the knee suppose or Elbo
has been bruis'd so y.t we can't expect the parts to recover,
a gangrene forms, & continues to spread, & we delay till y.r
Gangrene is altogether stopp'd, it may spread further y.n
it otherwise wo.d have done from the continu'd absorption
w.ch the mortify'd part furnishes, & the danger to the
patients life from y.t circumstance must be consid.d &
if we know y.t the Joint is violently bruis'd, & y.t the parts
are sound above, it will be better to operate on the sound
part, w.ch is not more expos'd after the Amputation y.n it
was before: & I have seen the advantage of this in 2. Cases
where the patient was sinking under a mortification, &
was restor'd by the Amputation, nay the practice is suppor=
by the nature of the thing; a Gangrene whether occupying
the deep parts, & surrounded by the living as by a shell
or forming a crust as it were over the rest, must hurt y.r
Constitution more than the taking off the Limb Entire;
And Bilgars chief argum.t is founded on a mistake y.t
the parts are affected Higher than we co.d expect: thus where
the Leg is affected, he observes y.t there are swellings in
the Inguinal Glands; But that is the strongest arg=
=ument for amputating soon, for the very acrid matter
passes thro' the Lymphatics into the blood.
Bilgar reasons in a general way against Amputation,
w.ch was discharg'd by the King of Prussia last war for
reasons known to himself. He gives a gener.l example,
y.t under his care, after one of the Battles there were 6000
wounded men, 1000. of these were wounded in the Joints,
so y.t Surg.ns wo.d have had immediate recourse to amput=
=ation. But by dilating the wound freely, & where a.

mortification happend, giving the Back in large q.ty and he affirms an useful fact, that he found the Back to possess a singular & specific virtue, whether in preventing or curing mortific.n And he endeavord to take off by incisions as much as he co.d & cut thro' the remaining parts into q.ty quick flesh &c. 600. dy'd tho' the wounds were confin'd to the Extremities: of the remainder 200. recover'd the use of the Limbs: So as to be able to serve in Garrisons. Now is q.ty any thing aquivalent to the success we have have had in our Hospitals, for Instance of the first 100. who had q.ty operat.n performd, with.t making any allowance for the nature of the Disease &c. only 8. dy'd wch. is only in q.ty proportion of two to 15. But supposing from the want of convenience in an Army, q.ty the proportion was only as 1. to 5. or that 120. only dy'd by the Operation, while 600. dy'd by q.ty operat.n to wch. Bilgar had recourse, there remains q.ty proportion of 880. alive to 400. & supposing 200. of these to be put in exact balance wth. the 200. Who in Bilgars method did not recover the use of their Limbs, there remains more than 600 lives against 200. wch. the tolerable use of the members, & q.ty proportion is in favor of q.ty common method. So where the Joint is violently bruis'd, the best general rule is to have recourse to Amputation.

Surgeons are often imbarass'd in Scrophulous Cases. If they consult their own character they will however avoid any operation: however when a few glands only perhaps about the lower Jaw are affected, and there is a collection abt. the Knee, corroding the Bones, so q.ty the patient must soon sink under the discharge, and die hectic in a few months, or when perhaps the disease

has somewhat of the appearance of Scrophula, but un
not altogether sure of it, it will be advisable to have re-
course to an operation. ——— Having supposed y.r oper.n
necessary, we shall mention in general the Instruments
requisite for doing it. ——The Ancients were very sparing
of Amputation, as they had no Tourniquet, were ignorant
of the improvem.t of the double incision w.ch we really owe to
Cheselden, & they had not thought of the crooked needle for
securing the bleeding vessels, or of drawing out y.r mouths
so as to tie them. ——We begin then by applying what
is call'd a Tourniquet, & first I shall shew you the most
common kinds us'd. —We take a roller made of Linen
not too hard but y.t it changes its shape a little on being
prest'd, & apply it over the Artery, applying first a cushion
of flannel, next we are to prest in the roller, & apply round
y.r member a piece of tape, such as is us'd for hanging
windows, w.ch is soft & strong, we put it twice round;
having an opening sufficient to introduce a piece of stick
we tie it w.th a simple knot, w.ch by pulling y.r two ends we
can in a moment disengage, we next introduce y.e stick
beneath the rope, & to prevent the patients skin from
being gall'd, we apply some firm substance as a bit of
Horn, or white Iron, or Tin w.ch a piece of leather sew'd
to it: & we pass the rope over it with.t passing it thro'
holes: w.ch has no manner of advantage. And we only
make the rope so long y.t half a turn is sufficient to make
it tight, & it can be slacken'd in an Instant. This requires
an Assistant. ——But in Fleets, Armies, in the Country,
the Surg.n has not the assistance of a person of sufficient
skill: therefore the Ingenious Petit has contrived two

plates of metal wch are pushd asunder by means of a screw: now tying the common Tourniquet to this we can fix it with an Assistant — Since many Surgeons have attempted to make the Tourniquet more easily managd. Here is another where the Strap turns round an Axis, & a catch prevents it from running backwards, wch is a very neat kind of Tourniquet. — Platner follows Petit & makes his Tourn.t of wood, wch they can be easily procurd, and a Navy Surg.n may have a No. of 'em But the Best contrivance is this Tourniquet, wch some workmen in this place, have been in the custom of making for a long time; it is as simple as that of Petit, & it takes up the strap double, wch we work twice as quick with the same Screw, & can tighten and slacken the member more readily. ——

Lecture 101st

We now proceed to explain and shew the steps proper to be taken in Amputation. And I shall beg in with the Amputation of the Larger Extremities. ——

We first determine the place of the member wch we mean to operate, now it is evid.t that we ought to save as much of the superior Extremities as possible, providing only that such places are avoided as cannot operate with difficulty. No Objection can lay against operating any where in the Humerus, wch you see, till we come near to the Joint of the wrist. Tho' I see examples by Mr White of Manchester where the

Amputation, was done in the Joint, it will be better to
operate a little higher. for when an amputation is done in
the lesser Joints, it is found to promote the Cure, if the Cartil-
age is cut off from the end of the Bone: & the rotatory power
of the radius on the Ulna can be of no use the hand being
remov'd. In like manner it is evident as much as possible
of the thigh shd be saved: with regard to the Leg we are under
a difficulty, which don't altogether solve. Suppose the disease
to affect the foot & perhaps the Joint of the Ancle, & the whole
leg above quite sound, it is the common practice to leave
only as much of the Top of the Leg, as makes a rest to the Patt
upon the Knee with the stump bended: for the rest of the Leg
wd be a load and incumbrance, But of late years Wright,
Bromfield, & White, have performd the Amputation near to
Ancle, & propose that the patient shd use the artificial foot after-
wards, adapted to the Leg, by bending the Joint of the knee
in the natural way, & leaning upon the edge of a board fitted to
the Leg, & leaning against the Top of it; they further propose
to turn a flap over the end of the stump, to afford a firm cush-
ion, with[t] pain, or the producing an ulcer, & the operation
has been still more recommended. But you can only
judge tolerably of it after the common method, & by[s] method by
means of a flap have been shewn. ——— The place being
determind the Surgeon next considers the posture of the
patient in the operation, & for the superior extremities the
best posture is to place the patient in a low chair, tho if
the particular circumstances require, we can operate without
while the patient is laid in bed, or on a Table. But if we are
to operate upon the Leg or thigh, the patients Body ought
to be raisd higher, otherwise the Surgeon is oblig'd to stoop

so he is best placed on a Table of a moderate height. —
If the Surgeon is to operate on the Humerus or Femor, he must place himself on the outside, if he is to operate upon the Forearm he may take his choice, tho' the placing himself on the outerside seems to be the best, as by performing pronation or supination, we readily turn the Arm so as to cut both the bones at once. but if he is to operate upon the Leg, he ought to place himself upon the innerside, otherwise from the standing situation of the Leg bones, & smallness of the outer one he will with difficulty saw both bones at once. —
The patient being properly placed, & the Surgeon provided with the necessary assistance, he begins the operation the operr. by applying the Tourniquet, & he ought to make it a rule to stop the circulation in as little of the member as possible: thus if we are to operate on the forearm, why apply the Tourniquet near the Axilla to interrupt the circulation in the Humerus: it is better to put it near the lower end of the Humerus: & if we are to operate above the Elbow, we place it near the Axilla to give full room — and you know the general course of the Humeral Artery along the Biceps, &c. it may be stopt any where. — If we are to amputate above the knee, in like manner to give sufficient room we apply the Tourniquet high: the Artery running down at the innerside of the Sartorius, & outerside of the musculi adductores, nearly parallel with y. thigh bone, so we place the Tourniquet where we can manage it conveniently, supposing the operation to be performed somewhere above the Knee. If we are to operate beneath the Knee we place the Cushion between the Hamstrings, where we know the principal Artery runs, & we place y. Tourniq.t upon the forepart. — We next consider more exactly of the

place to be cut, & of the manner of making the Incision.
I shall begin with the Amputation of the Leg in y.e most common manner. We preserve the Insertion of the muscles y.e Head this Point for the sake of the General motion, viz. the Sartorius, Gracilis, & semitendinosus, w.ch are fix'd to the Tibia at the inner side & are powerful muscles in moving the whole thigh: & on the outer side the Biceps & semimembranosus: & upon the whole the best general rule is to cut the Tibia about the breadth of the hand under the head of it.
For making the Incision we use a knife with a small curvature at the point: for the imitating the shape of y.e limb with the knife is absurd. The length is sufficient if upon drawing it from the handle to the point we cut deep enough about 9 Inches long will be sufficient for the largest member.
The Incision may be regulated by the Eye; & two. prefer this. But Surgeons generally direct the Incision by a Ligature; but a piece of cloth w.ch is thick & elastic will answer better than a piece of Tape w.ch is generally employ'd. Surgeons generally err in applying the Tape before they draw up the Skin, w.ch prevents a necessary step, and a principal Improvem.t made by Cheselden, y.e cutting the skin at y.e first stroke, the muscles at the 2.d draw. each severally, & strongly upwards; then sawing the bone. For the Skin has more elasticity than the muscles, if therefore we cut the Skin and muscles at one place, y.e end of the muscles project & are left bare. In like manner y.e muscles contract & leave the Stump pyramidal. A French Surg.n alledges that this is unnecessary in the Thigh, as the Rectus & other muscles on acc.t of their great length, will draw a gr.t retraction, equal to that of the Skin, but the fact is that

the fibres of these muscles are oblique and short, & have not more retraction than other muscles.

Instead of being anxious at once to describe a complete circle, it is better to make two half circles, first bringing the Incision under the leg halfway, then beginning from above & completeing the circle. We divide all the Cellular Substance, & rather encroach on the muscles, than leave any parts of the Cellular Thread to entangle the skin. Next drawing up the skin we make the Incision of the flesh, & we do it in like manner at twice, when there are two Bones we have also to cut the flesh & membranes betwn them, by means of a double edg'd small Knife. We also detach the muscles from the Bones some way upwards, otherwise we can't prevent the Bone from projecting. It is of no moment to cut & scrape the periosteum, by seperating it above the place we cut, we expose the patient to an exfoliation of the Bone. ——— The Saw used by Chirurgeons are very vile, but of late we have one more resembling that used by Carpenters, & we may suppose that experience has led them to the very fittest shape. you will see a drawing of it in Sharp, but I have added a hole for introducing the forefinger, & we had best imitate Carpenters in having the Teeth equal on both sides: this is more necessary for us than for them, as the Saw is more in danger of stopping from our not being used to it. ———

But before I apply the Saw I used some assistance to hold the flesh out of the way, wch wd. be mangled by the teeth of the Saw. Surgeons have done it with the hand, but it is in the way of the operator. My Father in a paper on the Subject in the Medical Essays advises to employ a piece

of old Linnen. And as the threads of this are apt to entangle the Saw; I teach directly not to use a piece of Leather; w.ch does tolerably well when there is one Bone: but where there are two it does not apply so readily, it tends projecting a little: therefore I have caus'd to be made, plates of metal, & where there are two Bones we have a piece, or rather two pieces to enter between 'em, on either Side. And I find that M.r Wood had found the inconveniance of the Linnen, & had caus'd a bit of Tin to be made with a hinge.

The Leg is left in a slanting direction, & we begin to saw the two bones at the same time. If when we make an. last stroke any spicula remain we cut off them with a pair of Forceps. — We next secure the bleeding vessels: If we cut an Artery & leave things to nature as. blood is disposd to coagulate when the Air has access, & the Artery is truly muscular, besides its elasticity, has the contraction of a muscle; w.ch time the neighbouring parts swell, & from these circumstances the Blood stops in the greater number of the vessels. But where the vessels are large we are under a necessity of using art. The Ancients us'd the actual Cautery: as. has been discarded for the potential Cautery, as a bit of Caustic, or Blue vitriol, involv'd in a little Lint; & secur'd by compression. But this gives the pain & has almost all the other bad effects of the actual Cautery. So instead of these Surgeons have substituted the milder astringents with proper compression partic.a The Agaric, or Sponge: And many Surgeons have not only ventur'd to use these alone in Amput.ns of the Breast, Fore arm & Leg: but in a few cases after the amput.n of the Arm & Thigh; but upon as. whole w.h very indiff.t success, only they answer better than common Lint: & where

we can't employ the Ligature, we apply there, as usual
we observe the blood oozing from a number of small orifices.
But wherever the orifice of an artery can clearly be seen by
the naked Eye, it ought to be a rule to tie it. Very humerous
seldom more present than one principal trunk: but in
the fore arm and Leg there are two or even 3. branches &c.
ought to be tyed. —— The most common practice is to
use a crooked needle, & to take in with the artery a packet
of flesh, considering the swelling of the neighbouring pts
as the chief Instrumt of prevents the Bleeding. But the
less we take in the better, & let us be careful of the edge
or point of the needle do not wound the artery. And we make
as nearly a Circle as we can. we ought to use a thread double
all the way, it may be pretty large & made fast not to cut of
Artery. In pulling with the point of the Thumb we press the
thread deep; we pass it but once: do not pull with a great
deal of force, secure the first knot by a second, & leave abt
an Inch or two of the thread, as of. we may say both of it with
the Forceps. —But a better method was long ago practis'd
by Surgeons, of pulling out the Artery & tying a thread abt
it; we have a pair of Forceps for of. purpose painted by
Heister, but they are clumsey, & we do rather use Cheseldens
Tenaculum; or, as it is in danger of tearing the Artery, we
may take the Forceps commonly us'd in dissg wounds.
And we can almost always separate the Artery from of.
other parts pretty by the accompanying nerves, wch appear
white & protruding from their having little elasticity. —
We are not to think of from the nerve being cut thro' it has
suffer'd very Injury it can suffer, it remains highly
sensible, & a Ligature on it is an additional Injury, &

sometimes has proved fatal. So this method is chiefly
useful in the large vessels wch are closely accompanyd by
nerves, where the nerves are small the common method may
answer tolerably well, & if the Surgeon does not catch y. Artys
readily with the forceps, he may use the Ligature. We
consider the dressings along with the Bandages.
I need not detain you wth performing the Amputation of
any one of the large members: shall only shew it you in y.
above the Knee. Sometimes, in order to save flesh I have tho.
y. we might relax the flexors & extensors, by altering the
position of the Leg: but when the joint of the Knee is swell'd
that is impracticable, It is in our power to cover the thigh
very much with flesh, so we may lay aside Sharps proposal
of passing a thick cord with a eaton needle thro' the opposite
sides of the skin, wch gives pain & increases the attraction by
putting and inflaming the parts: so we wd only first draw y.
skin by some gentle method. Now next suppose I intend
to preserve as much as possible of the Leg, & that I want
to form a flap. I first determine the place for the circular
incision, then take a double edgd Knife enter it there
between the muscles and Bone, & cutting down to near
the heel seperate the pieces, then having finishd y. oper.
in the usual way, we turn the flaps over the stump.
In the thigh it is proposed to form a flap on either side, so
as y. the two may meet. But D'Yalarian a late writer
whose work may upon the whole merit some little atten-
tion, forms the flap on the fore & back part, & in like manner
in the Humerus &c. making the flap where the flesh is
thinnest. He further proposes what I think is a real
improvemt. to keep the flaps seperate, & to dress it in the

same manner w.th the next, till the parts are begin.d
to heal, for ab.t 10. a 12. days & then to apply it.
Now what opinion are we to form of this practice. I know
y.t it has been done with succes. Mr. Wood try'd it on one
patient, who walk'd down to Leith & back again for his
first walk. But other persons have found it impossible
to bear the weight of the body upon the Leg: the skin has
been push'd up, & the Cicatrice open'd. The Celebrated
Mr. Pott I am told is an instance of this, & rather than
suffer the inconvenience of the Leg had the operation repe-
-ated in the usual way: And a Gentleman who studied
here, y.t had the oper.n done by Mr. White as he did not chuse
to submit to a second oper.n was under y.e necessity of sup-
-porting the weight of the Leg, so upon the whole y.e pat.t
sacrifices a good deal to appearance, & he ought to have
the matter fairly stated to him, as I think we sh.d prefer
operating in the common method till we have more ex-
-perience with reg.d to this. ——. One particular kind of
Amputation remains to be explain'd, as I do not find
any direction ab.t it that I wo. advise you to adopt, viz.
the taking the Humerus out of its socket. — Suppose a
disease to form in this Joint y.t must prove fatal to
the patient, & it is necessary to take off the whole Arm.
you remember the possibility of stopping the pulse by
pressing the Subclavian Artery, against the first rib
but a firm compress be push'd down strongly upon it till
the pulse ceases, as a Tourniq.t wo. be inconvenient, &
wo. slip on changing the posture. — It has been proposd
that we sh.d form a stump to be laid over y.e Glenoid Cavity
But the general argum.t against stumps applies here,

therefore we wo. only keep as much skin and muscle as in an ordinary amputation. The best posture is the recumbent in case of fainting &c. Shall suppose y.r the arm can't be got out of its socket but at y.e immediate & have treated this operation in a more embarassing way. And it is better to follow Le Dran the Inventor of y.e oper.n in bringing outwards. Having cut the skin w.ch may be done with a common Scalpel, we pass a Ligature between the vessels and bone y.t it may be ready to tie 'em if necessary. We next cut thro' the Deltoid muscle, y.e the pectoral, & being into view the head of the bone, cutt.g thro' the capsular Ligam.t & we readily turn it out of its socket; we next cut in very close to the humerus, & take care to come in a slanting direction downwards, & we can cut the end of the large vessels where we please, a little beneath where we propose to form the Ligature; & so bring away the member w.th ease, & drawing out y.e artery we tie it as usual, w.ch is necessary on acc.t of the No. and size of the nerves: while having the thumb-stile y.e 5. or 6.th day with directions to draw 'em if their is any Hemorrhagy. — With reg.d to another oper.n y.t cutting the thigh out of its socket: I wo. advise you never to attempt it, from the y.e size of the nerves cut, independant of the danger from y.e vast breadth of surface, it will certainly prove fatal: so we wh. content ourselves with imitating Bilguer method, in giving medicines, making proper incis.ns to give a discharge to the matter, & trust y.e cure to nature. The manner of operating on the small extremities is simple and evident. I shall take the mid-finger as an example, being the most difficult to cut out. —

If we mean to cut the bone at its middle, we imitate
y.e strokes of the larger operation, & defending the other fingers
we saw the bone. For it is a brutish way to chop it off w.th
a wedge, w.ch must bruise the Bone. Next I shall suppose
y.t we are to cut a finger off at a Joint, we scarcely need a
Tourniquet but we sh.d have one ready. The Surg.n begins
pretty high & cuts down on each side till he is past y.e Joint
in order to preserve the skin: & we can easily feel the Joint
with the edge of the nail. Bromfield observes y.t the cutting
the cartilage from the end of the Bone accelerates the cure,
so instead of avoiding the wounding the Bone, it is better
to take off a little portion of it. Supposing y.e meta-carpal
bones diseas'd, we are not to imagine y.t it is necessary
to cut off the whole hand, & the same applies to the foot.
I remember to have seen an excellent operation done by
M.r Adair, he took out the 3. middle toes w.th their meta carp.l
bones: the foot fill'd up, & by proper stuffing the patient
was able to walk, & no Arteries needed stitching.
If the disease is in the meta carpal bone & we do not think
it necessary to cut out the finger at the same time, may
if the disease is confin'd to the middle of the bone, we may
use a sort of Trepan and take out the middle piece w.ch
may be supply'd, or in the case of Exostoses, we cut off &c.
then cut out the diseas'd Bone & save the member.
These are all the operations in Surgery that are necessary:
if you understand well the manner of doing these, & the
Anatomy: few cases will occur where you will be at a loss.
I remains that we examine y.e Parts of the Body, the
Bones with their diseases, & the operations proper to the
Teeth. And then we consider the Bandages.

Lecture 102nd

I remain to explain some things relative to the structure of the Parts of the Body — The Bones.

Their general appearance, connexions by means of Cartilages Ligaments and Membranes you are sufficiently acquainted with & I only need to make a few cursory remarks.

The Hollowness of the Bones increases their strength. It is true that a larger Reed more readily gives way to a stroke for instance: than a smaller one of the same thickness: but we are seldom injured in this way, & when a Bone is broken by a carriage passing over it suppose, the Bone does not sink in, but the fibres first give way on the opposite side: & the resistence this way is increased in proportion as the outer parts are removed from the Centre of motion.

The Hardness & Inflexibility of the Bones depends upon a vast quantity of Earth entering into their composition, so that when burnt, it retains its texture & has not lost more than one third of its weight. This Earth is disposed in the long bones running longitudinally, & in the flat bones issuing from the Centre like the spokes of a wheel, or they shoot in streight lines from y.e part in w.ch the bone begins to form. We observe the fibrous appearance in young bones as they macerating them. I have made a dissection of the thigh bone of a man in its hardest part, & the fibres are as distinct as in a dry'd muscle or fish. These fibres are disposed in layers or Lamellæ, tho' not so distinctly y.t we can readily seperate them one from another.

We find the hollow Bones filled with marrow, which is contained in Cells or Cancelli, to prevent one part from

gravitating upon one another, these Cancelli are more numerous towards the extremities of the Bones, where the Bone, especially in old people is remarkably thin. And this leads us to observe, 1st. the Cancelli are formed from the solid sides, 2d. a plate is sent off consisting of fibres, these separate, intersect, & form supports for the marrow. These Cancelli are parallel near to the ends of the Bones, & their sides stronger, so are more of a lamellated structure than in the middle of the Bone where they appear fibrous, so the Cancelli are distinguished into fibrous and Lamellated. We further find canals betw. the fibres in the most dense part of the Bones, convey. Marrow. These are obvious in burnt bones when cut transversely: they are distinguished from the Canals for the Blood vessels from their irregularity, resembling the Cancelli within the Bone: so 3d. there is no doubt of their serving a similar purpose. And there is good reason to alledge contrary to Du Hamel 4th. the Bone grows harder as it proceeds outwards: these canals 5th. lodge the marrow diminishing. They are best seen in bones of a middle age, as these of young animals are too porous, & old animals too compact: but what we shew in any age surely applies to all. The marrow is further contain'd in a membrane nam'd junior tunica internum, but it does not belong to the Bone so much as to the marrow, for it enters deep so as to divide the marrow more minutely than the fibres of the Cancelli do, & confines it in what sacks wch. are exceedingly minute, so 6th. after a bone is boild the marrow retains its cylindrical

form, & is not melted by the water. The Marrow has been supposed for the nourishment of the Bone, but when we give madder to Animals, so as to tinge the Bones, the Marrow remains colourless, so y^e principal part of the nourishment is convey'd thro' the Arteries directly. And the marrow does little more than keep the Bones from becoming brittle: & we are farther to consider it as a repository of oil for the general purpose of the Animal Oeconomy, as the fat is in the Cellular substance, & the whole of the uses of either are perhaps not yet, nor ever will be sufficiently known by us. But we know that fatty substances are nutritive, & y^t Animals can subsist without swallowing for a length of time, whilst the marrow wastes during this period, so they serve one purpose of nutrition, but there may be many others as the adding somewhat that corrects the bad qualities y^t the blood acquires by its repeated circulation. The Cartilages from their situation &c are we may divide them into 4. Species. —— 1^st In the foetus the ends of the Bones are imperfect, and Cartilaginous. ——

2^nd In the more A. Cartilage is substituted in place of Bone, w^ch yields by bending, not by any Articulation.

3^d The Ribs are join'd to the Sternum, & several pieces of the Vertebræ are united to one another by Cartilage.

4^th The Extremities of the Bones in the Joints are fitted with Cartilage. Now as the Cartilage approaches to the bone in hardness, is intimately connected with it, supplies its place for a while, & what is Cartilage in one Age, is Bone in another, are we to consider bone & Cartilage as possessing the same texture & properties, only in y^e bone more of Earthy matter has been added: perhaps there

are good reasons for doubting if this notion be just; and upon the whole it will be better to consider 'em as agreeing in a general resemblance, but differing in material properties. The Cartilage, as in those of the Ribs, is cover'd w.th a similar membran, the periosteum of the rib continued forms the perichondrium of the connecting extremities, & throwing in an Injection into the vessels with Care, we find a number of vessels in both injected. But still I find reason to suppose with Dr. Nesbet that they are essentially different: nay perhaps it may be a question, when a Bone is fully form'd, whether there remains in it a single particle of Cartilage y.t formerly supply'd its place; for, first in y.e appearance there are several things wanting, as the fibrous Structure, the Cancelli. 2.dly There is no continuation of substance; those when we seperate the Cartilage from the rib, we find a smooth joint in the end of the ribs, & side of the Sternum, the fibres are not continued: & the rib by its more vigorous growth seems to encroach upon the Cartilage, for at no period do we find any intimate connexion: & if by age they ossify, y.e begins in regular points. We cant inject a Cartilage till bone begin to form in it, no cartilage admitting coloured Injection. — The Patella at first is entirely Cartilaginous: & afterwards changes into Bone, but not in plates, we see Arteries penetrate it, the Branches of w.ch secrete the Osseous matter; w.ch we find in round knots plac'd regularly around y.e vessels, & cutting the Cartilages we scarcely find any adhesion betw.t the new form'd Bone & Cartilage, so we are rather to consider the Cartilage as a fit Bed in w.ch the new parts shoot, & are fitly regenerated. — With regard to the Ligam.ts connecting the Bones together, & the Mucilaginous Glands; I need not give any very particular description of 'em: they are small

the deep Caverns of the human Body: & over the Ligaments we have seen, extending the periosteum. — Do shall next consider the Structure of all these parts in so far as they consist of vessels and nerves. We find the Periosteum full of vessels, the inner layer, q.v. we are to term periosteum, for in many places it appears double from the addition of Tendons; we find that it has fibres, q.t. are chiefly directed in q. same manner with those of the Bone, so that it tears more readily longitudinally. Next we obs. the Periosteum passing from one bone to another over the Ligament giving it an external Coat. We find it connecting strongly to the Bones by a No. of threads, many of w.ch are Ligamentous, but many others are vascular, & Haller is mistaken in alledging q.t q. external periosteum does not furnish every where vessels to supply the Bone. — We obs. vessels running thro' the Bone into the Marrow: & also vessels coming back from the marrow to supply q. bone; So that the Periosteum has very numerous vessels circulating the Blood: also the vessels of the Bone itself are numerous: the red juice however in Bones from giving madder is in consq. of this substance being secreted: but we see 'em by injecting the vessels q.t destroying the Earth of the Bones &. —
Following the vessels thro' the Bones, we find 'em numerous in the marrow, we find the membranes red as well as q. oil. Madder does not color the oil: nowe push the injection w.t more force than the Blood is push'd with: and after q. vessels have supply'd the marrow we find numerous branches went back again thro' the Bone. — We find vessels entering at both Extremities of the Bone; while the principal medullary vessels enter near the middle. Now these all communicate in various directions w.ch is of great use in fractures &. for

maintaining the Circulation thro' the Bone.
I have mention'd the periosteum, that in the 3 first species of Cartilage is Joyn'd the perichondrium. In the 4th species the communication is interrupted by the Ligament & the perichondrium is a continuation of the inner layer of the Ligament; now that admits of Injection about its edges, but where the surface is expos'd to pressure, we can't shew red vessels entering into the perichondrium & in none of y.e species can we make an injection enter into the substance of y.e Cartilage. The Ligaments have an Infinite No. of vessels wch. are continu'd into the Glands of the Joints, wch. after Injections get a red colour: & we can make the fat and marrow red when y.e bones are little tinged; y.e minute distribution of y.e vessels in y.e bone being smaller. — All the parts composing y.e Cavity are provided with Lymphatics wch. are invisible from their smallness But wherever added matter forms, whether on the surface or within the Cavities of the Joints, the Lymph.c Glands situated the parts affected & the heart are expos'd to swell.
The last point & a very material one respects the Nerves. to determine the degree of sensibility of each of the parts of y.e Cavity. — The substance of alone of a Cartilage, independant of their membranes, may be cut or burnt in a living Animal, with.t giving pain, they are absolutely insensibility itself. — With regard to the marrow we can't speak with absolute precision: Haller from its resemblance to the fat concludes, y.t like the subcutaneous fat, it may be bruis'd or destroy'd with.t the Animal feeling it. —
Duverney tells us again y.t on amputating the limb of a Dog, & introducing a sharp pointed instrum.t to the marrow the Animal shew'd marks of very great pain. Now

perhaps we are to settle between these extremes, on a Limbs being amputated. I have once or twice touch'd w.th the point of my finger the marrow, the patient shrunk, and express'd more pain than when I touch'd y.e muscles, the latter being less injur'd by the touch. In a 3.d Instance y.e patt. scarcely shrunk tho' I press'd with some roughness. So we may say y.t it is not a very highly sensible Organ; And I do not know of a proof of death being occasion'd by pain & Inflam.n excited in it: Where matter collects y.e patient may be render'd Hectic & kill'd by the absorption of that matter. — With reg.d to y.e periosteum, where Exostoses are form'd on it, y.e patient often feels consid.le pain, even where the Tumor is not so large y.t the pain can be ascrib'd to the stretching of the external Tegument. But in a sound state of the Body y.e pain is certainly not very consid.le, & the same time Hallers experim.ts on this Subject are not very satisfying: He made 'em on y.e Tendinous Aponeuroses of the Occipito frontalis muscle, & there is reason to suspect y.t y.e were cut, before the periosteum was laid into view, his words are, Si modi nervi subcutanei accurate removentur; But upon the whole we may say with regard to the periosteum, as with respect to the marrow, y.t it is not yet prov'd y.t an Inflam.n of it occasions Symptoms of high danger.

But with reg.d to Ligaments I am inclin'd to draw a diff.t conclusion, In a sound state they have not much sensibility: but in the diseas'd state they become so highly sensible as that the irritation may prove fatal. Parts may be supposed to have exactly the same degree of sensibility in a sound state, & yet the one may be 10. times more sensible than y.e other when diseas'd. The Nerves are here more strangulated and oppress'd than in the other Cases.

To mention the leading circumstances, I wd. begin with
the reason of the thing. Can we imagine that nature wod
join membranes to keep together bones, &c. as frequently
put upon the stretch, & yet that those shall be join'd very
sensible? They must be fitted for their office of resisting
a sudden violence without affecting the Animal very much.
And Hallers experiments are decisive here: He made a hole
in the Ligament, so y.t the Experiment was made on y.
immediate with the nerves entire, yet the Animal does not
complain t violently. We have an instance by Dr. Simpson
where the patient screamd out upon cutting y.e Ligam.t
in making an Incision into a joint: but a nerve might
have come in the way, or the part may have been before
inflam.d: and we have many instances where an incis.n
has been made into the Joint, & where the pain was not
considerable. Next in explaining the Joint we in some cases
feel acute pain, in other cases it is not acute, where the
nerves running over the joint are not affected. In luxations
the Ligaments are not only extended but torn, & we see the
Patient free from pain, an acute pain does not succeed
when the part is not exposd to the Air. So y.e pain given
to Ligaments by stretching & Incision in a wounded state
is not very considerable. But in a diseasd state the case
is otherwise, in consequ.ce of sprains a pain frequently
comes on slowly, & matter is collected w.th effect of fever
in the most sensible manner, we have a Case by Dr.
Johnston: a Collection in the Joint of the Ancle, when the
Surgeon let out the matter, who happend to make the
Incision under the fibula, where the Ligam.t is thick, he
touchd the Ligament with a probe, & the pat.t complain.d

much, the Ligament was highly sensible. Next obs. the pain attending stones forming in the joint in the case of the Gout: or the pain we feel in Rheumatism, q.d. disease affects other places, but it is wd. that the Joints are chiefly affected. If we move the Joint, lift the limb wt. the hand, & stretch the Ligament: the patient complains: so that the affection is not in the skin as Dr. Hales experiments. And beyond all doubt several persons have been killed by a puncture of the Ligam.t of the Knee: when it has been done in consequence of water in the Joint, & q.d. water actually found. The Patient has suffer'd the most racking pain confin'd to y.e Capsule of the Joint. So we are not to take it for granted q.d. incisions may be made into Ligam.ts with tolerable safety.

Lecture 103.d

It remains to determine more particularly the use of the Periosteum. Several purposes wch. it serves as justly wd. be. It grasps the Bone, gives it a smoothness, allows the muscles to slide & play easily upon it, lessens the attrition. From its close union it connects in young part.s the Epiphyses to the Body of the Bone. Dr. Hales has made an Experim.t to shew this, He separated the Periosteum from the Leg of a calf, just when the Epiphyses are join'd to y.e Body of the Bone, & hung weights to the Leg, till it separated: He made the same experim.t on the other Leg, & found that it requir'd 2lbs. additional weight to make q.d. sepn. So investing the Periosteum from Bone to Bone it adds strength to the Capsular Ligam.t. Next. From its structure we perceive q.t q.d. vessels furnishing the Bone divide in the most minute manner in the Periosteum, q.d. this

membrane serves to conduct the vessels & allow them
to divide properly, as the pia mater conducts Vessels of the
Brain. But are we farther to suppose with Du Hamel y.t y.
periosteum not only supplies vessels for the nutrition of y.
Bone, but that the Bone are formed from it in successive
layers, in the way that Trees are formed: as Bark is Did
entirly Some wood: & when we cut a Tree across we find y.
consists of a No of Ringlets, or layers, & by the number y.
age of the Tree can be determined, one being added every
year from the Bark: this Analogy seems to have led
him to the opinion, he compares a Bone to a Tree, the
Periosteum to the Bark. the bulk of Bone to the layers of
Wood, & the marrow to the pith of the Tree, & there is no doubt
a striking resemblance, but still the Oeconomy of the
two is very different: He observes y.t not only y.e periosteum
is proportionally thicker in Children w.ch is a fact, but that in
attempting to seperate it, he finds y.t one part of it seems of a new,
& another part seems to remain soft, y.t what is periosteum at
the Extremity is Bone at the middle: but here he takes the soft
Cartilage for the periosteum, these being more intimately glued
together in young subjects than afterwards when many of
the Ligaments and vessels are obliterated: so we do not find y.t
his opinion is worthy much regard. But it is a matter not only
of curiosity but of use to observe, y.t tho' the Periosteum
does not seem in health to detach successive layers, yet
wherever a fracture is made, or a loss of substance, the new
growth of Bone is chiefly from the Periosteum. We see the
operation going on within Cartilages, the Bone forming
at a distance from the periosteum, we find likewise
Bones running together by Arches or Laces, where y.e Ligam.ts of

× secretion, wch terminates in the Generation of Bone.

interpos'd by Anchylosis. but there is a great addition made from the periosteum. In case of a fracture we dis. a great degree of Inflam.n especially in the periosteum wch is greatly thickend; any layer is detach'd & yet to the feel it seems firm: in y.e thickend membrane we see porous points, & when we run a wire thro' it, it comes to be cover'd with the callus. When the callus advances farther it resembles a mass of Sand; & were it not for the membranes it could easily be broke: when we inject a callus we trace the vessels from the periosteum deep into it, so the presumption is that they have originally form'd it, we find the largest vessels on the surface: & the smaller branches going deep into the callus. In like manner when we cut out a portion of the Skull the sides of the Bone don't gradually enlarge, y.e opening remains & is fill'd up by an ossification spreading outwards from the middle to the edges, y.e new substance scarcely adhering to the edges of the Bone, but to the membrane within: the edges of the Bone do enlarge, but y.e ossification begins in distinct points, not in the original Bone. & where a Bone is taken out y.e membranes contribute to fill it up. So we ought to be very saving of the periosteum, as it is a principal Agent in nourishing broken pieces of Bone, or in supplying the loss of substance. _____ The formation of Bone chiefly depends upon a certain plexus of vessels: to use a vague term, wch we shall perhaps never be able to define wt more precision. But after the Bone is form'd there is no doubt y.e pressure makes it more dense & compact, & when we see certain parts of the Body y.t are expos'd to pressure, subject to decay, instead of considering the pressure as y.e principal cause: we are to consider it as first producing a disease, a certain disposition of the vessels, in consequ.ce of wch there is a morbid

Lecture 10th.

Diseases of the Bones.

We find y.t ossification may proceed from an affection of the periosteum as well as from y.e extention of y.e substance of the Bone: This enables us to understand appearances that are frequently seen in practice, as y.e Exostoses, or processes which grow out from Bones: several of w.ch begin in the periosteum, are at first movable, but afterwds adhere firmly to the Bone. We find w.ch are at first filled with a watery gelatinous matter, w.ch is succeeded by an oily substance. In other cases y.e Exostoses are in consequ.ce of an affection of the Bone: So when a person has rec.d any injury on a Bone, we ought to be careful to discuss any Inflam.n in the periosteum, as it may produce an osseous substance: If these Exostoses begin in the periosteum, they may be cut out: but if they proceed from the body of the Bone y.e saw may go deeper, so we must proceed with greater Caution. Next we can explain a change happening to our Joints; what is call'd Anchylosis, where the two Bones are united: y.t is produc'd in two ways — By suppure, as in the Spine of some Horses of Burden; such a change is produced in the vessels of y.e Cartilages, y.t the Osseous matter is secreted, & the Epithyses are connected or converted into Bone: & in curvatures of the Spine we find the several Bones joind together, when where there was probably no ulcer or erosion in the Bone: But for the most part it is occasioned by an erosion of the Cartilages, in consequ.ce of w.ch a new growth of Osseous matter is produced. Here are examples of what are called y.e white swelling of y.e Joints, the Fungues Articulorum: y.e Ligaments of the Joint are thickend, an acrid matter produced, & a degree of Erosion can

be very well elevated, an ichorous matter is produced in consequence of the Erosion, that glues the thigh to the Tibia, & the patella to the thigh. With respect to this affection perhaps y.e best general rules will be these. — If an erosion happens within a large Joint it seldom fails to produce Hectic fever. The Anchylosis is the resource of nature to make abone, to fill up the ulcer with an ichorous matter, & in that way to prevent the discharge and the waste. But it is seldom y.t she completes her purpose: therefore unless there are evid.t marks of scrophula, it will be a good rule after moderate tryal, to proceed to Amputation. But if it does not depend upon this Cause that that the Joint has been kept with.t motion: & if we judge y.t the parts are past the recovery of motion, instead of endeavor. to prevent the Anchylosis we ought to promote it by keeping the Joint with.t motion, for besides saving y.e pain & danger of an operation the two Bones joined together may be afterwards more useful than an artificial leg. But if there is only a tendency to Anchylosis, y.e muscles shorten'd & the Ligam.ts contracted, we w.d endeavour to prevent the Anchylosis, & restore the motion by giving gentle flexion, & extention, with.t occasioning pain: we may further assist by rubbing the part with oily medicines, & by using y.e steam of warm water but the motion is chiefly to be attended to. ——

When the Bones are crooked after being softened: In some y.e Curvature is very remarkable, & yet there is no appearance of Erosion: It is frequently occasioned by the Rickets, & the action of the muscles is the principal Agent, But there is also a Diathesis Cachectica, for rickets is not a mere laxity, there is something further w.ch is determined irregularly into

into different membranes. Besides. that the head is larger than common, & often the Anterior part is remarkably so: In consequence of this the Vertebra of the neck come to be bent forwards: this seems to depend upon the manner in wch the head is balanced: when a person in an erect posture falls asleep, y. head falls forwd the fore part being heaviest, & the Brain gravitating on the Bones seems to dilate them, tho' there is still something farther y. gives a greater urge to the fore part. ——— The Curvatures in the Trunk are very uncertain, in some the Body is bent forwards: but if from any pain or habit, the Child happens to bend sideways, the growth is checked on that side of the Vertebra whilst the other grows luxuriantly; & the weight is thrown much to one side; hence the Child is led by an instinct of nature to throw y. common weight upon the Bone by inclining to the other side: & thus we find two or more Curvatures in the Spine. The Ribs generally grow flatter, & appear still so in life, when the several Cartilages are ossified, and y. Ribs are prest inwards by the weight of the Arms: & also by the constant weight of the Air apply'd to y. outerside, while the full weight of it is kept off in the inner side by the discard'd state of the Lungs, & y. Diaphragm is also pusht up into the Thorax. ——— With regard to the Extremities the Clavicles are bent exceedingly: They serve as Beams to sustain the Extremities at a distance from the Trunk, and there is a constant tendency to bend them; & Men who have us'd the Arms much they are

more bent than in Women. The Os Humeri has some little degree of curvature outwards naturally, & from our leaning our weight upon it, it takes a greater bend: but the action of the muscles, has still more effect; we employ the flexors with greater force y^n y^e extensors but there is a considᵇˡᵉ variety in the direction of y^e Curvature of this Bone, y^e Diathesis Cachectica disposing it to bend differently in different persons.

On the forearm we find naturally a hollowness upon the inner side to lodge y^e Bellies of the muscles, they y^e greater strength of the flexors the Arm is drawn further inwards, as a Bow is drawn by the string into a Curvature.

Next the Pelvis is generally alterd in its shape, y^e Ossa Ilia are made flatter, & the thigh bone is pushd in more nearly to a right Angle, y^e neck with the body of the Bone: & the top of the thigh Bone is pushd further out than common, & this has been mistaken for a luxation of the thigh bone.

The Body of the thigh Bone is bent forwards & a little outwards: & to understand this we need only look at the Skeleton. — Rickets has been criticisd then but unjustly, then is a Curvature on the fore part, & the bone being soft that is increasd. — And there is such a change produced on the Leg Bones as in y^e forearm; the strongest muscles draw the Ancle backwards, but the direction w^ch the middle of the Bone takes varies according to the Childs happening to walk more or less; or according to certain Circumstances; some Children place the knees at a distance, others that are more weakly, put the Knees inwards, & the feet outwds.

to enlarge their Bavis, wherby the Bone is bent more inwards. ——

Here wd. obs. that it is an absurd conceit that the Rickets is a new disease that began in England the last Century: there is nothing contagious in it. — Glyson alledges y^t. it only appeard abt. 80. y^rs before he wrote: but each person has remembred this disease as long as they cd. remember any thing. It has existed in all parts of the World for many thousand years. & in Holland there are 8. for 1. affected with it that there are in England. It is most frequent in the Fenny Countries, where people are weaker & the fibres more relaxd. ——

I may also with the Rickets, another circumstance, wch. is a further step of the same kind of Ailment. —

The Incarnation of a Bone.

When it is chang^d into a fleshy appearance: of this you will find now a N^o. of Examples in the works of most of the Societies in Europe. The causes are very various: Sometimes it occurs after a common fever, sometimes the persons have been sickely: others a Scurvy, or a Diabetes, or contracting some bad habit, as the Eating improper substances. — Now this is a disease something resembling Rickets, where the curvatures are similar, but more irregular because the softness is greater, & y^e. bones more affected by pressure; they are so soft that they can be cut with a Knife, & semi pellucid: generally the hardest parts are found to be softest. ——

Now in what manner are we to explain this? I have

no doubt that if such Bones were burnt we wo. not find above 1/10 part of their weight of Ashes remaining, perhaps not a 50.th part, not more than a Quarter.ge: there is a continual secretion of an Earthy matter going on, & the hard matter of the Bone is absorb'd, when we feed Animals with madder, we also. that this change is very quick, every particle of the Bone receives the tinge, & the whole is reassumed again in no long time, if therefore from changes of wt. we have no just notion, the proper quantity of earthy matter is not supply'd continually, or too much is absorb'd, such a state of the Bone will be produced without the Interposition of any acrid matter. — next let us go farther, & we also. still greater changes operated, that a Bone is subject to Inflam.n & all its consequences, you will readily admit, for a part tho' invincible may be suspected capable of Inflam.n induced by a certain activity of the vessels. — And we are to view affections of the Bones as resembling those of the soft parts as subject to Inflam.n and all its consequences. —

If a soft part inflames, & the Inflam.n does not discuss, y.e p.t suppurates, or mortifies, is turned into a Gangrene, or becomes Schirrous, & we have Examples of every one of these produced in a Bone. — You know what is call'd a Caries of the Bone, the Term is appl'd in a vague way, & comprehends Ulcer & Gangrene. — We begin with the Ulcer. — where the vessels run into the Carious part, & there is a discharge from the Bone. If generally brings on it a degree of Gangrene, there are certain portions in wch. there is no circulation, in consequ.ce of wch. the Cure proves tedious, we obs. a group of vessels coming out from the Bone, Nature attempting to fill up the void of the Ulcer, & the Gangrene

a exfoliation of a Bone resembles an Eschar, wch we
can form in a soft part with Caustic. —— Next I think
I see appearances wch we wd. compare to the Schirrus state
of the softer organs, where hard knots form on a Bone & the
part yt has been diseasd is evidently harder than ye sound
Bone was: at other times we dis. a general thickening or
swelling of all the parts of a Bone the hardness & weight
greater: we may compare this to a schirrus of a Gland. —
Next we dis. the appearance wch the ulcer in a Bone puts
on. If that is superficial, we find a degree of roughness
on the surface, & there is perhaps scarcely any particular
Growth; but if the ulcer has continued long & gone deep, ye
we find a spongyness in the Bone, the several Tables and
fibres are seperated, and we see holes eroded what have been
call'd worm eaten caries; from these holes we often find
spongy flesh growing out, resembling the erosion of the softer pts
where there are a number of holes in the skin, & from these a
softer kind of flesh growing out. — We dis. further that
certain diseases affect particr parts of Bones, most of the
Cutaneous diseases, as small pox, measles, & Erysipelas,
are apt to affect the surface & produce collections between ye
Bone and periosteum: We find other diseases particr the
Lues venerea, disposd to affect the hardest Bones, gen.ly
attacking the middle. The Rickets attack first ye Extremities
of the Bones: & we find the like happen in what is call'd
the Spina Ventosa, or Scrophulous Caries of Bones; and in
the Scrophula of the Bones, the Spina Ventosa &c. ye appear.ce
much resembles what we find in a Gland, there is a slow
swelling, the matter not very acrid, a small hole forms,
wch lay the mouldering of the Bone enlarges. In a Cancer

affects a Bone, it grows hard, unequal, & scabrous. Then a spongy flesh grows out upon it, and this discharges a great quantity of Blood, so that struck at the appearance we look with the idea of a Cancer of the Breast: — So far we der. of the genral Analogy: & in the manner of treating 'em we wo. apply what is approv'd of in the softer parts. — If a sound Bone is laid bare Surgions deter us from applying oily Substances, tho' they praise these applic.ns in y.e softer parts: But Ointments may be apply'd repeatedly to Bones with. the smallest bad consequences, but here, as to a soft part, dry Lint is the best applic.n & we may cover it with a soft oily substance to keep out the air. But when the Bone is injur'd instead of torturing y.e patient with the applic.n of Spirituous medicines, or of the actual or potential Cautery, if the operation can be easily done, y.e best way is to cut off y.e diseas'd portion w.th a sharp instrum.t & dress y.e sound bone as we wo. a piece of wound flesh exposed to view. —

Then is a particular species of Caries w.ch I wo. mention as that complaint described with accuracy by y.e Arabians, under the name of Spina Ventosa, Fistula, or Odaxthracace. Look into Boerhaave or Vansweiten, or Heister, it is mention'd as proceeding from a variety of different causes, as Scurvy, Lues Venerea &c. & a variety therefore is proposed in the method of treatment; they chiefly order mercury &c. the decoction of the Woods. Now I wo. offer instead of this to an excellent Writer of the last Century, Wiseman. He proposes it as a Scrophulous Caries: tho' sometimes prejudic'd by the writings perhaps of others, he forgets his own & dont dissever the Bones of this head, of the Skeleton, the Sutures are cooperated: next lies the Eye, or any of the Bones near

+ was given to it: perhaps from their having a better Idea of the disease, and the Rickets being considered as an effect of weakness, and Constitution no name was given to it.

a Joint, & you understand the meaning of the Term
Spina Ventosa. They found a large Cavity with't anything
filling it, & upon pressure wind had formed the Tumor, they die.
a member of irregular processes, because the Bone is slowly
consumed hence the two names joined together expressing y.
cause and appearance of the edges of the Bone.
The Bone is enlarged, rough, whitecolor'd, Spongy, y. legum.ts
are affected, the Bone eroded, & the matter escapes thro' the
holes. If the disease continues longer often spongy flesh
grows into the Cavity. — Children disposed to Scrophula
are often attack'd w.th Spina Ventosa, the Age, Constitution,
Cause of the disease, the appearance, an ulcer in'm mean
-ing an ulcer in the softer parts: the continuance of the
disease, the difficulty of Cure, by any known remedy, the
danger of trying rough remedies; every circumstance
shews a scrophulous Caries. — So it is to be treated in
the same manner, making an allowance for y. greater
hardness of the parts, & the vicinity to the Joints, to w.ch
Causteries & Caustics are by no means to be applyed.
Physicians conceive that Scrophula is a Disease seated
in & originating from y. Lymphatic Glands of y. Body.
But I have repeatedly seen the Spina Ventosa, the first
symptoms of Scrophula, beginning at a distance; with't
the reach of the Lymphatic Glands; so it exists in the
Constitution, before it shews itself in swellings of y. Glands,
or it is not any change in the Glands that occasions it.
Now are we to conceive that this disease first began in y.
16. Century, because it was then first described properly?
It is described by Hyppocrates & Celsus as y. destruct-
ion of the Bones: but no such name as Spina Ventosa

Lecture 105th

It remains that we examine the Structure of the Teeth in order to compleat the Human Anatomy.

Lecture 106th

You all know the general parts of a Tooth, that above the Gum call'd the Base, the root which fixes it to the socket, & the neck or collar where the root joins with the Base.

The Base of the Tooth is cover'd with Enamel, but the Bone within the enamel alone forms the roots: so from y.d extent of the Enamel, that it covers all that part of the Tooth exposed to attrition, we wo. say that the chief purpose of it is to render the Tooth durable, & to fitt it for this purpose we observe that it is fibrous, & that the ends of the fibres are turn'd outwards, are set perpendic.r upon y.e obscure substance from the regular disposition of the fibres, & particularly there being placed perpendicularly we wo. suppose y.t y.e Enamel is an organiz'd substance, not meerly a juice throw out from vessels; & it wo. appear to be capable of some degree of growth, for if a little of it is broke off, the tooth grows smooth ag.n in a great measure no doubt to the wearing down of the sides, but perhaps also in some measure to some little degree of filling up in the middle. — The Enamel differs in its properties from the Bone it is harder, contains less oil, & more earth. The Quantity of oil in the bone is so y.t as to render it of a black colour on being exposed to the fire, but the Enamel remains white: or we can render the obscure part transparent, but the Enamel can not be rendered so, the quantity of earthy matter is such y.

Substance insoluble

it falls to pieces, consumes entirely & falls of in a white powder. We find a farther difference in the direction of y.e fibres, those of the Osseous part are horizontal, they are in plates surrounding the middle Cavity, so we are not to conceive y.t y.e Enamel is merely the outer part of the Bone hardend by pressure, but are to consider it as a substance sui generis, essentially different from the other Bones of the Body. —
The thickness of the Enamel varies according to the chance of rubbing, it is thicker at the sides y.r between the Teeth, and thickest of all on the Top. — Next we find that the osseous substance forms the principal bulk of the Basis of the Tooth, as well as the whole of its root. —
Within the osseous Canal of a Conical shape beginning near to the point of the root a little to one side, & spacing those Canals from the different roots we find em meet within the Basis in one common Cavity, & not divided by osseous septula, & these no doubt communicate w.th one another, tho' we can't give a proof of this in so small vessels. This Cavity contains besides a pulpy substance w.ch is not of an oily nature, but is hard, of a red colour, and a very ordinary injection communicates color to the whole of it, so a great number of vessels seem to enter into its composition, and in a transparent tooth we can perceive a bundle of vessels in the Canal seeming to fill it compleatly. —
Next the root is cover'd with a vascular membrane, a periosteum resembling it in other places: perhaps the Socket is lined with one layer, & the root cover'd with another, but we seem to see a membrane common to both, y.e whole of w.ch can be made red with Injections. — The Bone between the pulp and outer substance is very hard, we see it

in flakes, but we cannot certainly shew vessels in it, they are smaller than in the other bones. ——— Most Writers tries to perswade us That the Bone of the Teeth wants vessels, & That it is not an organic substance. it is true y.t when y.e bones of the body have grown soft, the Teeth are little affected. Yet I wd. consider the bone of a Tooth as a vascular substance thro' w.ch a circulation is carry'd on, for we find the roots undergoing changes even on their surface, altering in their shape & Processes growing out, & we find it allow'd y.t the teeth have grown to the Socket, y.t a compleat Anchylosis has form'd, & we can displace a tooth y.t has been recently pull'd in the Socket, & it remains of the same colour with the rest, & serves its purpose well, grows firmly to its socket, with.t being thrown off, so y.t such a tooth becomes again a part of the Body. As when we cut of a Cock=spur, & fix it in the Comb, it grows nearly in y.e same proportion as in its natural place, w.ch must be owing to a vascular structure: It is not that y.e Socket mechanically grasps the substance, but y.t it really unites with it: & I make no doubt that such a Tooth may be injected as well as any of the rest: so upon the whole I conclude y.t y.e bone substance has a circulation thro' it, & only differs from y.e rest of the bones in being harder, having its earth more com=pacted, & hence the vessels are smaller. ——— With the Blood vessels we perceive nerves entering. Some accurate Writers tell us That they never c.d find the nerves going into Teeth, but in young subjects, when the Teeth are forming, we perceive with the naked Eye a minute nerve entering along with the vessels, & the known sensibility of

The Teeth is a sufficient proof of this, in this respect y.
Teeth differ from the other bones of the body, & y.t for reasons
wch we can't very easily assign. — Next the roots are of a
Conical shape, & the Sockets are spongy, are the softest part
of the Bone, whereby the pulsum is divided and a single
point less affected, the blood vessels & nerves enter at the
point with greater safety: & the spongy ness of the Sockets,
there roughness gives a firmer attachment to y.e membrane
& by yielding a little a sudden pulsum is eluded. ——
The Teeth are certainly Gather, provided wth Lymphic vessels,
for I have seen a carious Tooth ach, attended wth swelling
of the Lymphic Glands, and where there was no ulcerat-
ion, or collection of matter in the Gums or Jaw. ——
The Teeth are divided into 3. Classes. — The fore teeth have the
properties of wedges, they act with all the power of a wedge,
and we may reduce their effect to a calculation. ——
The next the Dens Caninus is more made for perforating,
is of a rounder shape. —— These behind have at No. of points
& are made for grinding, the two first are smaller, & fitted
for laying hold of the substances divided by y.e anterior teeth
while the Backmost are more contrivd for grinding the
food into powder &c. —— From the teeth of Animals we may
in general with proper attention determine the nature of
the food, & structure of the inward parts, but the common
rules have been apply'd to man with.t sufficie.t reflexion.
The most part seem to conclude y.t man is by no means made
for Animal, but vegetable food, & no doubt the Molares
are chiefly fitted for the comminution of such substances, as
are by force broke down into a powder. But even from the
Teeth it is evident y.t man is intended for feeding on the

Animal as well as the vegetable Kingdom, for we finde[n]
of an intermediate texture, they are not contrived for the Crude
Vegetables, or for chewing much because the Enamel is thin
compar'd with that on the teeth of the ruminating Animals. In
these too it is more in a slanting direction, & does not cover y.
whole base, but that the teeth may continue rough y. & sharp
part is worn down with the Enamel: so we are not to consider
the primary use of it to be the defending the bony part from
corruption, nor is it found y. the osseous part immed[y] grows
carious upon being expos'd: the other bones do because
they chiefly receive their nourishm[t] from the periosteum:
but the teeth receive their nourishm[t] in their base only from
their canal, into the roots both ways. So the osseous part
remains long exposd to the Air with[t] growing carious: it is
to be sure more in danger from injury, from a suddenness of
the blow a part of it may be broke off, a nerve may be torn,
& an Inflammation produced with all its consequences.
We see an example too in the Dens Caninus of a resemblance
to the Carnivorous Animals, tho' the Caninus is diff[t] from
y[t] of the ferae of Linnaeus, yet considering our superior
reason, & manner of preparing the food, y[t] difference may
be accounted for: these tear the prey by the Teeth alone, but in
accounting for what is proper to man, we are constantly to
take into account the reason he possesses, superior to what
guides many other Animals: so this structure serves to
connect y[e] vegetable with the Animal eaters, & shews that
man is fitted for living on both Kingdoms. ——
More particularly with regard to the Teeth, the Incisores are
broader & stronger in all respects in the upper Jaw than in
the under, but the structure is perfectly similar they have

cutting edges, with all the powers & properties of y.d wedge, only with convex and concave sides, the base of these Teeth comes to be very strong. The root is conical, but in that cone there are two Canals, with distinct orifices in each: the sides of the Cone are flat, & placed with the edges backwards, & forwards, so that they are not so easily broke. The Size varies but in the under Jaw the first is smaller than the second, in the upper again it is larger. The Dens Caninus is a stronger tooth, long in proportion to its thickness, & rises into a point, in its root there are two Canals, & the point is often fork'd a little. — The two first of the molares have two sharp points and a hollow within, & the root appears conical, but not forming a sharp point, so we always find 2 Canals, sometimes more entering each root: In the upper Jaw we find the same general shape, but the inner & outer points rise more nearly to the same height, & the small Molares are always larger in the upper Jaw than in the under. ——

In the great Molares there are 4. or 5. points with holes between them: If we compare the upper Jaw w.th y.e under, y.e teeth are nearly of the same size; but upon the whole there is a point less in the corresponding teeth: Gen.l Observe that the first Large Molares or the middle one is y.e biggest tooth: on the outer side of it in the lower Jaw there are 3 points, on the inner two, the next have two without, & two within: the last has nearly the same number but they are not set so regularly: the Corners are drawn out a little, there not being the same room for its growth: In y.e upper Jaw, from the general rule of a point less, we find four principal points in the third: & three & an imperfect one in the two last. — In the Molares we find 2. Roots

nearly of the same length, and in each two Canals, the plate is transparent between them, and these are placed with the edges inwards, the two last have the same number of Roots but these are shorter: in the last Human Natural are frequent, there are often 3. roots, two longer and one shorter, the roots are rounder, & not so flat as the rest. — In the upper Jaw the structure is similar, but with the addition of another root, w.ch stands inwards, & the farthest back has also three roots. — In general y.e two last Molares in the under Jaw have a very thick covering of Bone on the outer side from the rise of the Coronoid process; but almost all the other Teeth have the outer side thinner y.n the Inner. — We next follow the Teeth thro' all their Changes till they are at last thrown off from the Jaws, observing what happens to both. — At first we discover 20 Sockets in each side of each Jaw, or the rudiments of 20 Teeth in all, are laid very early, & cutting the Jaws, we find that the rudiments of every tooth is inclos'd in a vascular membrane between it & the socket, adhering to the tooth, more than to the Socket: besides this we find the Gum stretch'd over the top of the Socket. There seems to be little connexion by vessels, or otherwise between the Membrane containing the Teeth & membrane of the Gum. — The Gum receives its nerves from the same source that the Teeth do, branches from y.e inferior maxillary nerves running between y.e sockets into the Gum &c. Within the Vascular membrane the Teeth begin to harden in this manner, a pulp forms within the membrane that seperates the osseous matter of the Teeth, forming y.e outer part of the osseous substance first, it throws off one scale, y.n a 2.d hence we find the osseous part lamellated one following

another from without inwards perhaps more distinctly here than in other parts of the Body. The vascular membrane inclosing the pulp seems chiefly to form the Enamel, & as the Enamel is within it its production is in the reverse way from that of the osseous substance &c. innermost parts first formed than the outer parts added not in flakes but fibres, one particle after another forming a pendicular fibre; so &c. After both examining the Sockets, we find the Base of the Tooth almost entirely formed before, the posterior part imperfect, only the Top of the Base formed. The Incisores are the most complete, but the same general order takes place in all. The Socket is only big enough to contain the Base: so when the roots are added, the Base necessarily is raised, there is less resistence to their rising upwards, &c. to their sinking in the Jaw, wch. is about done early so the addition of their roots is the Cause of their cutting the Gum. First the Incisores cut the Gum & so on gradually backwards. We wd. find 'em regularly raised in this way, were it not the Canini are out of the line, there is not room for their coming in till the Jaw extends itself, particularly in that part, so after the Incisores the first Dens Molaris appears &c. the Caninus, then the 2nd Molaris &c. & the lower Jaw sends its teeth thro the Gum sooner than the upper.

As the Base raises not only the membrane proper to the Tooth is torn, but likewise the Gum, &c. it is often attended with a considerable degree of pain, for large nerves enter it, and their course is irregular, so that perhaps the Trunk of a nerve may pass over the very Apex of the Tooth, hence the Inflammation may be increased from a variety of Causes, & in consequence of the Inflam. the Sensibility of the Gum will

be greatly increas'd. From knowing the Cause of the pain we are led to the Cure. I place the Cause entirely in the Gum. — I once had a distant suspicion y.t perhaps the nerve passing thro' the Jaw Bone might be injur'd by the points of the Roots working downwards: but there is sufficient thickness of Bone to defend the Trunk of y.e nerve. The second set is still deeper, & yet there growth is not attended with symptoms of equal danger, & we constantly obs.e that the pain is greatest when y.e Gum is evidently inflam'd and upon the stretch. So we are directed to the division of the Gum; & I have no doubt whether we consider the reason of the thing, or consult exp.ce, y.t the cutting of it is a matter of the greatest importance, & y.t it is not done frequently enough or soon enough. A prejudice prevails y.t when we do not hit the proper time, we form a Cicatrix w.ch will be harder, so must repeat the operation: But y.e early division is not a cause of any bad consequence, y.e Cicatrix opens easily not only with less pain, but w.h greater ease y.n the Gum at first. So as soon as the Child has conceiv'd pain we ought to divide the Gum freely: & we are not to expect y.t after the pain has increas'd so as to produce convulsions y.t y.e dividing the nerve will remove the Symptoms; I have known sev.l instances where it had no effect. The Case is the same here as when a nerve is punctur'd from W.S. after the Symptoms of danger have come on, it is not enough that we divide the nerve above the place injur'd: the rest of the System comes into a Sympathy, y.t we can't acc.t for, but when the oper.n is done early we are pretty certain of preventing the Symptoms, & even where it is

done late it may have the effect of removing them, of this I have seen one instance, where the Symptoms were come to a very great height, they cutting the Gum over the y. of y. molares they were entirely removed. — After the 2.nd year a Child has got five teeth on each side: for tho' I mentioned 6. Teeth formed early, one of 'em lurks in the Jaw for many Years.

Generally the Teeth begin to appear abt the 6.th month and they are all grown to their full length at y.e end of y.e 2.nd year. It is matter of use as well as curiosity to observe y.e y.e first set of Molares differ essentially from the second. The Incisores & Caninii agree nearly, but the first molares of the Child resembles the 1.st of the Adult, & the second of the Child, the third of the Adult: and the same general rule, applies to those of the upper Jaw, where they have a joint less & a root more. — The first 20. Teeth are afterwards shed, they are pushed off from the Jaw, by a second set forming deeper than them: & the formation of these last resembles y.e of the first, they are not in one line, but lie Zig Zag, nearly in the same manner as y.e first: And those begin more early than we wo. have expected: they are formed long before the first appear: & yet the first 20. continue for 7. years before they are thrown off by the second set w.ch had begun to form so early.

The rule with regard to their situation is this, the 2.nd set of Incisores & Caninii are not directly under the first, but a little farther in nearer to the Tongue, so they raise the 1.st set obliquely, & throw them outwards. But the second Molares are almost directly under the first: each set have seperate Sockets, & it is only after the first set are shed and the resistence taken off y.e the second set get

into their place. The room occupy'd by these different sets is more nearly equal than we wo. imagine, & 2d. Incisores & Caninus are a great deal bigger than the first: but the Molares are smaller, so measur'd together the breadth is not very different. —— Next we have seen hitherto but 5. teeth but there are 8. in the Adult; one of these, as we have observ'd, forms early in its socket, therefore in a Child of 2. years of Age we find a space between the Teeth, behind them, and q. Condyle of the Jaw, after the first set are completed, but the space is only wide enough to contain a single tooth, & this is added between the 7th & 12th. year. Some Children of 10. years have only 20. Teeth, others that are younger have a greater number, when that Tooth appears it nearly fills the whole space: or another is just beginning to form w.th in the Jaw, & gradually as it forms the Jaw lengthens, so q. 7th is added between the 10th or 12th & 16th or 18th Year. —— The last the dens Sapientiæ is added between this last period & the 22nd or 24th year. But q. constant rule is q. q. Teeth occupy all the Space of the Jaw back to q. Condyle, so when new teeth are added the part of the Jaw in which they form grows in a greater proportion at q.t time than the rest of the Body. And there is a farther change like wise going on in the Jaw, the processes are growing longer, for in a Child these are very short, & they are constantly enlarg'd or enlarging till q. size is completed. The roots are not quite so strong or so long in proportion as they are in the Adult, But when they are shed from the Jaws we see Bases with. roots: or q. Teeth beginning to form, & these shed much resemble one another q. roots are worn away, the stumps remain & these are nagg'd

and unequal. — Now in what manner are we to 244
acc.t for this? I apprehend that some things are to be taken
into view that are generally neglected, we are not to acct.
for it entirely upon mechanical principles. We see that so
far as the roots are added to the 2.nd the Bases of the 2.nd act
against the roots of the first, & the weaker substance yields
to the stronger, the Enamel of the second rules down y.e bone
of the 1.st set, & farther the Bases of the 2.nd set divide the bone
of sepals, or at least strain & compress 'em so as to destroy
the Circulation, & on that account the Teeth are disposd to
grow carious. — But farther I have seen instances where a
Tooth of the 2.nd set was wanting, & yet the Tooth of y.e first
set was disposd to Caries, was of a dark color, & therefore
tho' there is no unnatural pressure made on the Root, there
is somewhat in the texture that disposes them to shed, but
the farther change in the Root is m.ch owing to mechanical
pressure. So we may perceive y.e advantage y.t may attend
the drawing the first teeth as soon as they begin to vacillate
w.ch may hinder any suppur.n or Inflam.n from coming on, or
may hinder the Base of the second set from being affected
by the Caries of the first, & by this means we shall also
render the Teeth more regular, for the resistence of y.e first
set is sometimes such as to give the 2.nd a wrong direction.
Next it is of use to be able to distinguish the two sets from
each other, thus suppose more teeth than natural, as two
Incisores, & that we want to draw the one, w.ch of these
belongs to the first set? certainly the outermost; perhaps
from want of room they have got an uncommon shape,
but, supposing the shape the same, the Surgeon generally
speaking is to draw the outermost Tooth; or suppose

there is the common number, but one of them is out of
Line, if it is of the first set we wd. extract it, but if it be-
longs to the second we wait till the Jaw be extend, in the
mean time we give it the proper direction, as by tying a
bit of silk, or other Cord around it & another Tooth, & making
pressure frequently upon it. — Suppose next the Surgeon is
to extract a Carious Tooth, it is agreeable to be able to tell
whether the place will be fill'd up or not: & in the molares
he can be certain from attending to the number of points,
as it is seldom if ever any of the second set are wanting;
tho' the patient is perhaps beyond the common age.
Now after saying this much of the difference of shape,
what reason are we to assign for the change of the Teeth?
Why may they not serve their life as well as the other parts
of the body, as the Anterior Teeth as well as the Posterior?
for the three last are never chang'd. By attending to the
facts we account for this. We first see one evid. purpose,
that two sets remain more entire than one could have
done, they wear longer. But further, as a slight addition
of the thickness of Enamel wd. have answer'd all that
purpose, let us see how they are plac'd, we find that the Teeth
are not in one straight line at first, they are plac'd by Lay,
that the Incisores & Molares are contiguous. & we obs. the
same of the second set, so we obs. that nature finds a
difficulty of filling the Jaw with Teeth, or of giving to sub-
stances as many hard as the Teeth, the property of growing
in the same proportion with the rest of the Body, or that
it is easier to change the Teeth than to form such as would
grow in a proper proportion. — Further the figure of a

Child, and of a man is cast in a different mould, the
Jaw is broader proportionally, they are rounder set, the
breadth of the Chin is but little increas'd, but y.e length
of the Jaw is greatly increas'd, the Chin grows longer, &
the length of the face is increas'd, because of the growth of
the processes of the Jaw, the Condyloid process is rais'd to a
different Angle, & grows longer, and this is intended to give
space for the Teeth of the Child, w.ch are larger out of all proper-
tion than those of the Adult, compar'd w.th y.e rest of the body.
But even that is not sufficient the Jaw is not only filled,
but a greater number of teeth are added, w.ch are different in
their figure, for as the two first molares are small, or
chiefly answer the purpose of the Canini or anterior teeth,
we wo.d have wanted a sufficient power of grinding, so y.e
three farthest back are the chief molares.

In old people the teeth begin to fall out, & both y.e Jaws
& teeth are remarkably chang'd; the Enamel is wore
down, & even separated in flakes. The Teeth come to be rais'd
from the Socket, the Circul.r in them seems in a great
measure to have ceas'd, & they are thrown off like an artificial
tooth from the Jaw of a young person. The molares begin
to shed first, & the Incisores remain longest. As the Teeth
separate, the Socket is filled up with an osseous network,
& the edges are press'd inwards, an imperfect growth is
observ'd w.ch prevents the Gums from being wounded
with sharp pointed bodies: & the Gums also acquire
a degree of insensibility, in common with other Cicatrices
perhaps the nerves are not in the same proportion on the
upper part y.e they are in the sides, so they can break
hard substances without suffering much pain

From the manner in wch the Teeth are shed, there remaining last wch Children have, we see the food that is proper in old age. We are not to imagine yt the most nourishing Animal food, wch is proper for persons in middle age, is the most proper in the decline of life: their Teeth are not of that structure yt can give it the necessary preparation, before it enters the Stomach. On from yt Teeth we may determine the nature of the food proper for Children, as well as the time of weaning them, yt they ought to have nourishment of the lightest kind.

As the discaves of the Antrum Maxillare come properly to be treating with the discaves of the Teeth it is proper to attend to its situation. The middle of the large molares is upon the whole nearest to the middle of it, the root of this Tooth is seen moving as it were within yt Antrum, only a plate of Bone as thin as paper being over yt roots. N.B. An observation in the former part of this Lecture is more shortly thus. ——The Pulp within the Membrane forms the Bone from its Surface; while the Membrane forms the Enamel, and adds it to the Bone. ——

Lecture 107th

Operations on the Teeth.

I have observed that the dangerous Symptoms wch often attend teething, depends upon the Irritation of the Gum covering the points of the Teeth: and inferd yt necessity of dividing the Gum. ——We make a crucial Incision on the swelling, over the point of the Tooth, wch may be done in one direction with a common Knife blunt at

the point tolerably well: but we can't always apply it conveniently to cut at the side of the mouth: so I have caus'd to be made two conceal'd Lancets, the one for making the one incision, & the other for the other Incision. 1624.

Next when the first set of Teeth come to be loosen'd by the growth of the 2d. we ought to extract 'em, w.ch we readily do with a pair of Forceps, for whilst they are carious, and their shape somewhat alter'd, they are rais'd a little at the same time. — Next you know of a strong or Stony Crust frequently forms upon the teeth nam'd Tartar from the Idea that it is form'd from the acid parts of our food, as Tartar does from wine, & were this the Case a person washing his mouth with water after eating wd. prevent the growth: but I am satisfy'd that it is a salivary concretion similar to those in the ducts of the Salivary Glands, & we often obs. it chiefly about the fourteeth of y.e under Jaw where the Saliva falls down by its weight. —

As it is a spongy substance containing moisture for a length of time it necessarily will be dispos'd to putrefy; or to be the cause of putrefaction, & by its bulk it sometimes pushes away the Gum from the Teeth: & adhering closely it stops the circulation in y.e parts to wm so may be a cause of Caries. — Therefore it ought to be carefully remov'd, or as Dentists speak the Teeth ought to be scal'd. And for this purpose we have a number of Instruments fitted to the same handle, by w.ch the roughness can be scrap'd: & we ought to make the separation with care for if we leave little particles remaining upon the Teeth it grows again more quickly. And in time of doing it we prevent an uneasy sensation by applying the Finger to prevent

the Caemor. ——— Next we proceed to the diseases in
wch the Structure of the Teeth is concernd, & as these
agree in texture with the rest of the Body, are provided wt
circulating vessels, Lymphatics & Nerves, it is evident
that their diseases must be similar, & therefore ye. besides
the exposure of the Teeth to accidents, Blows &c. or to heat
and Cold, & avarice of matters receivd, they will freq.ly
be injurd from external causes, likewise internal as
where the general habit suffers, as in the Scurvy, Rickets
& Lues venerea, by wch their sockets come frequently to be
affected. ——— Now as certain diseases affect particr
parts, as the Gout more especially certain parts of the
feet, so there is a disposition in some cases, ye. humours
fall readily in upon the Teeth. ——— The Scurvy soon
appears here, & what are call'd Rheums, so ye. when
some from catching cold are affected with Coryza, others
are affected with Tooth ach. If an Inflam.n from whatever
cause exited, forms in the Teeth, & comes to suppuration
as it is generally within the body of the bone, where the
parts are most sensible, it will run on to the greatest
Extremity, Pus will be found in the Cavity of the Tooth, &
the effect will be nearly the same as if it had ended in
Gangrene, the Pus corroding the nerves & other parts
within the Teeth ——— & Accidents of this kind will happen
more frequently as persons do not pursue ye. Antiphlogistic
Course, wt such exactness as where organs essential
to Life are affected ——— Nay there is not only a dis-
-position of diseases to affect the Teeth in general, but
further the similar teeth have a certain Sympathy, as

Pulmonicos, or Pleuriticos

if there is a Caries in a Dens Caninus the next y.
passers will readily be one of the same kind: tho' there
are many exceptions to this rule. ____ The Molares are
the most readily attack'd with the Tooth-ach, because y.
chance is most against 'em, & they are more expos'd to
the violent action of the Jaws, from there vicinity to the
center of motion, their Enamel is thinner so that they are
less able to resist. ____ If a Caries begins on the surface
& goes inwards, it is scarcely attended with pain, & y.
only sign of the disorder is a blackness without. ____
Surgeons have laid it down as a rule y.t we ought to file
off the first appearance of caries, because it is apt to spread
now I wo. not object to this in general, I wo. only obs.e
y.t we are not well assur'd y.t its beginning in a spot
is the cause of the Caries proceeding farther: & a black
Enamel may be better than none, for tho' it is not chiefly
intended to defend the ~~Jaw~~ Bone from caries, yet often
it is remov'd the bone is more expos'd to Injury, from
heat & cold as well as pressure. If, as in 49. of 50. Cases,
the blackness proceeds from the Caries beginning in y.
Cavity, or we find that sometime before the Patient has
had violent pain in the Tooth, for sometimes the pain
leaves the Tooth, because the matter confin'd altogether
destroys the nerves: But from the number of Nerves,
their size & confinement the Disease is often attended
with great torture. ____ Now in order to lessen the
pain we may try various Expedients. ____
1.st We endeavour to lessen the Sensibility of y. whole
System by large doses of Opium, or what an Eminent
Dentist substitutes in its place, Camphor, or perhaps

by giving Camphor and Opium united, wh. the pain still
continue, an electrical shock made to pass thro the affected
tooth, or the burning a part near to it, as the Ear wch was
chosen from a supposd communication between the nerve
of the Ear & those of the Jaw. An Iron is made red hot and
apply'd to the inner Ear, wch I know have cured several persons
of a violent toothach in an Instant, but the cure does not
depend upon any connexion of nerves nor upon the pain
given, but rather upon the affection of the mind for it gen.ly
fails when attempted a second time: & therefore instead of
concealing the hot Iron, we bring it before the patients face
to increase the Tremor. Or we next endeavour to lessen
the sensibility of the Tooth itself, by touching y.e bare
nerve with Opium, wch operates here in a Topical way, &
a small particle of it will affect the nerve more than a
greater Quantity taken into the Stomach or we use Camph.
or ardent Spirits wch also relieve the pain, — Or these
still failing we destroy the nerve within the Tooth alto-
gether, by introducing the Button of a heated probe for
instance red hot into the Cavity, or we introduce a small
bit of Caustic, & stuff up the hole with Lint so as to
prevent it from spreading: or we stuff the Tooth with
thin films of Lead, wch answers better than mastich,
and such like resinous bodies. — But if a patient
will submit after a Tooth is very much carious, tho'
still the sensibility remains, the can not cure is extract-
ing the Tooth, or the detaching it, & perhaps replacing
it again, so we next proceed to consider y.e steps to be
taken in extraction, and the Instruments. —

[illegible] that we

First we study the direction in wch the Teeth are to be
Drawn, & this depends upon what we know of y.r roots
and Sockets. The Molares in both Jaws are not plac'd
perpendicularly but slanting inwards, and this is es-
pecially vident in the under jaw. Next the Sockets ex-
cept of the two backmost of the lower Jaw, are thinner
upon the outerside, now should not this regulate us in y.r
manner of placing our Instruments? & yet I find y.r even
where these very circumstances are attended to, some of those
that have wrote the latest, disagree very much in their Ideas.
Suppose a Molaris of the under Jaw slanting inwards,
and the Socket thinnest upon the outerside, what sh.d we
infer from this? we shall suppose even y.t all our Teeth
have their roots so spread or crooked that we can't draw
them from the Jaws, without either breaking the root or
Socket: for the one or other accident necessarily happens
very often, & what is proper in the most difficult Cases will
apply to all. Are we with Mr. John Hunter to draw y.r Teeth
outwards because of the thinness of the Socket? I apprehend
he is altogether mistaken, Suppose the Tooth to be drawn
streight over, so that the point of the Root is the Centre of
motion, his rule is proper, because we must break the
Socket quite open, & it is better breaking it where it is
thinnest. But the Instrum.t raises the Tooth from y.r socket,
& turns its points in the opposite direction. Now if y.t
be the case, we ought to apply the Instrum.t upon the
inner side, for it is the point that must pierce & break
the Socket. & I appeal to manifest Experience, that the

socket always breaks upon the side away from y.e Instrum.t
if we are turning the Tooth inwards, it is the outer side y.t gives
way: And this enables us to judge of the proper posture of the
patient: If we are to operate on the under Jaw the hand applies
best when the patient is set on a low Stool before the Surgeon,
bringing the Jaw a little beneath the hand; but the sitting
posture is inconvenient for the upper Jaw, the Instrum.t falls
away by its weight, & we don't see very well the Tooth, so the
plain rule is to bring the upper Jaw into that situation w.ch I
said is convenient for the under Jaw, by setting the Patient
on the floor & turning the head back, whereby we bring y.e Jaw
a little between the Knees, w.ch is the Posture Fouchard recomends
in all Cases. Or let the patient be laid across a Bed w.th y.e head
over it, w.ch brings the Jaw into the posture we wo. prefer, the
Surgeon being seated, or standing before the Patient.
We next detach the Gum from the Collar of the Tooth and
likewise from the Socket a little way; That there may be
full room for fixing the Instrum.t where the Tooth grows
narrower between the Base & the Roots: For this purpose we
use the common Instrum.t the Scarifyer, w.ch ought to be
pretty sharp: we first cut it down lengthways, then press it
away from the Tooth & Top of the Socket: & we do the same
on the Inner side. —— Now this is all that is ever proposed
to be done, but if I am about to draw one of the fore teeth
suppose, & that my Instrum.t w.ch I find the best is not much
calculated for raising the Tooth upwards, & wo. farther split
the Socket, with a knit of Iron made sharp, & give it a
slight stroke, cutting it lengthways; for the dividing it
where it incloses the Tooth if it is drawn is of little moment,
for the socket is worn down, and in a manner wasted

may cutting shut of it off wod. be a real advantage to ye patient. —— We next consider the proper Instruments. I say avide some old ones, as not having sufficient force to hold. Here is one ye. was much used till of late Years, particularly by the Surgeons the Pelican, where the rest is made on the Jaw, & by pulling the handle we draw ye. tooth over. The objections are, that it pulls the tooth too much over with raising it: & it pulls obliquely so that the tooth is drawn against the one next it, another person has proposd to remedy this by altering the crook of the Jaw: but the direction is not alterd: so we say avide this Instrument with its improvement. — The two I shew next answer ye. purpose better, you till will find am described by my Father in the Medical Essays: the one is intended for the Foreteeth, & the other for the side teeth: with this for the foreteeth we have a vast purchase of Lever, & depressing the handle serves as a center of Motion, round which the Jaw turns, so ye. tooth is raisd a little, & by a proper managem.t of ye. hand we can raise it somewhat more. — If we mean next to pull the side Tooth, the other Instrum.t the Turnkey is applyd, by which the Tooth is drawn over, & at ye. same time elevated from the Socket; & from its conical shape, a very small raising of its root, loosens it sufficiently. — Since that time various attempts have been made to improve these Instruments. Some have made an objection to the prepare the Instrum.t makes ab.t ye. root of the teeth, supposing that it is in danger of preventg. the Tooth from moving, so have made the rest at a distance: but this Instrum.t is dangerous for while we pull one Tooth out one way, with the rest we are

in danger of pinching the neighbouring tooth the other way: so that the rest ought to be in the same line. If we mean to alter the rest we cannot make it broad upon y.d solid part of the Jaw, & I have caused one to be made so, but I have not tried it so often as to be fully satisfy'd that it is an Improvement. Farther I have obs.d that if the points of the Tooth turning outwards w.ch breaks the Socket generally on the side opposite to the rest, therefore in drawing the backmost molares we must place the Instrum.t on the inner side, but out of choice we sh.d do the same with the rest in both Jaws: but if the Stalk of the Instrum.t be straight we can't put it deep enough on account of the Incisores, to remove that we bend the stalk: w.ch does not materially alter the effect of the Instrum.t This is the best general shape of an Instrum.t for the purpose of drawing the backmost Molares. ——

Some have proposed the making one Instrum.t serve for all the Teeth, the Claw is made to turn round w.th a catch to stop it either before, or on either side, but it is better to be provided with two Instrum.ts as we can't adapt one so accurately for both purposes; we prefer a wooden handle & the handle taking off renders it more convenient for Carrying. —— So far we wo.ld upon y.e Instrum.ts commonly employ'd: but there are some others that remain to be shewn. We may use the Old Pelican for the fourteeth, adapting it by means of a screw, and making it rest on the solid Jaw bone. Or some apply this to the Molares, but when we do y.t we must draw 'em outwards. Now I do not much object to y.e draw.g the small molares out wards, but the Objection

is much against drawing the large ones outwards.
There are some where wt still remain. The whole attempt is
the drawing the Tooth over, & raising it a little at ye same
time: Now ed. we contrive any Instrum.t to lift ye Tooth
entirely out of the socket, we wo. be in less danger of break.g
either the socket or Roots. — Now here is an Instrum.t
that was thot of by Dr Higgens, when he attended Lectures
here, it is a common pair of Forceps, but at the point
the claw moves a little upon a Pivot: so when raising
any weight the motion keeps the Claw more nearly per-
pendicular, but as the force of the hand is not sufficient
to lift out a Tooth, we use the forceps as a lever, thrust.g
in a piece of Metal below it; now there is still an ob-
jection, ye this motion is so distant from the Centre of
the traction is still oblique, it moves in a portion of a
considerable Circle. — I shall shew a method in wch it is
possible to lift a Tooth almost quite direct. The Claw is a
sort of Screw wch is fix'd to the Tooth, we next lay a rest on
the neighbouring Teeth, & introducing a sort of Forceps,
we elevate the Tooth straight the thickness of the rest, wch
is sufficient to disengage it: & this may be made the
best Instrum.t for the fourteeth. — Suppose the Base of ye
Tooth is rotten & ye roots only remain, to get these
out Dr Higgens Instrum.t is very convenient. —
If there are two roots adhering, rather than try to bring
'em away together, it is better to disjoin them, by putting
in an Instrum.t & giving a stroke, If we can't get
hold of them with the Forceps we thrust in a punch, &
having fix'd the point we push down the handle and
raise the Root.

After extracting the Tooth if the part bleeds consider
& the common Styptic Substances don't check it, we
fill the socket with a Bit of Sponge, & tie the Jaws together
or wh. these measures fail wch seldom be the case, we
may stop it with a Bit of Caustic, they wing sometime.
Now after considering the Extraction of Teeth I w. propose
the addition of replacing them. — Several of the French
Dentists have recommended this, wch is certainly preferable to the labouring to fit Artificial Teeth: so where a
Tooth is tolerably sound we ought instantly to replace it,
& generally if it is extracted with Caution, it grows in ag.
Jaw, & w. the further advantage y. there is no return of
pain, the Nerve not recovering its sensibility. Perhaps it
may be only necessary to luxate the Tooth, to raise it a
little, & then replace it. If this is not done, or the Teeth are
very much spoild Surgeons have recommended Artificial
Teeth of Ivory or the Sea Unicorn, imitating y. natural ones,
they are put into the middle of the Socket & then tyd: but
they prove uneasy: & there is a continual effort of nature to
throw 'em off: However if from the inconvenience that
attends the want of 'em, as of one of the fourteeth wch assists
in pronouncing Letters, we have recourse to an artificial
one, it is best to tie it in with a silk Thread, as wire is
apt to cut in upon y. Enamel of the neighbouring Teeth.
If the whole have fallen out, there is a manner of supplying
them, but the appearance costs more trouble, than most
persons would choose to undergo, and we ought to refer
the making of them to the Mechanics, who will
generally execute them best.

Lecture 108th

The Antrum maxillare, very much owing to its vicinity and connexion with the Teeth, is much subject to Inflamation & suppuration, & the matter resting, in our erect posture, upon the under part, Stagnates, becomes acrid, destroys y. Membrane, Bone, & at last the roots of the Teeth. —

Now, as it is a rule in all collections of matter, y. y. giving a discharge in the most depending part promotes the Cure, it is evident that the forming an opening at the Bottom of the Antrum as was long ago propos'd by Mr. Cowper, must be attended with considerable Advantage. —

We distinguish the disease by attending to the several circumstances that gave origin to the Complaint, as well as to the present appearance. — Both in this Complaint & in the Tooth ach the pain is very much - but in y. Tooth ach the pain is more acute, wth more frequent intermission: whereas if the pain or complaint has begun in y. Antrum the pain is more constant, tho' less severe, & strikes round between the mouth & the Eye, y. whole membrane of the Antrum Sympathizing. But the most certain way of ascertaining the Disease, is to put the Patients head into such a situation as shall bring the opening of the Antrum into the Cavity of the nose to be the undermost part, when the matter runs out, & the patient will generally be sensible of a bad smell in one Nostril only. Besides in the diseases of the Antrum the Teguments are not so readily affected, nor is the swelling so readily communicated up the Temples, as when the Teeth are affected. If again

it happens that the opening from the nature of the cause is so
small, that there is a concretion of the sides, we sometimes obs-
an enlargement of the Antrum, not merely owing to the collec
tion within, but that the Bone becomes to be softened and in
a diseased state. — Sometimes a portion of the superior max-
illary Bone & all the Teeth have become Carious, so that we
can look into the Antrum & even into the Nose. — At other
times the Caries takes its direction backwards, under the
Sphenoid Bone, & at last penetrates into the Substance
of the Brain. We next determine the place and manner of
making the perforation, & the manner of treating it afterw.
The Antrum is deepest in the middle, & I have remark'd
that there is but a thin bony partition between the Molares
& it, partic.y the middle Molaris, or backmost Tooth but
one, so when this Tooth is extracted we often break in y.e plate
between that and the Antrum, the bone being remarkably
thin over the roots, & perhaps we find 2 Roots in y.e teeth
of the upper Jaw, partly on acct. of the softness of the
Bone & partly on account of the size of the Antrum wherby
the roots of the Teeth are prevented from rising so high: —
Now if matter is collected here, & these teeth perhaps carious,
& we are apt to make the perforation after extracting the
Tooth, if we have our choice, we wd. draw the middlemost
large Molares. But if the Teeth are sound, & the Disease
has not originated from them, we can open the Antrum
upon the outer & likewise upon the inner side, but the
latter is carefully to be avoided, on acct. of the nerve and
Artery descending thro' the palato maxillary Canal: &
we wd. make the perforation on the outer side where we

Jul the Antrum project. We do it with a perforator
or with such an Instrument as I recommend for
boring holes in wood; or a Shoemakers Awl will answer
answer the purpose tolerably well. — It remains to
observe the proper direction, for tho' I have remarked
the nearness of the Teeth to the Antrum; yet their roots
spread differently, & they can all slant considerably so
the best rule is to make the perforation upwards and
outwards: for if we go inwards we may slip into the
Cavity of the nose; if we make the perforation from the
outside, we are directed by the swelling out of the Antrum.
but here we are in danger of wounding some of the
Branches of the nerves going to the Teeth. —
We prevent the opening th till the purulent discharge
ceases, by introducing a Tent, as a bit of wood wch
swells moderately, & at the under part can be shaped
like a tooth so as to fill the hole exactly, we farther
inject what is called a healing Liquor, or rather any =
=thing that washes out the purulent matter once or twice
a Day: or I have caused a small Silver Syringe to be intro=
=duced, of the shape of a Tooth beneath, with a bit of wood
fitted to shut it, & we need only to remove this once
two or three days, that the flesh & membranes may not
grow too closely about it, so that it may be removed wh
difficultly. And drawing out the wood, instead of using
a Syringe the patient need only fill his mouth with the
Liquor, & squeezing the Cheeks he can make it run
out by the nose. when there is a fetid discharge we may
use a Solution of Castor, with a little of the Elixir pectoral
added to it —

We next consider the several dressings & Bandages with the other Instruments that are necessary in Surgery. To shew the general treatment of wounds of various kinds, and first it may be proper that we attend a little to the changes that happen in Inflam.n whether heeding spontaneously, or occasion'd by a wound, for I generally observe that Authors are apt to reason either too little, or too much upon this subject, & endeavour to explain circumstances that are much beyond our reach.

The danger in generall attending wounds has been in effect explain'd in speaking of the properties of our diff.t Organs, you know that the danger must be from wounds of the large parts of the circulating System, or from the Nerves — You also know that the smallest nerve of y.r Body, such as escape us in dissection, can be so irritated as to produce the most fatal symptoms, & this is one effect, or termination of Inflam.n which is generally not sufficiently attended to, y.t the danger arises not from the mere functions of the part being disturb'd, but from the affection of its nerves, of w.ch we shall never be able to conceive any very just Idea.

If a part is inflam'd, the Inflam.n does not kill the Animal, & is not discuss'd, it remains y.t it suppurates, or mortifies, or an appearance is observ'd in the part afterwards which we call a Schirrus.

If we mean to discuss an Inflam.n we do it first by lessening the general impulse of the fluids, this is most effectually done by drawing blood, first perhaps from the larger vessels, & afterwards y.r neighbourhood

of the part. We likewise divert the course of the
Liquors from the part inflam'd, by giving purgatives,
which draw the humours from the channel to wch they
tend by giving purgatives, at the same time we en-
deavour to lessen the irritation in the part, by applying
such substances as do not merely relax, we relax to re-
move pain, but we frequently discuss when ye applica-
has little of this Effect, when the sensibility is dimin-
ish'd, a certain tension is prevent'd, & ye with-stopping
the perspiration in the part, or tending to increase it,
And in this way we can explain the Effect we derive
from such medicines as the Saccharum Saturni. —
We further dilute & use medicines & a proper Aliment
such things as are acid and accescent. —
If We find it impossible to discuss an Inflammation or
that it is advisable to bring on a suppuration, before
we rashly venture on medicines let us consider what
happens in Suppuration, you know that before this
forms there is a consid.ble heat, the Inflam.n continues
for a length of Time: When Tumors begin to be collected, we
find an evident effusion into the Interstices of the sev.l
soft parts, & whilst the Liquors are effus'd they undergo
changes, & the solid parts are likewise chang'd.
We can only perhaps fully explain the changes in
either way by supposing that there is a certain
process resembling the Chymical fermentation that
takes place, & the humour is continually changing
its Qualities that at length remaining longer in the
part, & the ligamony increasing, not only the softer,
but the most resisting parts are destroy'd, making

its way where the resistence is the least: therefore
in order to promote suppuration we must not divert
too much the course of the humours by giving purg
atives, nor are we to dilute too freely, nor to throw in
Quantities of acids & acescents. And while we apply
to the part relaxing medicines or substances, to soften
the Tegumente & promote the effusion, we at the same
time stimulate the part, that the change which was
at first begun by a stimulus may continue to take
place: & to obstruct the power we use oily medicines,
& vaginous substances, wch too by their warmth favor
the fermentation & change both in the humours & in
the solids. — An Inflam.n produced from an internal
cause may discuss; but if it is the Consequence of a
wound, it is evid.t that a certain degree more or less
according to the treatment, of suppur.n must follow,
for the division of the nerves gives the stimulus, & the
division of the vessels occasion an effusion, & that
stagnating in the wound the vessels are stimulated,
& there is a formation of pus, wch very much depends
upon a degree of change made even by the heat of y.
Body upon the Coagulable Lymph, & Lymphatic
Part of the Blood. I have seen a curious proof of this,
on tying the Lymphatic vessels of Animals we
trace them emptyd of their Contents by a crust of a
yellow matter like pus inspissated, wch covers them
in their whole length ——— Next suppose y.
the Inflammation is still more violent, & threatens
a Mortification. It has been laid down as a Rule

by Surgeons to make an Incision into the part;
Now I scarcely see the propriety of this, excepting
where the Mortification arises from a great degree
of plethora & Stimulus. If V. S. in such a case wd. be
improper, there is no just reason for propos.d incision
into the place suspected, this must add fuel to the flame
by increasing the Stimulus: at least I am in doubt
with regard to the propriety of the practice. ——
Next suppose the Complaint owing to Mortification
we also. That this is more ready to happen in Elderly
people & in certain habits, as the Scorbutic or Dropsic.
But in all Ages & Constitutions it may be occas.d by
of violent Contusions or even in consequence of
spontaneous Inflam.n when there is a gen.l affection of
the discolord part: Not that the mere effusion is to be
considerd as the principal cause, it is rather an effect:
for a simple Inflam.n is not attended with any great
danger there may be a consid.ble effusion of a floid color,
& yet the Inflam.n discuss: but the unfavorable effects
follow: a change produc'd on the vessels, on w.ch the
complaint seems to depend, and if we macerate a
dead body in water, in a few hours it undergoes much
a change as we see in a mortify'd limb of a dead
person: so it is rather the change induc'd upon the
solids than the mere effect of the Effusion that we
have to dread here. —— If the mortification has
formd fully & the part is dead to a certain depth,
how are we to treat it? The most common rule by
the most Eminent Surgeons is to make Incisions

thro' the mortify'd part into the quick, till the patient feels pain at every stroke. — Now this is a rule I can't see any foundation for: nay I think the Surgeon is with caution to avoid wounding the subjacent sound parts: for if y.e disease has made this progress it is allow'd that the letting Blood even in small quantity is hurtful, besides we add to the irritation, & allow the corrupted matter to be reabsorb'd: however the Incision of the corrupted part is proper for by the Mechanical division of the crust the sound flesh throws off the dead part more readily, just as an Eschar found by a Potential Cautery seperates more easily by cutting into it. Having made a sufficient division of the mortify'd parts, the dressings we employ have a better effect, & the applications must be such as tend to correct the nature of the humor, as acid Spirits — Resinous bodies &. Perhaps we ought to join the Bark, as this has a singular virtue in such cases given internally. So Bilgar observes that the Bark has a singular & specific virtue in preventing & curing the Mortification. And farther to counteract the putrescent Tendency we give Antiseptic & cordial Medicines. If the part has been wounded, it seldom goes into the Schirrous State, but runs into mortific.n nay tho' Inflam.n in the Breast sometimes gives occasion to Schirri, in general the Schirrus breeds slowly, & in the end produces Inflam.n, so it is more frequently y.e cause than the Consequence: while there is as much circulation as preserves Life in the part there is a consid.e resistence to the Circul.n by the Substance in the intermediate space. & from irritation it is liable to be inflam.d.

If we are to treat a wound in w.ch the healing goes on in the common way, without the danger of such bad accidents, our treatment ought to be very simple, by observing what nature does we are led at once to the cause: after a wound there is at first a discharge of red blood: by degrees the vessels exclude the red parts, & the Lymph & Serous parts come only to be discharged: and these are perhaps somewhat changed, so that we may consider a wound as a gland, making a particular kind of a secretion, and in consequence of that, the absorption of a part of the Lymph & that state of change owing to fermentation, w.ch every effused Liquor undergoes, we also an humour adhering to the wound what we call pus: If we were to judge from the first sight, we see a necessity of that forming, we might be doubtful whether by art we co. not substitute in place of it somewhat that shall have a better effect in closing the mouths of the vessels. But when we attend to the progress of the healing, we also see that in the purulent matter there is going on a change in the Extremities, it forms a Bed in w.ch the new vessels form. So in the deep parts of the Body, where adhesions form between the different Bowels, we first observe an inorganic matter with vessels, at length the whole appear Vascular, & the new formed part has a circulation in it. It is evident therefore that the purulent matter is the best Applica.n that can be made to ancient wound, & the Surgeons not to clean it away anxiously. It is only to correct certain bad Qualities in it, thus when too much is form'd out, & it is too thin, we apply Substances to suck up the

thinner parts of the humours, as a Bit of Sponge out the dressing. But in general we need only to defend the part from the Air, & other Injuries, for on the Authority of Celsus, & consider the Air as hurtful, he warns Surgeons in dressing a wound to have all the new dressings ready; for the Cure is more tedious when the parts are not so dry. Air: I mention this because Sharp doubts it, & because the finder wounds in Quadrupeds heal without any attention: but this is only saying that nature gets the better of every thing. — In some few cases a certain access of Air may be of advantage, but in general the exposing a raw part to the Air is attended w.th bad consequences, especially when the Internal parts are laid in view as the Abdomen, when we make a small wound in it the Animal is much in danger, not from the wound of the Flesh or Skin, but from the applic.n of Cold; & we may apply this in a certain degree to the more superficial parts: As the Product of soft Lint is generally that is required, when it is of a proper thickness it keeps out the Air: serves as a defence, & sucks up the moisture, leaving the Pus of a proper Consistence for the production of the new vessels & Flesh — Let us now consider the Surgical Instruments & the manner of using and applying them. — Suppose a wound found we apply the common dressing to it, But perhaps the wound or Complaint may be of such a condition as to require that some foreign substance sh.d be thrust into it, to hinder the External Parts from closing before the Internal are rightly filled up, as in an Abscess or Fistula. In such Cases we introduce some Lint

doubled, or made into a Cylindrical or Conical
Shape, wch is called a Vent: or in order to dilate it, & open
still more we form the Vent of Sponge dipp'd in an Other
ine Substance, as a Solution of the Methyr cretta, and the
parts squeez'd together till the watery Solution hardens, or
till the Solution of the oily or Resinous materials cool:
This being put into the narrow opening by the heat of
the Body the materials are dissolv'd, & the Elasticity of
the Sponge taking place the opening is enlarg'd:
Now this is the only power that we shd ascribe to these
Vents, & we are not to consider them as conveying Bal
samic medicines to the Bottom of the Fistula: Nay it is
seldom they have any good Effect, the stimulate in an
unnatural way, & in general where there is an Ulcer
they make it less disposd to heal. — In such Cases
we may do somewhat by external applications, but
the chief changes are to be produced by intern. medicines
and a proper Regimen — If a substance resembling
the Vent be made into an oblong shape, the Lint folded
& put into a superficial opening, it is called by
Surgeons a Dosil; they suppose after the Operation for
the Fistula Lachrymalis, & the tegements are disposd
to shut before the part is heald from the Bottom, we
introduce this, & that we may take it out readily we
put a thread about it. — Next we need to apply the
Lint folded in forming pledgets or extern. compresses
for the purposes already mentiond in a gen. way. —
When about to dress a wound or Sore, some years
ago the common method was to make the Pledgets
into a regular Shape, by twisting the Ends, then

beating them between the hands or the boards of a Book, to give them a better appearance, but now the apply the Pledget quite flat, as making a more equal compression, only perhaps cutting off the superfluous threads with Scissars. & in like manner where pledgets of a larger kind are to be found from Tow, instead of twisting the ends, the threads are first drawn out, & any lumpy substances drawn away & the Edges are turned in as little as possible ——

Over this dressing we often apply a compress, a piece of Linen Rag folded we employ old Linnen, w.ch is easiest folding it quite smooth & avoiding all doublings or inequalities of the Cloth. —— Next we use a Bandage, or in slight cases we sometimes make the Cure by plaister w.ch is of real use in some cases. These may be shaped very differently according to the Intention. Suppose I am to treat a longitudinal wound, & to cure it with a plaister perhaps we lay some of the Lint on the wound, & then over that the plaister: or without Lint we first apply the Plaister to one side join the sides accurately & then apply it to the other, & we make the plaister narrow in the middle, or cut a hole in the middle of it, to see how the healing goes on, or we have two plaisters one on each side, & unite these with threads, as I mentiond in the treatment of the hare lip, & upon the whole it is evid.t that we ought to employ the plaister, or bandage as often as possible, & use the needle as seldom as we can: —— In general all longitudinal wounds of the Trunk and Extremities, & even transverse wounds of the Head may be treated in this way, by applying a compress & Bandage, we may avoid the necessity of

a Suture, but if by the plaister & Bandage we can sufficiently retain the Lips of the wound contiguous, we hasten the cure by joining ye parts accurately with the needle — Being now prepar'd for the use of

Bandages. —

Let us examine the materials of these, & the manner of forming them, & it is evident that a variety of substances can be employ'd, as Leather, Metal, Cotton, Linen & the properties of all w.ch are well known, only I would observe y.t Cotton is a good medium between the Flannel & Linen, having the warmth, & toughness of ye former, & thinness of the latter, But if the Linnen will answer the Intention equally, we prefer it from the ease of getting it, & forming it into Bandages. — If we make one long slip whether we roll it at one end or two that is called the simple bandage, but if a piece of Cloth is slit into a number of Tails, Surgeons call that a compound Bandage. — The manner of rolling up is obv.t if it is not broad we can manage it without an Assistant, putting it between y.e finger & thumb; if the roller is broad an assistant spreads it, the Surgeon using both hands: & we make it as tight as possible. We apply the roller wet or dry according to the Intention, either that the substance w.ch w.e use wet it may be suppled & ease, or that we nicely regard the effect in shortening or in lengthening the Bandage: tho' the effect in this way is very inconsid.le The manner of applying these must vary according to the nature of the complaint: in fractures

Amputations &c. We begin the Bandage on the part: In applying Tourniquets, treating Aneurisms &c. we apply the Bandage above the part: In applying it for varicose veins &c. we begin at y.e most distant part, & roll towards the Heart.

I shall first shew the manner of applying the single headed roller, on the Arm for instance, & can roll downwards, or ascend by spirals, we need not give names to them according to the breadth of y.e Spiral If we go from one part to another y.t is Serpentine.

Next suppose that the members of a conical shape, as the forearm & the Bandage comes to be loose on the one side, we can correct this by turning y.e Roller inwards only we take Care in making the reverse to avoid y.e Subcutaneous large vessels, & having now got the Roller underm.st w.ch is not so convenient, we make a second reverse as soon as we can: In taking off the Bandage we keep the roller always undermost, so disengage it with Ease.

The Double headed Roller is apply'd in the same gen.l way, but both the hands are employ'd, w.ch is inconvenient in putting it on, and more so in taking it off: so we avoid their use as much as possible. Their Advantage is that we apply the Bandage quicker, & using both hands we draw it tighter: but in genral the Single headed will answer nearly the same purpose with the double, & ought to be more in use.

Along with the Bandages, Plaisters with Oil have been recommended, but you'll find y.t these dont answer

the Intention: & if the Bandage does not come off readily the best way is to cut it, as the purulent matter may glue the turns: or if the Case is slight, & there is no risque in pulling it away, we may soften the purulent matter with warm water

Bandages for the Head.

I shall first shew a Bandage for covering y^e^ whole Head, the Couvre-chef, absurdly named the Grand couvre chef, it is either made of a Towel or piece of rag. We double it, but make the one side a little longer y^n^ the other, & fold it a second time to get the middle, then applying it we use both hands, bring it down to y^e^ Eye Brows, with the broadest fold hanging down to y^e^ point of the nose. We next give the two outer tails to an Assistt to keeping hold of the inner tails we pull them forwards till we bring them close in upon the neck, then turning 'em back over the outer tails, we tie them behind y^e^ head in a Slight Love, or cross 'em behind, & join. we next fix the two outer tails w^ch^ is done by a knot made under the Chin, & thus we have a very equal covering for the whole head, w^ch^ fits it exactly, & is readily lifted off again. —— Next with a Handkerchief we can form a Bandage for the whole head folding it equally w^th^ the two opposite Angles apply'd to one another. We lay it down above the Eyebrows, bringing the Tails round the hind head, we tie or join them before, & also turning the other tails up behind we join them. This is called the Triangular, or lesser Couvre-chef, but for want of straps under the Chin this Bandage is not secure.

Next we are indebted to Galen for a Bandage of six
Tails, the poor mans Bandage, & is said like y.e former
over the head, & the best way is to begin with the two
backmost tails w.ch we tie on the forehead, we next tie
the two foremost tails behind, or rather pin them, &
then with the middle tails brought under the Chin we
secure the whole, this answers its purpose tolerably, has
the security of the Couvrechef, & is lighter than it.
But Surgeons not contented with these simple bandages
have compos'd one made of a double headed Roller, for
its security we put it round the head, then begin to
make reverses, bringing the one thats towards, then
turning it back again, with one hand describ.g circulars
, whilst with the other we describe reverses, now we have
it in our power to cover the whole head, & we finish
with the two Circulars, this Bandage may be of use
for making a greater pressure upon the head, as after
performing an operation for the Hydrocephalus, and we
mean to make a pressure on the Crown of the Head. but
from the difficulty of applying it, & taking it off we do.
seldom have recourse to it. I think it worth while to
shew one more, a Gentleman who attended here some years
ago, lent me his night Cap w.ch might very well supply
the place of all of em in slight Cases, it drawn with a
string behind, & by adding a strap to come under the
Chin we make it a very good Bandage.
Next suppose that we need dressings for particular parts
of the Head, suppose we are to bleed in the Temporal
Artery, we stop the Bleeding w.th Dr. Butlers Tourniquet,

or suppose this not at hand we use a double headed roller, crossing them just over the place wounded, we form a Knot which can be repeated at pleasure, or we apply a Bandage which is in no danger of shifting its place. ——

Next suppose a Longitudinal wound or even a Transverse one in the Head we use for it what is call'd the uniting Bandage, one with a slit in it. — The manner of using it is to bring the two heads together, & to pass one through the Slit, whereby the Skin is drawn together, we then make one turn and pin it, having finish'd with a few Circular over the Head. — Going still lower we can make a pressure with a knotted Bandage or make the turns of the uniting Bandage lower than the Eyes without crossing the face, as suppose the Parotid Gland cut out, and we mean to make pressure, passing a single roller may be suff=icient, but by altering the hands we make a Knot which we repeat at pleasure. This is the knotted Bandage of Heister wch has all the Specks that he proposes from it. ——

Edinburgh January the 1st. 1776. Monday

Lecture 109th

Beginning with things the most evident & simple, we have shewn the Bandages for the whole head, and some few others for particular places and the last shewn was the uniting Bandage. Here I shew you an improvement upon that where instead of a longitudinal slit, we have the effect of drawing the parts into a Cord, the two rollers are first by a number of threads, wch are cross'd in a regular way, & by that we stretch the turns of the roller very equally. Some trusting to this improvement have attempted to cure the Hare lip by it with the use of pins, & some cures have been made in y. way, But I wd. not only, not trust to this Bandage, but besides the use of the pins, I formerly recommended the applying adhesive strictures.—
Next suppose a slight wound on the forehead, or y. we have let blood in the frontal vein, to give y. bandage a neat appearance as well as firmness, the Surgeon first takes off as much of the Bandage as reaches to the nape of the neck, & having made 2. or 3. circular turns round the head, he turns his straps over y. head, & pins it at the nape of the neck: & it not only looks well but answers its purpose very fully: & to give it still more an appearance of art, these straps may be placed in a slanting direction, the former is called the Diserimen, while this is call'd Scaphia, forming the figure of a Boat on the Crown of the head.
Next suppose that the Bandage is intended for y. Eye, in rolling the straps so far as we cover the Eye, & go the

(249) with edgeings to cover the whole Eye; and as the sides stand out uneven at the side of the head, to give a neat appearance to the whole, & finish with circulars around the forehead: & we secure the Bandage Leather, by turning the end we began with over the Head; or we can make the turns so as to cover both Eyes neatly in y.e same manner, ascending on the one side & descending on y.e other. These have got names w.ch are a compound of Greek & Latin, viz. Monoculus & Binoculus. It is however very evident y.t the shape of the part does not allow the Bandage to be apply'd with any great security, we make merely a slight Covering: so it is not necessary to trouble the patient with so many rollings, when we can give a covering equally good with a handkerchief to one or both Eyes. ———

Suppose it is necessary to apply a dressing to the Nose, we have a double headed roller with a Triangular piece, & a strap to turn over the Head: & there are holes in it for the Patients drawing his breath, & this is an abundantly convenient Bandage. ———

Next suppose the Lower Jaw needs a Bandage, & that it is to be apply'd w.th considerable tightness, as in Cases of a fracture of the Jaw, a single or double headed roller is recommended, having apply'd pieces of pasteboard or other Compresses, we begin on the fractured place & cover it with a few turns, & going forwards by edgeings we

include the whole: Then we come forwards from the nape of the neck, in order to contain the fore part of the Jaw, & conclude by a few other turns over these; by w.ch all the edges are drawn in, & the applic.n comes to be every equal, we do this more expeditiously w.th the double headed rolle., but the single is preferable: because the Surgeon has more the command of y.e other hand to fix the Bone, or do any other thing necessary. — But we may supply the place of these by a long, or 4. tailed Bandage, with a small hole in the middle for including the Chin, we turn'd the undermost tails over the head, while we fix the uppermost behind, & we can draw them sufficiently tight; Then doubling y.e fore tail we make it fit exactly. — This is most useful for treating ulcers & wounds of the fleshy parts. — In a fracture we might make a Bandage of y.e same sort, only stronger as of folded Cotton, & we may give it 6. tails in place of 4. & adding to their length, we repeat the turns as often as we please; we leave a certain degree of opening, that the patient may take food, & by lay an effort of the muscles may be opened wider, or where the fracture is considerable some soft substances may be put in between the Teeth —

The Sling too, but without the hole, is very m.ch used in other Cases only changing the direction, & taking advantage of the shape of the part; as to the Head. — Next suppose the Tongue to be wounded, as from a stroke given to the Jaws when the Tongue is between them, or in convulsive Cases. —— Here is a

Contrivance proposed in the French memoir: it consists of a Bag, the size of wch is proportioned to y.e Tongue and the place of the wound. This is kept on the Tongue by a piece of wire, wch goes into the Mouth, & wch is tyed by a Bandage, & it gives all the Security we can require. ——

I formerly shewd you a good way of excluding too strong a light from the Eye, at the same time admitting the Air, by means of a circular piece of wood or sort of Box, wch is coverd, with a piece of Gawze, single or double, the holes few or coarse according to the degree of light we want to admit, this ties with a Ribbon behind, & has a middle piece to go over the head to the nape of the neck. The last Bandage adapted to the face is the Mask, wch may be useful in several Cases. — It consists of a piece of Cloth shaped to y.e face wth 6. Tails: we first tie the upper tails at the nape of the neck: then the under over the head, & y.e middle behind. — This is useful when the skin of the face is burnt, for applying a poultice or oily matters, or in the small pox, wch only leave marks where the Skin is exposed to the Air, so applying this oild we keep the Skin soft, and prevent the ennots from hardening & confining the sharp humour so as to corrode the Skin. Or when we want to apply any wash or particular medicine to the face, when the Skin is tender or subject to Inflam.n or where there are

few worms, [illegible]

Pimples, to wch we may apply a Solution of Saccharum Saturni or Vitriol. alb. & then is no dange in trying these as is generally thought. ——

We next consider the Bandages wch may be apply'd to the neck. —— Bandages for the Neck. —

There is not room for any great variety of turns here; we can use merely a Bandage to contain dressings. — The Quintentive Bandage, as when a person is bled in the Jugular vein, when the neck is long, we support the Bandage by laying a strap over the head, and making a few turns, — or — Suppose the Case of a Wry-neck, & that it is necessary to divide the sterno mastoid muscle, we have to keep the head in the proper posture, so as to allow the void to be fill'd up with flesh, by means of a Bandage apply'd so as to lay hold of the head, & to pass round ye shoulders so under the Armpits; But after the night cap is put on, a few straps pinned to the Cloaths will serve the same purpose so such a Bandage is never to be thot of. — We next consider the variety of

Bandages for the Trunk.

In Heister & others you find descriptions of 20 very tedious, & not a little perplexing: one wd imagine that there was an infinite variety of Bandages necessary or possible here: whereas we may reduce them to very great simplicity, & more than one half are of very little use. They begin with the proper Bandages for the Shoulders: these for

the middle, then the Bandages for the lower part, whereas from the superior and inferior Extremities being connected nearly in y.e same manner, similar Bandages will apply above and Below. ——— The different turns that can be made are, first, a figure of Eight on the Chest only, or on the Back only, or on the fore and back part alternately, and that either w.th the single or double headed Roller.
Or we can apply the same figure w.th Edgings, or we can describe the figure of Eight on one or both shoulders, & can descend not covering the former turn entirely, so that we have on the Top of the Shoulder an appearance of the crossing of the Red in an Ear of Barley, & hence this is named Spica. ———
Next taking advantage of the shape of y.e Body we can secure the Bandage in a differ.t way: we make a Circular or two round the Trunk w.th one head, & carry the other head over the Shoulder, fixing the first turn with a pin, we readily secure the rest: this is called Quadriga, because persons driving Chariots gave a firmness to their body by Bandages resembling these. ——— Now is it not evident that I can make the same applications to y.e lower part of the Trunk. If I am to form a figure of Eight, I pass round the Os. Ilium, & return ag.n as before; or I can next form a Spica, begin.g

with a Circular turn to secure the end of y^e Bandage
and & form it down upon the outside of the Pelvis. In
like manner & can use the reverse, either w^th a single or
double headed Roller, & join the two Bandages at first,
& with one head & constantly pass between the Legs,
whilst the other goes round in the Circle & secures it.
So & can make a pressure upon the perinæum & can
supply the place of the knotted Bandage of Heister,
who, twisting the two ends forms a knot, & to give it
firmness he brings it back all y^e way over y^e Shoulder
But there is a better way of making a pressure, as in the
Operation for the Fistula in Ano, when there has been a consid^e
bleeding
vessel, we apply a Tourniquet, and support it by a Roller,
or any strap put round the Body. —— & it is evident that all
the variety here may be varied to as few as agree in the general
manner of application. — But considering the Trouble there is
in putting them on, that the patients Body must be exposed,
& that every turn we make round the Axilla between y^e Legs,
the Bandage is drawn in & corrodes the parts, we shall endeavour
to supply their place by simple contrivances, & these are
only useful where considerable pressure is required as in
Luxations of the Clavicle, or Os Humeri, where Lint may
be put on filling up the hole with Compresses. But for
wounds, or Tumors that have been cut, it is better to use
some simple contentive Bandage, as a thin waistcoat of
Linen or Cotton, drawn together with a Lace: or a piece of
square Cloth with straps put to it. —— Next come
Bandages for the Trunk w^ch are in more frequent use than
these rollers. Thus suppose a Disease to have formed in
the Mamma we may use various Bandages to

support our dressings, as the rolling Bandage. The ends of wch are first over and under the shoulder. The effect of this is likewise had from the T Bandage, crossing the two pieces of the Cloth, we form a Bag for holding a poultice or other dressings, and the patient herself can manage ye Bandage. I suppose a roller under the arm fit to answers very conveniently. —— There is a third kind more frequently in use in such cases where the containing dressings is the principal object: It consists of a roller made very broad & put round the body & one shoulder a Scapulary over the head, so by pinning this to the Circular we make it very secure: it is call'd ye Napkin & Scapulary, & the back of the Scapulary may be turn'd to the Circular, so that on dressing the Patient the Surgeon need only to fix the Fascends to the napkin. ——

Suppose a case requiring more pressure, instead of a linnen roller we might make it of flannel, as in a fracture of the Ribs, after Compresses we apply the flannel Roller, and support as before with the Scapulary. Sometimes it is found more convenient to slit the Scapulary the whole length, crossing the Ends to join it on both sides, whereby it is fully more secure in its place. —— The same applies to wounds of the Thorax, adding Straps below to make the Bandage more secure: or to wounds of the Abdomen, or we may apply the T Bandage. ——

For the Pelvis we chiefly employ the T Bandage varying the shape according to the particular part to wch the dressing is made to be applyd: we put on ye circular, cross the Ends, & join exactly; Surgeons are faulty in applying the circular to the Abdomen & not to ye Pelvis, for it should be over the Bone where it will be firmest,

without shifting its place, then bringing the straps forwards we pin 'em to the circular: or we may prepare within and the other without and tie, but pinning is better in cases of consequence. — Now this Bandage can have its applic.ⁿ varied: if suppose we'd apply a dressing to a Bubo, I bring the Bandage in a slanting direction; & fixing in any poultice, we pin it, & for further security we can bring the other upon the inner side, & slanting the same way, we press in a poultice upon the Groin & keep it in its place. — We may use the same Bandage as a Suspensory of the Scrotum; now the common way where that is the Intention, is to tie the Circular before, having the Straps between the Legs, but it is better to tie the circular behind, & passing the Penis, thro' a hole made for the purpose, we draw the ends & pin them behind: some have thought of tying the straps to the Circular with openings behind as in treating a fistula, y.ᵗ it might be readily unloosed, but it is better to reverse the Bandage & pin behind. — Now having convinced y.ᵉ variety of operations above the Pelvis in w.ᶜʰ these Bandages are useful: you will find y.ᵉ 1.ˢᵗ Bandage for instance will be found very convenient in the Case of wounds about the Pelvis, cases of the Os Sacrum, Luxations & Caries of the Os Coccygis, and the operation for the Fistula in Ano, after Lithotomy where the Urine passes tolerably well thro' the urethra, after Castration, the Hydrocele, the Operation for the Inguinal or Crural Hernia, or for Bubo's. — Or here is a compound Suspensory for the Scrotum, the patients measure round the Pelvis at

taken, and a Circular made for it, wch is provided wth Buttons, & to these a Purse for the Scrotum is fix'd by straps wch are brot round the Thighs: the purse is made so that it can be enlarg'd or contracted at pleasure, it applies perfectly close, at the Perinæum, & exactly sustains the Testes, this is of use for containing dressings or poultices or in case where there is a swelling of the Spermatic Chord, or Ducts, or where the Spermatic veins are varicose, or in suspending the weight of the Hydrocele, a Scrotum Testicle, or when the Bowels have dropp'd into the Scrotum. ——

For treating of Hernia we have a Bag truss, or a large purse made of flannel or some warm substance, wch is of real use when the Bowels are out of their natural place, & an additional thickness be given —— For the Inguinal Hernia we use a Truss, & the shape of the Body to be taken as accurately for it as a suit of Cloaths, it has one or two Cushions as the disease is on one or both sides, & Circular is made of Metal properly stuff'd &c. But for a Child we use a cotton Bandage with a Cushion, & hard substance for the Cushion, as of Ivory, is not so heartfelt here: perhaps one wch prefer Cork cover'd with Leather, & wch a spring to Ivory: but in general they are made too soft, so that the Bowels insinuate, & then a slight pressure has a worse effect, than a greater pressure has when they are within the Abdomen. Here is a Cushion that was us'd by a poor Man, it consists of a Bit of wood cover'd with Tow, & that with Leather, the Head Band of the Breeches serv'd for a Circular, & in like manner for an Umbilical Hernia we use a Cushion with a Spring to surround the navel so that it may be kept tolerably well apply'd.

In the Case of a Prolapsus Ani we may use a similar kind of Truss consisting of a circular, & aplate of metal stuffd to make pressure upon the Rectum. ——

To support the Uterus when it falls down sev.l contrivances have been tho.t of, the Os Uteri may be received into a hollow piece of Ivory, w.ch is supported by a small piece lying in the Vagina, w.ch is made with a Ball and Socket at it extremity, & this is secur'd by a Bandage. But from experience it has been found y.t a Ring answers the purpose better: the size is adapted to the part, it is introduc'd sideways & turned so as to receive the Uterus, & it makes a consid.le resistence. I lately somewhere read of a Case, where a ring of this kind was forgot & continued for several years, till the woman fell with Child when there was a necessity of extracting it, w.ch is a proof of the Case w.th w.ch a Substance of this kind may remain for a long Time, but from time to time it is proper to take it off & change it for one of a different size that the pressure be not always made at the same part of the neck. I shall next shew the Turns we can make upon the Extremities of the Body. If we are using a Bandage about the Elbow or Knee, as after V.S. we can describe a figure of 8. the Bandage is made to pass three times, & if we are to join it we begin with the end, but if we are to tie it, we leave a piece, & throw the End upon y.e vein, immed.ly on the Orifice. After the Operation for the Aneurism we use the same Bandage, only broader, & apply'd very slight, — Next suppose any disease in the hand, there is room from the shape of the part to vary the turns, to make edgeings, describe Circulars, or even up upon the fingers, or to describe the Gauntlet, or half

Gauntlet, covering the hand & fingers or hand only, & this we'd in the Case of Burns &c. But in Burns we are never to use such Bandages, because of the pain we give in seperating the fingers: we use Bits of old rag, or with the Ung.to Saturnin. laid between the fingers & over all y.e parts affected, so as to prevent them from gnawing & galling. In like manner we can apply the Bandages to the feet, & the manner of making the turns is so evident y.t it hardly needs to be shewn ——— At the same time, however simple all the Bandages may appear, I wo. advise those who practice Surgery to use themselves to their application for besides the real advantage to the patient, you are to consider that every By-stander is a Judge whether a Bandage answers its purpose, & it is allowable for them to Judge of a Surgeons Skill from what they evidently see. ———

Lecture 110.th

I have now shewn all the Bandages, w.ch our body from its shape admit of, & the compound Bandages of Hernia, w.ch we may consider as Luxations of the Bowels, and we now proceed to treat of the Luxations of the Extremities: for w.ch you are sufficiently prepard, because I have not only shewn in the recent subject & manner of distinguishing these, & the place the Bones take in the diff.t kinds, but have attempted to prove y.t in such Cases especially where a large Bone is displac'd, the Capsula Ligam.t is almost always torn: & from this Idea it appears y.t there are a number of Circumstances w.ch concur in rendering the

reduction of a bone difficult. ——— It is evident that the rent in the Ligament may be so situated that the Surgeon shall find it difficult to direct the head of the Bone into it. I apprehend however that this seldom a principal cause of the difficulty, because the lacerᵗⁱᵒⁿ is gen.ᵃˡˡʸ so much larger than the head, & the rest of the Ligament confines ye Bone so nearly in its place, yᵗ the Surgeon will find little difficulty in replacing it. But this operates more or less according to the extent of the Luxation. ———

Next it is evident that the ends of the Bones are mechanically fixᵈ, the extremities of all our bones are larger than the neck or middle part, or when one slips off, the heads of both come to press against the neck of ye other, hence unless they are previously seperated, by being drawn asunder the one head acts against the other. ———

Next you will consider the effect wᶜʰ the luxation must have upon the Muscles, merely considerᵈ as ends connected to the Bones, being thrown out of their natural place they pass across the Cavities, so hinder ye head from occupying its proper place, thus in ye luxation of the humerus, the tendons of the Biceps are thrown across the Glenoid Cavity. ——— Next you are to consider that the muscles from their sensibility, after remaining a little while out of their situation, & being put on the stretch, swell, are shortend, & their tension from passing over the Capsules, is considerably increasᵈ. ——— And considering the muscles as living contractile substances, & as acting against the will of the patient when irritated, & ye they are especially

thrown into that action as soon as by an effort of the Surgeon the joint is incread, so that tho' the patient indeavours to keep the joint loose, the Muscles are immediately thrown into convd. action upon the Surgeons attempting to reduce the Bones, the muscle swells, grows hard and more tense.

If the reduction be delay'd, the nature of the complaint perhaps not being properly understood, in that case it is evident that every difficulty is increas'd in the highest proportion. For

First even when we suppose that the laceration of the Capsule occasions no difficulty whilst the Case is recent; yet by delay the Capsule granulates, endeavours to heal up the rent, so that it now catches the neck of the Bone, & may at last not leave room for the reduction, A future experience may shew the possibility of the head of the bone being left out of its natural place, and that a Cavity shall form, other adhesions be contracted, and a new capsule form'd over the head, or a new substance wch. supplies its place. Next wh. the Granulations of the Capsule, adhesions of the muscles may take place to such a degree as to give an insuperable resistence to the reduction. — may the Bones themselves may change their place, their shape be alter'd, and the rise of the head be increas'd; the socket may

may also suffer like changes; just as the Jaw fills up after a Tooth is drawn.

Next consider the effect wch the rubbing the edge of the Socket against the End of the Bone has, and if periosteum is capable of imitation, can supply the loss of substance & what Excrescence grow from it, there can be no doubt but the Bones may send out processes, & that the processes of the one bone be intangled in those of the other. ——— The longer therefore a luxation is in being reduc'd, the chance of success is less. — The time however is no way determin'd, some are reduc'd after three or four months, in other Cases the same luxation cannot be reduc'd after so many weeks, and therefore in general we shou'd attempt to reduce a luxation, unless we find the shape of the Bone sensibly alter'd, a fracture along with the Dislocation &c. taking care to make a suitable prognosis. ——— Now suppose the Case recent, or at least of a few days standing, when Surgeons seem most at a loss how to proceed, as we, with almost all Surgeons, to delay the reduction till the swelling has mostly subsided? This may be sometimes proper: but I apprehend if this general rule were reversed, it would be attended with a more successful practice; tho' the Patient may suffer immediate pain, this is not to be balanced with allowing the Bone to stay out of its place, for unnatural adhesions begin to form, and this will sooner happen in proportion as the accident has been the more violent. ———

Next the posture of the Patient, & of the limb luxated

must be studied. The whole Body must be made
easie otherwise the attempts of the Surgeon will be
eluded. — Next we consider the effect of all the
muscles concerned, & we relax them as much as we
can, least in attempting to reduce the Joint any
muscle slip over it: & when any of the muscles
slip over a neighbouring Joint we must relax
these also, as in the luxation of the Humerus we
bend the forearm, some of the muscles slipping
over both Joints, but we chiefly attend to the
muscles connected to the Bone luxated.
Next we confine the Extention & counter-extention,
or the pulling and resistence to the Joint only
that is affected, not exposing any other Joint to
suffer from the stretching: so we do not extend
the forearm in reducing the Humerus. —
M.r White of Manchester in directing to a par-
ticular manner of treating that Joint ties his
Instruments to the wrist: But in this way we
injure the Joint of the forearm, & the yielding
of that Joint disappoints the Intention of the
Surgeon. — Next we employ our force by
slow degrees, and we are not, because we have
in one case seen a certain degree of force neces-
sary, to suppose that in a patient of the same
strength and in the same joint, the same force
will be required, nothing is more uncertain of
the force required, & in general no great force

is not necessary, as many Surgeons have imagined, from their not attending to the several circumstances that I have mentioned. But on the other hand it is needless to observe, in talking of the greater or less degree of force with which the Large Bones may be reduced, building upon a single Instance where the Os humeri was found to have got into its place in time of sleep, after the reduction had been attempted in vain, from the Biceps muscle having got into a better situation ——— If I were to mention a general rule, suppose the Humerus luxated, so far as I have seen it will require the strength of 2 persons to seperate the Bones in an Adult: may in the small Joints I have seen a great deal of force necessary ——— But if a certain degree of force fails, we are by no means to aim to a greater degree, but to continue our efforts, for by long continuance we may come to succeed where the same force at first failed, for the muscles of the patient come to be fatigued, & the effort to contraction grows much weaker. And as a plain proof that this is a very material Circumstance, we do. of. when a patient happens to faint, then is the time to succeed: there is an appearance of Equality in attempting to replace the Bone in that situation, yet by doing so, a few further attempts will generally prove sufficient. ———

Now having mention'd the leading circumstances I shall choose out an Example, & shew the manner of treatment, and as the most frequent & considerable I shall take the ——— Luxation of the Humerus. You recollect the situation of that Bone, that it is

pushd forwards on the ribs, & within the two pectoral muscles. The patient is set on a low Chair with his Side to the Surgeon, we lead in the forearm to relax the Biceps Muscle, next we determine the posture of y. Os Humeri, & upon the whole, if we are to pull in the ordinary way, it is best to bring the Elbow a little farther in towards the Body than when the arm hangs, wherby we relax some of the principal muscles covering the head of it, particularly the pectoral muscles, next we keep the arm at an acute Angle with the Body but we do not press it down to the side wch wd. stretch the supinn Spinatus muscles, wch are strong & raise the Body. The Surgeon next fixes a Garter or Napkin to the lower end of the Humerus above the Elbow, leaving two tails wch he throws behind, and gives to one or two assistants, who place themselves below the Patient, pressing their seat against a firm substance; & their business is to pull in y. direction given to the Arm; the resistence is to be made by the same muscles, One says hold of the Scapula, & a 2nd generally says hold of the first: but tho' a hundred were to say hold of one another in this manner it wd. have no more effect than if one only pull'd. Therefore unless one can make the resistence let one, & the strongest stand at the Back, taking hold of the Scapula, & the other at the forside take hold of the Body. The Surg. does not attempt to reduce the head of the Bone till a sufficient extention is made, & when it changes its Situation a small force will bring it into its place, drawing it a little more downwards, & directing it

into the Socket. Some tie a Serviette round their own neck, others cover a ruler with a Serviette to pass it under the neck of the Humerus, & strive to lift it, but this will not do unless the Extraction is made, & then it is unnecessary, & we may bruise the soft parts against the Bone. — Some lay the patient on a form, an assistant lies down with him, with his head the other way, he puts his heel into the Axilla of the Patient, takes hold of the Serviette with two hands, & draws down while he pushes up with his Feet: This is really not materially different if the one way succeeds the other with y.e same force will do the same. But suppose next that these Methods fail, as we, as many have directed to pass the Patients Arm over the Withers of a Saddle, and an Assistant to lay hold of the end of the Humerus, when the Chair is drawn away from beneath the Patient so as to bring the weight of the Body upon y.e Humerus? or are we to employ the Ankle of Lisfranc, when the Body is held down & the Os Humeri raised? Now the latter of these methods is preferable, for as it raises the Humerus it makes at the same time the extention. But it begins to pinch the Humerus upon the before it is detached from the Scapula, so we need scarcely think of it: And we are provided w.th other Machines that are more effectual, & 1.ly we can employ a Cord & Pullies, we tie the one end to some part y.t will make a sufficient resistance, & y.e patient must be tyed to another, now by pulling the rope of the pullies, we can extend the Arm

frauenfully; if there were no resistence by the
friction the force of the pullies No 4. wd. be 8.
to one. Now this may be felled to the Ankle of
Hippocrates, wch is done by the Late Monsieur
Petit, we apply a piece of Leather to secure the
patients Body and particularly the scapula,
or by means of it we make the resistence, next
we fix a Vague to the patients Arm, to wch we
fix the pullies by a strong Rope, & with this
Machine it is evident that I can increase the
pulling with a power that is conceivable. —
Now there are several Objections to this Machine,
we have little hold of the Cap of the Humerus,
nor can we allegive it the proper direction, &
if we relax the pullies it may slip back into
the hollow. now several of these Objections
are removd by the Late Mr Jowie, his machine
is made quite portable, consisting of a Box,
wch is opend & fixd by Hooks, & the whole
machine is fixd to the floor with two Iron
pins, wch shd. be screwd, & the Box shd. be of
very strong wood, so as not to shake in the
least; next we fix the Vague to the humerus,
wch is broad & made of thick Leather, to pre-
vent the soft parts from being hurt, & wch
Iron hooks upon these we fasten the ropes of
the pullies, & the patient is seated in a low
Chair, till raising the Instrument it enters

into the Axilla. Now we can extend the Arm at pleasure, having all the advantages w.ch Pelli's Instr.t has from the pulley. next having made y.e necessary extention, we have the use of Dr Desaguliers' Arm lay, raising the Bone at the same time from y.e Axilla upwards into it's place, or if necessary, we can at the same time turn it inwards or outwards, so y.t this seems to have almost every advantage that we can give to a Machine of this kind. We secure the Body by people holding it, or with a Belt laid over the shoulder to keep down the Scapula, & we secure the Belt by a hook entered into a ring that is screw'd into the Floor.

Yet with all the Advantage of the Machine we sometimes fail. I have known it used, & stay'd very fairly, & after this was done w.th little effect, another method w.ch I am to mention succeeded perfectly well; An account of that was first given by Mr White, tho' I find that several others in different Corners have practis'd nearly the same thing. — It is to raise the patient by the Arm, his whole weight from the Ground, Mr White even in doing this lay the waist, least it can be done after laying y.e forearm; the Patients Body is to be elevated in y.e manner from the Ground, & the weight sometimes does very much to disengage the Bones: but experience has that not sufficient the next thing is to raise the Body to height of a foot, & then lay a 2nd Ligature

to let go the rope with a shock. Now I have try'd this in a Cave with a Wardrobe, where a Bone setter in the Country had evidently used great force for the rope parts were very much Gall'd. We fixed a couple of thick Cords on the Floor, & the patient was laid on them, the fore Arm was bent and kept so, an Assistant took hold of his Legs and rais'd them then the Patient was drawn up by a pully fix'd into a Beam in the Roof, & then prapos'd giving him a shock; & after 5. or 6. we obs'd a loosening of the Cord, & after he had got about a dozen the Bone went in with the slightest touch of the finger: now did the patient suffer the half of the pain he had endured from the Bonesetter & Machine. Or we place the patient on a stool, tie the Arm to a Beam in the Roof, & kick away the Stool, I am convinc'd that the weight of the body & this posture together, the muscles taking all their natural direction, will have an excellent effect, as we only have upon those that make the resistence: & an attempt in this manner will be found to succeed, when we shall fail by the more common methods. ——

So far of the Luxation of the Humerus — we next proceed to the forearm, suppose it dislocated as it may in all directions, for as the Ligaments are tore it may be twisted in all directions. Surg.ns from conceiving of Ligaments

to be only reland think it impossible y.t y.e ends
sho.d be brought forwards but this can happen: or
they may both slip on the back of the humerus, w.ch is
more common, or they may slip outwards or inwards:
& the Ulna alone may have hold of the humerus; but
the most common kind is when both bones slip
behind the humerus & remain connected. how Surgions
generally attempt to take hold of the hand, and to
thrust in their Elbow into the Joint, but the same
objections lie against this practice, as against y.e
Ancle of Hippocrates y.t we do not sufficiently ex =
=tend the Joint: & we will succeed but by having
the proper extention made, & when the Bones are dis
=engaged we readily push 'em into their place. ——
Next the Wrist is sometimes luxated, tho' this rarely
occurs, & the Bones may generally be replaced with
much force. with regard to the fingers I have no
particular observ.ns to make, only that you will
sometimes be oblig'd to use more force to make the
extention than you wo.d at first sight expect. ——
Next let us take the lower Extremities, and I shall
begin with the Ancle if it be disjointed we distin =
=guish the Complaint by the length of the foot, its
sliding out behind or before, owing to the direction
given it by the lateral Ligaments. We lay the
Patient on the side & bend the Knee to slacken the
Gastrocnemius muscle, & the reduction is made
with no great difficulty —— The Patella when
luxated, is to be push'd backwards, so we turn it round
& make it slide readily into its place. ——

Next the whole Knee may be dis-jointed, there is an instance of this by Hooper, where the Leg was pushed up-wards to the back of the Thigh-bone. ——I have lately met with a Case with Mr. Wood, where the Leg-bone had gone behind the Thigh bone, & was out behind it an Inch or two, & we found no difficulty in replacing it. The Patient was an old Man, had Pectoral Complaints, & soon after dy'd dropsical, so that I had an opportunity of examining the Joint three months after the accident: I cd. not discover on the fore-part of the Knee any appearance of the former disease, there was a difficulty arising from the dropsy, that every Layer of the Cellular Substance, & even of the Ligament had water in it; I thought however that the Lateral Ligam.ts were thinner than natural: & I found the Ligaments supporting the Os-lunare, the Crucial Ligaments had been torn beyond all question yet they were grown grown again, but then the colour was different they adhered to the neighbouring parts & a piece of new bone was found between the upper-end of the Crucial Ligam.t & bone of the Thigh, now all we know of the manner of treating this Luxation is bending the Leg.

With regard to the luxation of the Thigh I formerly shew'd you that it may be inwards or outwards, & if inwards the head is lower than the Socket-polish extends is necessary, but same is, because the round Ball sinks into the Foramen Thyroidæum.

1st We relax the muscles by bending the Thigh & rolling the Leg a little to relax the Tendons of the Flexors of the Thigh, then we hold the Pelvis & make some degree of

of extention by pulling the Knee, an Assistant does this, he pulls the Knee towards him, fixing the Pelvis perhaps with his Foot: that being done moderately y.e Surgeon pushes in the Knee with one hand, & draws out y.e Thigh-Bone with the other, & it will probably slap in w.th ease. But if the luxation is backwards, the Thigh is shorten'd, the Bone lies in within the Glutæi muscles, & we first relax these by bending the Knee as before & thigh: when these muscles become rotators draw y.e leg outw.ds then we make a considerable Extention, & here Petits method is the best, we take such a Sagum as that of Petit, & with the Horn of Petits Instrument we make the Extention, & this being done the Surgeon draws out the Knee, & pushes the Top of the thigh inwards, and turning the head of the Bone round, directing it towards the Acetabulum he can with little force push it into its place: tho' this luxation will be more difficult to reduce than the other. ——

Lecture 11th.

After Luxations are reduc'd we apply Bandages to keep the Bones in their place. —— Formerly the manner was to lay Compresses in all the holes round the Articulation, then to apply one or more Bandages with the same accuracy as where there is a fracture; & they allow'd these to continue & the Joint to remain without motion for 6 w.ks. —— Instead of this, of late several Surgeons of eminence tell us that Bandages are in no shape necessary. But in following these Gentlemen I apprehend

that we wd. run into an opposite extreme, and in speaking in that manner they have not made an allowance for the shape of the Joints, & have had in their Eye a luxation of the Thigh where from the depth of the socket y.e patient may walk with.t much danger imm.ly after the reduction. But we sh.d at least have the appearance of a Bandage otherwise the patient will use more freedom than is safe, & the Surgeon be brought to answer for every indiscretion he happens to commit. — If the Thigh bone is luxated, instead of applying the figure of Eight you will find it sufficient if inwards, to keep the Knees from being seperated, by fixing 'em together with a Garter, that the Patient may not give the Limb such a situation as to throw the Thigh out of its socket. — If the luxation is upwards & outwards more attention may be necessary, & besides fixing the Knees we wd. apply a compress upon the outside, & make a few turns w.th the Spica Bandage. If the Humerus is luxated towards we in like manner wd. keep the Humerus inwards by causing the arm to be supported by a Scarf pinn'd to a waistcoat without Sleeves, or if the Joint is very loose, & every small motion in danger of throwing the Bone out of its place we may add a few turns of the Spica Bandage. —

If the Knee or Elbow are luxated, more attention is necessary from the want of sufficient depth of socket, so we study by applying Compresses & Bandages to secure these Joints. If the foream is luxated upwards, & backwards, a thick compress applyd above the Cleeranon, w.th a few turns of a Bandage gives security ag.st y.e accident returning. — If it is the wrist or Ancle still more attent.n is need

the Bones having little hold of one another, so they must be secured by a Compress & Roller. But from time to time during the Cure, we let the Bandage be loosen'd, & holding the Bones we give the several Joints a gentle play in different directions, to prevent preternatural adhesions.

Treatment of Fractures.

Where a Bone is broke, whether in one or in more places, without a wound of the Skin, most Surgeons call it a simple fracture. But some apply the term of Compound if the Bone is broken in more places than one, But generally y^t^ term is understood to express a breaking of the Bone, w^th^ a wound of the softer parts, that the flesh & skin are cut or lacerated. We shall begin with the treatment of the simple fractures, for whether the breaking is in one or more places, the gen^l^ management is the same. ——— If we find that a Tooth may be replac'd in its socket, & that the Spur of a Cock may be transplanted, we may suppose y^t^ altho' a piece of our Bone be broke at the two Ends, it might continue to live, suppose even all its membranes torn, & all immediate connexion by means of vessels intercepted, But we can scarce imagine y^t^ all the periosteum and other membranes will be lacerated so as to tear away y^e^ spikula, so in genral we are not to think it necessary to make an Incision, & to take out the middle piece w^ch^ may appear loose. ——— We discover a fracture from the nature of the accident, the shortening or bending of the Limb, and the rubbing of the broken pieces against each other. ——— In the Treatment the rule laid down for luxations is still more necessary here, y^t^ we should reduce the fracture as

soon as possible, notwithstanding y.e swelling to a considerable degree has come upon the part because the sharp edges of the Bone drove out of their place irritateing the muscles & nerves may produce still more mischief y.n the smooth ends of the luxated Bone. ——— In order to reduce the broken pieces & to bring em to a right direction, we study the posture of the member, for it is evident y.t the muscles are the chief organs w.ch can make a resist-ence, & those in certain situations pull the ends of the Bone nearer to each other, than in other situations. Now what we wile find best in this, is if we are to reduce the fracture of the thigh or leg, let us not extend y.e memb-ers, as was formerly the general practice, for then all the muscles, the Hamstrings for instance are put on the stretch, & every effort of the patients drawing the ends nearer, the broken pieces are necessarily made to pass one another, therefore if the thigh is broken, we bend the thigh is broken, we bend the thigh & leg to nearly a right angle: & if this fracture relaxes the bones most, & allows the reduction to be made, y.e member ought afterwards to be retained in this posture, & therefore the patient is not to be laid upon his back, or the member upon its back, but upon the outerside & that is in general the best situation for the Superior & Inferior Extremities. ———

For the superior, if the humerus is broken we relax most by bending the forearm, & raising the humerus a little, whereby the muscles are more at their ease, & the patient may conveniently remain in the sitting or walking posture, may be kept easy, & the weight of the member rather serves to draw y.e parts asunder

If the fore arm is broke, we bend it nearly to a right angle with the Humerus, & keep a medium between y.e pronation & supination, or allow it to lie in y.e easiest posture, with the fingers moderately bent, or in that situation they fall into when we make no effort, hence if a patient is laid in bed we lay it on a pillow, or contrive a case w.ch has nearly the same effect, & allow him to walk about. ——— If these rules are attended to in practice, there is no need for y.e ancient machines for extending fractur'd limbs, such as are used for extending the Bones in luxations: it is enough to do y.e with the hand, an assistant pulling moderately whilst the Surgeon puts the Bones in their proper situation. Next the posture w.ch we agree upon necessarily determines the kind of Bandage. ——— Either we employ a Roller as the principal Contentive, or a piece of slit Cloth, a Bandage with a Number of tails, w.ch is laid on, & the fractur'd places gaurd'd by means of it, it is called a compound Bandage. ——— Now it is evident that if the Leg is to rest on its outer side we wo. use a Bandage y.t can be open'd with.t lifting, or running any risque of the pieces being displac'd. At the same time I by no means mean to say that it is necessary to change the Bandages as often as is recommended by Heister & others, nay it is gen.ly better not to change them till the cure is compleated. But where a patient complains of sharp pains, or startings are occasion'd by the pain, & the bones do not rightly preserve their situation, it will be necessary to change them: or if matter has form'd about the fracture

& it is surprizing y.t such accidents do not happen more frequently than they do.

In general you will find that in a full grown person it will require at least 6. weeks to compleat the cure of a fracture of the Bones of the forearm, & perhaps some what longer, as a couple of months to the cure of the leg or Humerus, & 3 months perhaps to make a compleat cure of the Thighbone; Having mention'd the several & general circumstances, let us next review y.e machines w.ch Surgeons have propos'd to use, & see whether they may be employ'd with propriety. The common manner of treatm.t is this, Assistants hold the member in y.e proper Situation the Surgeon replaces the bones, & immediately applies a compress, it is very common to use a bit of Bag, slit at one or both ends: or some few apply a plaister: but the greater number reject them because they gall the part, & make the dressings adhere. After such a compress if rollers are to be employ'd, they apply an inner roller first, beginning the turns on y.e fractur'd place, & continuing them upwards & downwards & they purposely make this applic.n slack. They next use what are call'd Splints, made of some firm substance as thick pasteboard, two or more such are apply'd, adapting the ridges of Bones, & subcutaneous vessels, over such coverings of pasteboard with a compress within 'em, another roller is put on and drawn tight, after w.ch certain machines are employ'd to prevent this member from moving with.t the others be mov'd along with it, as Junks of wood cover'd with Straw, & tied the whole length of the Member: then a covering is us'd to keep of the weight

of the Bed cloathes, or in place of y^e^ last Instruments the patients leg is put into what is call'd a fracture Box. If instead of rollers the compound Bandage is employ'd, the common one in use is triple, three are three pieces of cloth sew'd together, w^ch^ are slit into 6. Tails making an 18. Tail'd Bandage. Then over their inner rollers or six inner tails are apply'd, after that a Compress & splints: Then the outer tails, & then the same machines as where the roller is employ'd ——— Now what is the use of the inner tails of the Compound Bandage? surely none it is apply'd loose, & a Bit of rag might serve the same purpose. Or do you perceive any use in this inner roller? surely both may be laid aside; as a Bandage with 12. Tails will be sufficient. In like manner why employ this inner compress? it is a mere embarassement to the Surgeon, & does nothing to sustain the fracture'd Bone, so it likewise ought to be omitted. Next the Splints have been very improperly used short for two evident reasons. 1. The Bandages apply'd press them too violently in, against the most sensible part of the member. 2^dly^ If they are long, so as to fix the ends of the Bones we do more to prevent the motion in the middle, then by fixing them nearer to the fracture'd place: suppose the tightness equal, it will require a double motion to have the same effect upon the middle, y^t^ a motion will have half way between the end & the middle. So the Splints ought to extend y^e^ whole length of the broken bone: but it is of advantage y^t^ they sho^d^ go farther, because their ends come to

restrain the motions of the neighbouring Bones.
So I apprehend upon the whole y^t we ought to treat broke Limbs in the following manner. I shall take one or 2 examples to explain the whole form.
Let us suppose a fracture of the humerus, the Patient is set in a Chair, & he inclines to the opposite side while the Surgeon dresses him: or he may be laid in a Bed, & laying aside plaisters, inner compress & inner roller, we begin with the Splints, defended with Linen cloth &c. is made a little broader than the pasteboard, & is one of the best substances for making the Splint, that it may apply exactly we wet it with water, so when it dries it keeps the shape & applies very neatly, we might perhaps undertake to manage a fracture tolerably well with two bits of Splint, & pieces of Tape to tie 'em together but I do prefer the application of a roller: we put one Splint upon the inner or back part avoiding y^e place of the principal subcutaneous veins, & we bring the other to the outer side: then we make them come over the forearm so as to confine it a little, & the thicker y^e Splint is made it is not only better by its firmness: but also in y^t the Bandage is rais'd a little off from the subcutaneous veins. ——— Next suppose the forearm fractur'd, we introduce a Splint beneath in order to take hold of the Ulna, & bring it down to take hold of the hand, tho' we need not come so far as the joint of the fingers, & here instead of the roller we may put on the 18 tail'd Bandage. We have all the dressings ready, put the Bandage outermost, then the Splint, then the member is to be put in the proper situation, then we

put on the other splint, & begin to apply the compound
Bandage; the ends of the Bandage shd. be long enough
to pass over one another, & to give a proper security we
may put in pins: if this Bandage is of suffict. breadth
we hardly need any Case for the forearm, if otherwise,
suppose that some lighter substance has been used, it
is easy to contrive a Case wch. shall take in the whole
forearm & hand, & if we are to allow the patient to walk
about we further suspend the forearm by means of a
large Scarf, wch. is fixd over the opposite shoulder wt.
pins, to prevent the swing of the Arm we secure it
to the above & below the Joint of the Elbow. ——

Suppose the Thigh fractured, the pat.t is to be laid sideway
& under the thigh we place a large splint reaching
the whole length of the thigh bone, & under it the proper
Bandage, we apply another piece of pasteboard upon
the inner side: & whoever considers the Thigh will find
that while we relax the muscles most in yt. situation,
we also support the broken bone better, as it is not cover.
with muscles near so thick on the Interior side as on
the posterior, so the splint laid in makes the whole
surface smooth. ——

If we are treating the Leg we adapt the Splints to the
shape of it, Mr. Wm. Bush of London uses one adapted
to the foot also, & wch. a hole cut for the Ancle bone, he
makes them of Leather hardend with Glue, but you
will find the pasteboard answer fully as well. We
put over these an 18. tail'd Bandage, and from the
situation of the Leg, we have little occasion for any
Instrument, such as is us'd for the keeping off

the weight of the Bedcloaths, when laid sideways the weight is so equal along the whole member, there is little occasion for it, But if necessary, we can make one to answer any case that can occur, thus I have caused pieces of wood to be made with holes at the sides into wch we fix bits of Cane to make the arch, And we let it out & draw it in by means of a cross piece of Wood. — Or suppose next that the patient tires of any one situation, & that the Surgeon wants to change the posture to wch we have been most common, let him be provided with a Box, as that invented by Petit we can raise the Bottom at pleasure so as to alter the Angle at the Knee, & by raising the sides & foot board the weight of the Cloaths is sufficiently kept off, & even a degree of motion allowed to the foot, we stuff this by means of a pillow, & above it we apply the B. tail'd Bandage, if any place is too loose we put in Tow. This machine is well adapted to its purpose, & in practice many be convenient. — If there shd be a necessity of transporting a Patient from one place to another as in Armies, M. Gouche has proposed that a firm substance shd be laid upon the leg to support the shock in the time of the Carriage: but for common purposes this substance is more cumbersome than useful, & the Paste board will answer every purpose of it. — If in time of applying the dressings, a part of the End

of a Bone is obvious to project instead of attempting to push it down by force we raise the Inferior portion and bring the Bones to a level.

Next suppose that a Bone has been broke with a singular degree of Obliquity, & that the pieces have not a proper hold of each other, it has been proposed to make a powerful extention & counter extention: but attention being paid to the posture of the Limb the common bandage will be sufficient, & therefore put another, or proceed now to.

Compound Fractures.

Where the Skin is broke and the Air admitted, we find from a number of Cases compaid, that the chance of Cure is much less and by the Wound, nay there is strong reason to believe that suppose one Leg is broke by a blunt Instrument & the other with the sharp edge of the same Instrum. as an Ax suppose, tho' in the latter there is a clean wound, & the Lesion of the neighbouring parts &c. less, yet it will be found in practice that the Leg wounded will be longer of curing than the one broke merely by the Contusion. i.e. the access of the Air seems to have a dangerous effect upon the deprecated Organs, the Bones, muscles & other parts an irritated by it.

Now when the Bone is broke & the soft parts wounded, we replace the Bones by y. rules given for the simple fracture, & need not add that we

shall succeed by putting the Limb into a proper situation, when by extending it that may be impracticable.

But suppose that in all fractures, whether from the violent action of the muscles, their being spasmodically affected, or from the Inflammation and swelling, it shall be found impracticable to replace the broken ends, are we immed.ly to have recourse to Amputation? or are we w.th Mr. Gooch and some others to cut off the Extremities of the Bone, & endeavour to save the Limb, tho' there may be a necessity of cutting off several Inches of the Bone?

I apprehend that no absolute rule can be laid down, and that a Surgeon is to be directed by partic.r circumstances, & what I wd. say of the compound fracture or luxation, where the Bones are at their Extremities forced through at the Teguments. ——— If the patient is healthy, young, & there is no sign of a very violent ~~Contagion~~ Contusion I should never hesitate to attempt to save the Limb, though a consid.le portion of the Bone needs to be removed. But if the patient is unduly, has been unhealthy, & the parts are violently contus'd and swell'd, perhaps the best rule will be to proceed to the Amputation, for our success will be much greater, if it is done before a mortification than after that has begun.

Let us suppose then the best Cave that we attempt to save the Leg or Limb, that we have cut off the proper portions, & put the Limb into the right direction, In consequence of the void and want of resistence to the natural action of the muscles, and it will be more when they are irritated & swelled, Surgeons have been led to propose

machines to counteract their effect, to make an extention. —— Here is one contriv'd by my Father for a partic.r case; where the Thigh had been broken by a Bullet, & about three Inches of the Bone had been taken out, It was evident that leaving the Cure to Nature, the Limb wo.d be considerably shorter than the sound one, so he contriv'd a Box w.ch is made to rest against the Pelvis with a Circle, & a Cuff fix'd above the Knee, & brought thro' holes at the Extention Extremity of the Box to make the Extention, & the wound was dress'd by pulling out a part of the Box, the machine seem'd to answer but the pressure on the Pelvis grew so intolerable that there was a necessity for laying it aside. —— Here I shew you another machine that has a similar effect, contriv'd by an ingenious Surgeon in Town Mr. Aitken, it is made to fit around the pelvis, & has a circular above the Knee, between these are plac'd in the direction of the Thigh three pieces of Iron, w.ch keep the Thigh extended now this seems well calculated for its Extention, but the objection against this, as well as the former is, they imply that the limb is to be kept in the extended posture, & hence perhaps in such a Case we are directed to a Machine that will answer it's intention fully better, the contrivance of Mr. Gooch, & consists of a circular adapted to the Thigh, above the place fractured, defend the Thigh with a turn or two of a soft Linnen roller, & another below it, with two pieces of Iron Instrument, by means of a Screw we can make an extention and counter extention, & change the place

of the next we need only have a third circular made under the Knee, with a hinge that we may allow the Joint to play when we please.

I have caused one to be made on the same model of wood, wch can be adapted most exactly, & instead of two pillars, I have made three to make the Extention more equal.

Now with regard to these machines, I wd observe that tho' in some Cases, they may be of advantage, yet we are Not to imagine y.t we are to bear asunder the muscles when they are in a State of Inflammation, or strongly irritated, but in the after part of the Cure, I have no doubt that we shall sometimes better promote the Solidation of the part as well as make sufficient room for the growth of Callus by their use, and another plain effect is, that in any case of common fracture, when the patient begins to go about, he may use more freedom by using one of these Machines, which keeps the weight of the Body from bearing upon the place of the fracture. ——— Where a Suppuration, a large one perhaps occurs, let us carefully examine y.e place in wch the matter lodges, y.t no splinter of the Bone be lurking in the flesh, wch must be removed, & we must make a free discharge at the most depending part, that the part may heal, and we support the strength of the Patient by the use of Bark, Wine & a light nourishing diet after the State of Inflammation is gone off, and we try the effect of these before we proceed to the only remaining remedy, Amputation

Lecture 11th

I have endeavoid to shew that the treatment of fractures of the Extremities may be reduced to very great simplicity, that if we attend to posture very few dressings are necessary: that perhaps we need scarcely more than Splints properly lined with thick compresses, & a simple contentive Bandage, for surely no good reason can be given for applying a Bandage before we apply the Splints, it is little better than a compress, & there is this objection that by pressing in upon every part of the Member, we are in danger of stopping the flow thro' the subcutaneous veins, & bring on considerable swellings, & gather in time of applying the Bandage there is danger of the Bones falling out of their place before we get the Splints applyd. ——— I spoke only of the 18. Tailed Bandage, & forgot to mention another kind, viz.t when applyd has a very neat appearance, It is very simple, we take a number of straps the length adapted to the member, so putting the longest uppermost, if for the thigh or Leg: & we join them by a transverse piece in such a manner that the edge of the one covers the edge of the other. The manner of using it is this, we lay the member upon it, spread it out in an equal manner, and begin at the undermost part, because every one turn is intended to secure the next, & then we proceed to the top of the Bandage It has the appearance of much art, & yet the thing itself is very simple, we need only secure the last by pinning it. You'll find this described of late as a new Invention but it is delineated by Scultetus 120. years ago.

I appointed that the 3 tailed Bandage, or rather
one with 2. tails, as Good. Throw away the inner tails
for the reasons I have mentioned, that this is preferable
to the many tailed Bandages for this reason that with
the other we are under the necessity of beginning at the
lower part of the member: now it is of advantage, to first
secure the Splints, & to make the pressure at the place of the
fracture, by crossing the two middle ends, wch we secure by
a pin, or we can next make the upper ends come obliquely
over them, then we apply the under tails, or if we observe
that any one place of the many tailed Bandage is too
slack, we must undo all the turns in order to remedy this,
but now if the upper or under tails are too slack, we can
tighten our single, without disturbing the rest, And as
this Bandage is double we give an additional security
by it, & a certain degree of support greater than is
proposed to be given by the late writers as necessary in
fractures: we must keep the Bones from slipping in any
shape upon each other, & tho' we recommend absolute
rest, the patient must now and then move the member
a little, & the pressure ought to be such as to produce a
slight degree of swelling in the member, under the fracture,
otherwise the Bandage will be found to be rather too
loose; However with either we may compleat cures very
readily: & the Surgeon ought to accustom himself to a
particular manner of applying the Bandage, as beginning
with the middle, next the upper part confining any of the
muscles that may cause the member to start &c.
If there is a wound as well as a fracture you see the
inconvenience from the discharge of Pus destroying the

Bandages, so we ought to have a piece of Oild cloth
immediat, wch prevents the Spirs from going thro', & ad-
heres to the cloth and comes to be offensive, or if we see
that the Case will prove tedious, we may have a couple,
for it is a matter of real danger to be under the necessity of
raising the Limb from the pillow. ——

Some few bones & parts of Bones acquire practice & treatm.
for what has been mentiond applies chiefly to the long
Bones of the Extremities. —— But we shall shew that our
Clavicle is fractured, from its situation & use, that it
is to bear out the superior Extremities, that whilst the
Arm by its weight, pulls the extremd beneath the inner,
the Shoulder falls in nearer to the breast, so that the ends
are forced the one lower than the other, & ye outermost is
drawn in towards the Sternum, whereby the distance
is lessend between the Acromion and top of the Sternum.
Now to counteract these effects it is necessary to raise
the Elbow, pushing the Acromion upwards by means
of a Suspensory bandage; next to prevent the Shoulder from
falling inwards we draw it strongly outwards and
backwards by making the resistence upon the sound
Clavicle & Shoulder. —— A Surgeon therefore about
to treat a fracture of the Clavicle places the Patient
in a low Chair, an Assistant standing at his Back,
draws back the Shoulder, whilst the Surgeon pushes
up the top of the Shoulder by raising the Elbow, then
the parts being thus secured, & pressing down the place
of the fracture, he gives an easy security by throwing
a figure of eight around the Shoulder & Back only,
putting Compresses under the Axilla. He then applies

to the fractur'd place a firm Compress, somewhat
firmer than that commonly in use & thicker, as a piece
of pasteboard rolld in Linnen, wch is laid especially
above the Clavicle, that it may not compress the Artery
going to the Arm, he then secures this wth a few turns
of the Spica: & puts the Arm into a Scarf, or a waistcoat wch
proper shapes may be fitted to the part, & made to serve
this purpose. ——— Next I shall suppose that the
Extremity of the Ulna is broke or end of the Acromion: or
Ancles, the Malleoli: or any other Bones projecting over
a Joint, & in such Cases we are in certain respects to
counteract the general rules, if the Olecranon is broken
the fore arm must be extended, wch contributes to the
relaxation of the muscles attach'd to the fractur'd Portion. —
In like manner if the Acromion is beat downwards, or
a part broke off, in time of the Cure we relax especially
the Deltoid muscle, wch comes from the whole circumference
of the Acromion, by raising the Elbow a little from the
Side, & in time of the Cure least the luxuriant Callus,
or wrong direction of the Bones shall prevent the necessary
motion, we now give the Joint a gentle Play. ———
Now as our Patella represents the end of the Ulna, or
does its office we shall next consider the treatment of its
fracture, & this happens not only by a stroke given, as
by the edge of any hard substance, but by a violent effort
of our muscles, whilst we attempt to save ourselves
from falling, & where the Knee has not touch'd the ground.
But in whatever manner the fracture happens the general
manner of treatment is nearly the same. ———

The method formerly employ'd was to extend the member
then to draw together the broken pieces, and to keep them
joined by a thick compress, wch is secured by an uniting
Bandage: we lay in a bit of paste board shaped like the
Patella, and wrapped in Cloth, we lay it above the Patella,
and lay another such piece below it, wch are held by an
Assistant: we then defend the ham with any soft compress
to prevent it from being galled, then with a double headed
roller we pass down the upper Compress, & crossing the
Ham we draw up the under Compress and repeat these
turns at pleasure, some farther apply a piece of Cloth
slit over the Compresses, & making the turns of bandage
by pulling the opposite sides of the slit Compress we
draw the paste board Compresses nearer to each other,
we then secure all with pins, & to prevent the flexion
of the member we put on a Cave of paste board, &
bits of sticks, or any hard substance at the sides, and we
are directed to keep the Knee in this Situation till the
broken pieces are fully united i.e. for the space of 6.
weeks or 2 months. — Now of late years a very diff.
practice has been recommended, & those who propose it
have been led to it by observing that in several cases
where nothing had been done, & the cure left to nature,
the Patient could walk tolerably well, especially on
plain Ground, Hence we are advised by Surgeons of
eminence not to apply bandages, nay, on the Contrary
to direct the patient to bend and extend his leg.
Now I can't help thinking that in this way we are in
danger of running into a very opposite extreme, and
equally hurtful to the Patient, and if cases can be

produced where nothing was done, & yet y.ᵈ Patient walk'd tolerably well: there are other cases where y.ᵈ Pat.ᵗ was altogether same, by Callus extending very luxuriantly, or where he co.ᵈ not walk better than if the parts had been joined by Anchylosis: Nay there are very Gentlemen allow that the Callus is more or less luxuriant according to the accuracy with wch the Bones are set, nature filling up the void by a luxuriant Callus, & I know that limbs have been very well cur'd, treated in the old method, & even where the Bone is only united by means of a Ligamento-Cartilaginous substance as I shew you here, it is better than when the pieces are allow'd to remain at the distance occasioned by the flexion and Extention of y.ᵉ member so I have caus'd to be made this Instrum.ᵗ wch I have no doubt will be found very necessary and useful. We put 2 Straps round the Limb above and below the Patella, with Cushions fitted to the shape of y.ᵉ Patella, & we bring these together by means of three straps, we further add a Case of Pasteboard beneath, wch is tied moderately to prevent any motion of the Joint; we do this for at least ten days, till the Callus begin to change into Bone: then from time to time we give the Patella a gentle play backwards & forwards: & y.ᵗ is to be continued for 10. days more, & it is only after three weeks or a Month that the Patient will begin cautiously to give the Limb the flexion and Extention, in order to prevent the rigidity of the Joints, & in this way better than by either the old method, or that proposed of late, we will succeed in making a Cure.

If the fracture of the Patella is longitudinal the case is more simple, we need only confine the pieces by laying compresses at the sides, & we can allow the Patient to use much more freedom with the Limb, the flexion & extention may be allow'd very early but so as not to give pain, or excite inflam.n wch tends to make broken bones throw out more Callus, & the Vessels to grow more luxuriantly.

If it shall be found notwithstanding all our pains that the Bones are not joined together, but that the Callus remains soft, we suppose it to have found in the middle of y.e humerus: if we find that after keeping the member more accurately with the motion, surrounding it with proper splints & irritateing it by making considerable pressure, still the Callus continues to grow, there is one method wch has been found successful, to let in the Air by an Incision, & to cut away y.e luxuriant Cartilaginous substance wch fills the place of the Bone: or we saw of a little bit & reduce it to the state of the compound fracture, only the danger is much less here, as there are no muscles or nerves lacerated. You will see some Cases of this kind in M.r White. I might have observ'd, that there have been a few lucky instances where the end of Bones have protruded, & the Surgeon found it difficult to replace them, & sawing of a little bit of y.e end was compleated and the motion of the Joint restored.

From considering the treatment of the fracture of the Patella I apprehend we may judge of y.e proper treatm.t when the Tendon above or below it is torn; or we shall proceed to the treatment of

Luxated Tendons.

Both Cases have occurd so often that Surgeons have supposd it is always the Tendon that is lacerated. But all the different cases happen, the fracture of the Patella is most frequent, next the laceration of y^e Ligam^t. joining the Patella to the Tibia: then of the Tendon connecting the Extensor muscle to the Patella.

Suppose this last case to happen w^ch is the most difficult from the retraction of the muscle. Having extended the limb we apply a broad linnen roller beginning from the Top of the thigh, in order to press down the muscles, we come down by edgeings & drawing the roller pretty tight to prevent the Retraction of the muscles, & bring it down to the broken place, to give further security to this Bandage we may put a circular round the Pelvis, & bring down one Strap before & another behind, then join these to the several turns of the Bandage; we may then apply two such Leather Straps as I shew'd you above & below the patella, w^ch are buc^t together w^th 3. Straps, and after all we apply a large case of pasteboard from the middle of the thigh to about the middle of the Leg, & we keep the patient in that situation till the Tendon intirely united w^ch may require some months.

Next suppose the Tendo Achillis is torn from an effort of the muscles, My Father was a Sufferer in this way, had this Tendon entirely divided. But I may observe that sometimes, instead of the tendon suffering the Body of muscle is torn the fleshy fibres giving way.

The Cure of this Complaint depends upon proper posture & that you can determine from knowing the connexion of the Gastrocnemii muscles, first as they serve

for the extention of the foot, the foot ought to be
extended whilst with a proper Bandage or Instrument
we pull down the Belly of the muscles towards the Heel:
& further we bind the Knee for the Gastrocnemius
Externus comes by two heads from the Os Femoris:
so we ought to lay the patients limb somewhat in ye
posture given in the fracture resting it on ye outside:
As soon it is in that posture, I shall shew ye Dr. tum.
my father us'd w.th very great success ye Dr. with a Bandage
put round below the Knee we secure the Calf of the Leg:
it may be lac'd on the outside, or what will answer
better, made with straps and Buckles & may be made
of Leather, then we apply a slipper to the foot open at the
Toes: & we join these by means of a strap and Buckle,
whereby we extend the foot, draw down the Calf, and the
Leg is kept bended by putting a strap above & below the
Knee, or we apply a piece of metal so shap'd as to grasp
the thigh & Leg, as a further security when the Patient begins
to walk he may have a plate of metal properly defended
& made to rest before on the foot and Leg, so as to prevent
any quick motion of the Joint, & when beginning to use
more freedom he had the heels of His Shoes made more
than two Inches high, and ongoing up or down Stairs,
mounting on Horse back &c. he will take care not to
rest the weight of the body on that Leg. In time of the
Cure we give the Leg exercise by rubbing it frequently
so as to prevent in some measure the Shrinking of the
flesh. Now if by posture we can heal a Tendon that is

tone, tho' we do not see the manner in wch the ends are apply'd, surely when it is divided by a wound & we see it distinctly, a similar method will gen.ly succeed; therefore the suture of the Tendons is not so necessary as some have imagined; but if it appears that the two ends are not likely to unite & wd. by no means make the objection against sewing them together that is chiefly made, for tho' some degree of Inflam.n may thereby be excited, it is in no degree proportion'd to what has been imagined.

I have observ'd that when a Tendon is cut in its sheath during the Cure we make a moderate flexion and Extention, so as not to draw asunder the ends; suppose the flexors of the fingers are cut, after they are tolerably well fix'd, we begin to make alternate flexion & extension to prevent the Tendon from adhering to its sheath.

Suppose next that any of our Joints from the situation recommended have grown stiff, besides all the methods in common use to counteract that stiffness, & bring it to its proper play, as fomentations the rubbing it wth oily substances, & especially giving such flexion & extension as not to occasion pain, some have found benefit from sweating the member, & as this may apply to the Case of Rheumatism &c. it is right that you should know the manner of doing it.

We have a Box into wch the Leg is put, and then'd of it is lin'd with Tin or white Iron, so we lay any

soft substance or Blanket upon a Cable Tenter of the leg
a certain way into the Box, & we cover the Box with another
Blanket, If we are to sweat the whole Body the Patient can
lie in Bed, we then raise the heat by Steam, Spirit of wine
may be us'd, wch is put into a vessel & placed in the end of the
Box, as the chinks in such a machine are gen.ly sufficient
to allow it to burn, or we can introduce the steam of boiling
water into the Box, as from a Teakettein: or by means of
longer Tubes the Steam may be brot from a greater distance,
& we may extend the Intention to any practic.e part of the body.
Next if any of our Joints are distorted we may by such means
as have been shewn keep the weight of the body a good deal
off from the Joint affected, thus suppose one of the Knees
bended Inwards in a Child, if we fix a machine like that
of Gouchis for fractures, above & beneath, we keep off the
weight from bearing so immed.ly against the Joint, and by
making a hinge in the middle the patient may continue
to use the Joint, & whilst we bear off the weight from the
Joint, we are at the same time doing all we can to pull it
outwards, & in one case I have seen advantage from such a
Machine. Next suppose a distortion in the foot, a disease
wch has been treated off again & again under the name of
the Club foot; now first we observe that Surgeons mistake
about the seat of the disease: it is born with us; at birth
the toes are turn'd inwards nearly at a right Angle with
the foot, but with this circumstance that taking hold of
the foot we can draw it straight without seeming to give
the Child any considerable degree of pain, there is therefore
too great a degree of motion, wch is made not at the
Ancle, but at the fore end of the Astragalus so we

chiefly regard the Joint of the foot in the method of
treatment, But we find afterwards that every one of the Bones
of the Tarsus has undergone an alteration in their shape
greater than what there was at Birth. ——— Cheselden
advises to turn the foot into its former direction, & tie
it up with a Bandage that will grow firm, as by covering a
strap of Linnen with Flour & the white of an Egg. Now tho'
I have remark'd that often we can turn the foot straight
with't the patient complaining, we are by no means to
expect that we can at once bring it into its true situation.
The continuance of the turn gives intolerable pain, therefore
on this account I take it for granted that the method propos'd
by Cheselden will not be found often practicable. ———
It will answer better to make the change gradually, &
that by making the two feet counteract one another, we
put a Shoe upon each foot, open before, with two thin plates
of wood or metal fix'd to their underpart, there are a No.
of holes in the sole piece, into one of those we screw in a pin
wch fixes the Shoes at a certain Angle with respect to one
another, & by degrees we alter the hole till we bring the feet
to the proper direction, or what is neater the two Shoes may
be made to move upon one hinge, and the Child has little
inconvenience, for it has the free motion of both Knees, &
farther with a strap bid. over the foot obliquely we press
down the top of the Tarsus, the foot being too convex upon
the Upperside. ——— Upon the whole tho' I mention these
Contrivances as giving some chance, we are not to promise
too much: for tho' in some few cases the Complaint may be
owing to a looseness, yet there is reason to suspect that
there is generally an original difference in the shape of the

Bone wch it may be out of the power of art to remedy.
We shall next consider the dressings after the last operation,
Amputation, suppose the Leg amputated, it has been
the endeavour of the Surgeons to save as much of the Skin
as possible, and also of the flesh, in order to cover the end of
the Stump, the first thing to be done therefore after securing
the vessels, is to press down the Skin and the flesh, wch is
done by an Assistant, next we apply round the Edges of the
wound an oily substance, to keep the dressings from adhering,
the Surgeon dips his finger into a pot of Ointment, or a linen
Rag is spread with Cerate, and cut into strips wch are laid
round the Edges. Next to the raw flesh we apply pledgets
of Lint dry, & without powder of any kind added; some
have the fancy of throwing in flower, but that is unnecessary
& rather produces a hard & unkindly crust, we apply the Lint
to some thickness, so as to give a defence against the Air,
& to promote the warmth somewhat, wch encourages the
suppuration: & the Lint further serves to absorb the watery
part of the blood: for it is on the thicker parts chiefly that the
formation of the proper pus depends.
Formerly it was usual to use a thick Compress lind wth
Tow which was call'd the Malta Cross, but in some
places it is much thicker than in others, some rather
apply a Pledget of Tow, wch is soft and equal, & over that
merely a Cross of two bits of Rag sewed together.
But in what manner are we to put on the Bandage to
secure the whole? some use a single others a double headed
roller: but with either bending the stump backwards into
the situation in wch it is to remain, they make a few
turns, then lap the Bandage over the ends of the Stump

then they secure these with a turn, then make a reverse
reverse: having thus made a sufficient number of turns
they end with Circulars. ——— Now this is certainly most
injudicious: I shall suppose that instead of its being the
intention to cover the bone with flesh, it is the Surgeons in-
tention to draw the flesh away from the Bone, is there any
way so effectual for doing this, it presses the flesh at the side
back from it; so no turn of that kind is ever to be thought of
for legs are ever to be done with a double headed roller:
The Bandage is to be used merely as a contention, and a few
Circular turns just round the part: we consider it merely as
supporting the Cross put on, & lose every other Idea of draw.g
down the flesh, or preventing the blood vessels from break.g
out, One Lewis in the French memoirs proposes to apply 3.
uniting Bandages with Compresses along the Course of the
Artery, which are to be drawn very tight, My Father has long
ago observed that after any Amputation, & that the Large
vessels are taken up, if the Tourniquet is slackened there is
no bleeding, but when it is drawn moderately tight as we
wo. draw a Bandage, the small vessels begin to bleed,
the Tourniquet in this Case acting more upon the veins
than the despreated Arteries: so the slight Bandage is
best for securing against Hæmorrhagy, and we might
supply the place of the Bandage with any woolen Cap,
& secure this with a Garter: or we give the Appearance of
it with a Bandage but without using any. ———
The first dressings, unless the outer part which has absorbed
the bloody water, or the red part of the blood which is disposed
to putrefy, this we may remove after the 3. or 4th day, but we
never think of removing the inner dressings till they

1699.

are perfectly loose, for the remaining them lyes force not
only gives the patient pain, but hinders the part from healing.
Suppose next that there is a great retraction of the flesh in the
thigh, from the operation being done improperly perhaps, for
with proper management we can always cover the end of the
Stump: but from whatever cause, suppose that the retraction
is evident, are we to follow Mr. Sharp in passing Cords through
and the ends of the wound with the Seton needle, drawing the
sides forcibly together? I apprehend not the practice was known
long ago to Dalbar & others, & has been laid aside: for besides
the pain it gives it adds to the Inflam.n wch is the chief cause
of the retraction. So we must counteract the retraction of the
muscles by more gentle methods, pressing down the skin and
flesh, then applying some glutinous adhesive substance
spread upon Leather on the Circumference of the Member, &
then we tie over the dressings, with the further assistance of
Bandage, wch we begin to make from the top, and we may
farther make the Bandage adhesive, as with the powder of
Rozin, wetting it with Spirit of Wine so that it half melts, &
the Bandage remains like a Cave upon the part.
Suppose next that we have failed in securing y. blood vessels
by the needle: or that the Surgeon wishes to make an attempt
by some Astringent substance, or by some body wch from
its texture has the effect of stopping the vessels.
Now whenever the Arteries can be seen & taken up, we
are to lay aside all thoughts of tying them, you will
find by one Neal a Surgeon in London, who has acquired a
good deal of private practice; instances given where
persons have lost their lives by the use of Sponge and
Agaric, so we only use them where vessels bleed that we

can't secure by a Ligature, We put on a Tourniquet, and stop the flow of the blood, at least we make such a pressure that the flow is very languid in the under part of y. member, we then apply pieces of Agaric, or rather close Sponge, w.ch is preferable we put these on dry, one piece above another, till the pressure is confind to the bleeding point: for supporting them in that situation compley Machines are described in the French memoirs: or you will find one invented by Gouche, Petit Tourniquet, or that I shewd you will answer better. We keep the Tourniquet applyd for 15. or 20. minutes, scarcely can we venture to do it longer, by this time the Artificial pressure will have sufficient effect. But if the blood breaks out again we only no means to renew the pressure with the same dressing, for if it is made wet with the blood it loses its effect, and in general the application of Sponge is of use in other Cases, even without pressure except of a Bandage. Only there is one inconvenience attending its use, and which the Gentleman who has made y. greatest number of trials of it, has not hit upon the way of removing I mean Mr White. After 6. or 7. days when we come to the first dressing the Sponge is fixd to the Body, so that Mr White has been oblig'd to apply Butter of Antimony, Oil of Vitriol or other powerful Caustics. But we are to take it off at the first dressing, & that is to be made more early: for the granulations get into its pores, & pieces of Sponge have been left in a wound, & the flesh clos'd over them, but it can be taken off without any kind of danger.

I have mentiond the common dressing, and what is supposd the best. Dr Spry has found it practicable to save time &. by using Spirituous dressings, covering the

Stump with some powder and wetting it with the Tincture of Myrrh, now having the possibility of healing a stump without dressing at all, in this manner, It may be of use in fleets and Armies, where there are neither dressings perhaps nor time to apply 'em, or it may be of use when there is too great a Quantity of purulent matter, and where Sponge is recommended to absorb the matter, these Spirituous dressings may check the discharge. — Now I may repeat here, what I said with regard to the Operations, that if these Bandages are fully understood few cases will occur where you will not find the means to be used, or where it will be difficult to invent them. ———

Lecture 113th

Comparative Anatomy.

Having fully considerd the Structure of the human Body, & as far as could be done with certainty in the demonstrations, endeavord to explain the use of the several parts; & summary of the changes produced by diseases, & the application of the whole in the practice of Surgery, it remains only that we attempt to throw some farther Light on y. latent operations of the Body, by a comparison of the structure of other Animals with Man: and whilst by the Comparison we attain this end, & satisfy our Curiosity, we discover at the same time the reason of many names, detect errors wch have been introduced into practice, & are further enabled to examine many of the Operations wch are only to be discoverd in living Animals. —— But it is evident to you that from the gradation of nature, as well as from the variety of Animals that a necessity arises of making a proper division of them into Classes, for otherwise our labor wo. either be endless, or we wod not give a sufficiently comprehensive view of y. whole. Hitherto no division has been attempted in the order wch might be called an Anatomical one. The Writers on the Subject have contented themselves with dividing them from external marks into Classes: & as the System of y. Celebrated Linnæus is the most generally followd, I shall begin with giving a very general Idea of the principles on wch it is constructed reserving you for a more particular Account to the Professor of Natural History.

We find that the Animal Kingdom is divided by
Linnæus, or by the most accurate Writers into 6 Classes,
On the slightest recollection you know that there is a
large Class wch is commonly Quadrupedes, but we may
observe that some of the Animals we consider commonly
as Fish, the Whale kind, give milk to their young in the same
manner as the Quadrupeds therefore instead of using that
term we call the first Class Mammalia, these 4. give
suck to their young, comprehending the Whale with the
Quadruped, or Animal of 4. Extremities, in wch it is evid.
that Man is included. The next Class comprehends the
Birds. After that we find a Class of Animals often living
like the two first in Air, but possessing the power of living
longer than they do at least in water, so we name the third
Class Amphibia, after that we add a Class of Fish wch is
the 5th A vast number of Animals, most of them extremely
minute remain wch are divided into Insects or Worms, wch
division is made universally, Under one of these 6. Classes
all the Animated beings may be perfectly arrang.
Next it remains that each Class shall be divided and
subdivided, or a Dictionary of it so constructed that we may
find out readily any Individual, if we have the description
we may find the Animal, or if we have the Animal we may
find out its description with Ease, as the Class is first
split into Orders, then the Orders are divided into Genera, or
kinds of Animals, the Genera into Species, & the Species
consists of varieties: or to give some gen.l Idea of this, take 4.
first Class of Mammalia, or Quadrupedes, if you all know
that a number of Animals agree in their make & manner
of Life, the Cow, the Sheep, & a great many others wch have

a general resemblance: of these than join'd together we wd. constitute an order, or we observe that there are many Beasts of prey wch. we join together, professing swiftness, shape, & Organs capable of seizing & tearing to pieces the prey, they agree in a variety of Circumstances.

We then divide the order into Genera, the Dog, or Cat may be assign'd to the order of Feræ, or wild beasts, & the Cat kind make one Genus, the Dog another, then we observe different kinds of Dogs, & Cats, the Lion is one of the largest of the Cat kind, & we divide the Genus into various species. Thus the dog comprehends the Wolf & the Fox, next the species may be divided very fitly into varieties, & you all know y. varieties of the Dog kind, & with respect to varieties I wd. observe to you that there seems good reason to suppose that these are much more distinct than many Eminent Naturalists suppose; Look into Buffon & you find him explaining all y. varieties of Dogs, wch. he deduces from a single kind varied by soil, Climate & accidental Circumstances, supposing that the various kinds wch. commonly are taken notice of have all proceeded from a few original kinds. Now I doubt that this is with. proper foundation, nay I wd. allege y. Buffon refutes himself by that very accurate Enumeration he gives, If the variety of dogs depends upon the circumstances he supposes how comes it to find that there is a certain number only, the number shd. have been endless, & consid. the Succession of ages, he shd. not have been able to have found any distinct Idea, & yet every person at least in the same Country can very nearly enumerate all y. diff. varieties of the Dog, So these are more immutable than we are aware of, & are nearly as fixed, tho' not altogether so

as the Genus itself, and perhaps what we may allege of the varieties of one Genus of Animals may apply to all with[t] exception, & avoid saying what I think probable of man, but I am impressd with the Idea from Analogy, that the mixture of the Black & White is less vigorous than the Original of either, & probably if we could suppose that after a certain Period of years the mixt breed wo. entirely wear out, this seems to be the Case with respect to dogs, they can generate a certain number of times but after that the spurious breed wear out, and hence the varieties come to be mark'd so plainly.

Having endeavoured to explain the division and subdivisions that may be necessary, let us see on what principles these are constituted by Linnæus in the different Classes, & following his order we begin with the Mammalia. There is no difficulty of separating one of the orders of the Mammalia from all the rest, the whale kind wch. swim in water by the assistance of the Tail and fins, in other respects agreeing in structure with the Mammalia. The remainder, the Quadrupeds including man, are divided by Linnæus into 7 different orders from observing the number & the figure chiefly of the Dentes Incisores, but calling to assistance the construction of the other Teeth. But unluckily Linnæus in describing his division, has laid down a rule, to which he ought to have paid no kind of attention, that we ought to begin with Man. Whereas if we confine our view to the Anatomy, or

merely to external marks, there is no room for prae-
=cience, but we place the order containing man as most
convenient to retain the divisions in one's memory, By
deviating from this you'll find a confusion introduced, be-
=cause man possesses accidentally a number of teeth that
are intermediate. Some of the Orders are distinguish'd by
the want of Teeth in the forepart of either Jaw, then four teeth
are given to one Jaw, then a smaller number, two only, then
0. then 0. the shape varying in the different orders, then
there is an Anomalous Class comprehending some
Animals, wch otherwise tho' agreeing evidently, yet differ in
the appearance or the number of the Teeth. Now if we proceed
from the want of teeth to the highest number, and ascend
gradually, we recollect the division perfectly well, or if we
reverse the order: but if we break in upon it, we are lost in
the Confusion: with'. saying anything of the names we have
apply'd not very properly; so we have three orders, one call'd
Bestiæ, another Bruta, a 3. Bellua, names so nearly
alike, & used in so vague a sense by the Roman Writers, y.
cannot well apply them, nay the term of Bellua is not
apply'd to the Elephant but to the order comprehending
the Horse & shew your examples of the differ. orders of Linnæus
beginning with Man wch has 4. Incisores, and other An-
=imals resembling him call'd Primates. Then we have
the Bruta comprehending the Elephant, or the order where
the Teeth are wanting in the forepart of both Jaws, then
we have different Examples of the Feræ where we observe
6 Incisores, but then differing from others in being sharp,
fitted for laying hold, Clearing. Next we have Examples
of the Bestiæ, wch are an Anomalous Class agreeing in

the most material Circumstances, that of number of teeth varying in different Genera. After that we have the Glires, comprehending the Hare, Rabbit &c. wch have two foreteeth. Next the Pecora where the Incisores are wanting in the upper Jaw, after that the Bellua, as the Horse where there are 6. Incisores in both Jaws, but differing from the prae in their being even in the Edge, instead of rising into sharp points, now if he had begun with the Bruta as the Elephant where there are no teeth in either Jaw, then taken the Pecora, where the under Jaw is furnish'd with Teeth, but wanting in the upper, than the Glires, wch have two foreteeth, then the Animals wch have 4. Teeth, comprehending man, or the Primates of Linnaeus, then the Feras & Bellua, our recollection wd. have been easy.

The 2nd Class the Birds, is divided into orders the Accipitres, Pici, Anseres, Grallae, Gallinae, Passeres. The distinctions of the order are drawn from the Beak, & tho' at first sight there is a difficulty of understanding it, it is constructed on distinct principles, in so much that Linnaeus has unitormly attain'd that division tho' various Editions, tho' he is abundantly ready to correct anything inaccurate.

The third Class comprehends the Amphibia, now this Linnaeus has divided into 2. or 3. orders, 2. orders are sufficient, admitting the general

circumstances on wch he makes his division; the
first order comprehends the Reptiles Predatii, Animals
that move more slowly than the Quadrupeds wth feet,
& this we also comprehends the Tortoise, Frog & Lizard,
for the Draco is but a Lizard with wings, the second order
comprehends the various kinds of Serpents, now these two
take in all the other Animals that by other Authors have
been called Amphibia as, But Linnæus has added an=
other 3. Order, the Nantes Animali, How far he has done so
properly can only be understood when the Anatomy is
known, the Skate is reckond in the number, or in gen.l
this order comprehends what former Authors have
called Cartilaginous fishes, the flesh of wch is supported
by Cartilage instead of Bone.

The fish is his 4th Class of Linnæus he has removed
from it the Cartilaginous fishes, & the rest are divided
by him into 4 orders from the Situation of ye Pectoral
fins, or as he calls them the finnæ Pectorales; the
fish moves chiefly by the force of its Tail, but it has
other fins standing out transversely by means of wch
it turns its body in different directions; these again
are added to hinder it from falling aside way as on the
Back or Belly, now these on the Belly are its feet,
the fish rests upon them, spreading them out broad, &
Linnæus attends to the Situation of the Ventral wth
respect to the Pectoral, & if they are farther forwards
than the Pectoral he calls the order Jugulares, but if
they are under the Pectoral he names em Thoracici,
& if they are towards the Belly Abdominales, &c

710.) he has constituted 8. orders, Wherein finds another order wherein the feet or Ventral fins are wanting, And he calls that order Apodes with 1. Genl. — 8th Order still remains where there is a want of the Gills wch covers the Gills of the Animal; & he calls these Branchiostegi. Now there is some difficulty in reducing a fish even to its proper Order, for it is difficult to know how the Ventral fins are placed with respect to the Pectoral; So the Division by Artedi is more correct. —

Class Artedi. —

Cauda perpendiculari pinnarum radiis { Ossea { Branchiis { Circulatis pinnis / pinnulis pungentibus

1st Malacopterygii.
2nd Acanthopterygii.
3d Ossibus destitutes Branchiostegi —
4th Chondropterygii.
5th Sagitti. —

Cartilaginea —
Cauda Horizontale. —

We now proceed to the smaller Animals the Insects & Worms of Linnæus, he divides the Insects into orders, chiefly from attention to their wings, if they want wings he throws them into one order of Aptera wch makes his last, & might as well have begun with it, than we distinguish the wing'd Insects from

each other by the number of wings, by their covering of them, or by the appearance. There are many Insects w.ch fly, yet when they are creeping they walk on the feet, and we do not observe that they have wings, because the wings are conceal'd by a firm sheath, hence there is room for performing the order of Coleoptera, or wings sheath'd, But in many the sheath is incomplete, or there are double wings, for the sheath serves in some measure the purpose of the substance underneath, & hence the next order is call'd Semiptera, but it needs some additional word to give an explanation, next you know that if the wings of a Butterfly be touch'd a powdery matter seperates from it, & examining this with Glasses, we find Scales laid over each other in a general way representing the feather on the wing of a Bird; hence Linnæus comprehends such Insects under an order call'd Lepidoptera, wings cover'd with Scales, next in the wings of many Insects there are Threads running across, for the support of the Ring to give it a greater firmness, therefore Linnæus has call'd Neuroptera, but in many Insects the wings are smoother more resembling a Membrane; so he uses the term of Hymenoptera the membranous wings, now so far all the Insects comprehended under these Orders have four wings, consider. the Sheath as serving somewhat the purpose of Wings, But there are a considerable number that fly w.th 2. wings only, without sheaths covering 'em, so are call'd Diptera.

The Class of Worms still remains, & these are

divided in the following manner, All Animals have a Sack, or receptacle, for receiving the food within the body, now in many worms the Body represents the shape of the Sack, but other worms, tho' equally soft in texture have an irregular shape, have Limbs or parts projecting from em, We find room then for dividing the soft worms the Mollusca into two orders, the first is call'd Intestina, representing a part cut off from the Intestinal Canal of a large Animal Now we make a second of Molusca Ciliata Inclusta, meaning merely any thing projecting from the Body, as the horns in the Snail, next there is a large order of worms, in w.ch the soft substance is cover'd by the Shell, i.e. Molusca testacea Now we may subdivide this order from the N.o of the Shells or the shape, into the Univalvia, & the Multivalvia, &c. some again the shell is spiral while in others it is of a different shape .. ——— But still a very great number of animated Beings remain w.ch are not reduc'd to method Some of them have very regular figures almost like y.e horns of a stag, & with regular Cells on every part, now when these are examin'd in the Sea we find connected with these living Animals, see Ellis's very curious work on Corals, Cornalines &c these substances Linnæus intitules Zoodea, he calls the first Lithophyta, & the second Zoophyta, nearly the first the Stone plants, he understands a substance constructed by Animals nearly in the way the wax is constructed by Bees: but instead of extending the Idea to the Zoophyta: he conceives even where they had the resemblance of Stone plants, that a seed is sown and grows into the appearance of a plant, but when it comes to flower the flowers are Animated bodies; now how far that Idea

is to be admitted & shall consider when I come to speak of the Anatomy of the Class, & may be worth while here to shew you figures of the common Polypus, taken from the Philosophic. Transactions: we observe the manner in w.h it propagates, that a number of the heads proceed from one body, but besides the spontaneous propagation in this manner it is a fact well known, that we may divide it into any number of parts: & tho' it has a head & tail diff.t in appearance from each other, the head an organiz'd body, very curious with a number of subs.tances for laying hold of its prey, like the Snout of an Elephant, yet all the parts of the Animal are renew'd, if we cut it transversely the head forms a Tail, & y.e Tail gets a head: or we may cut it longitudinally, & have spoke formerly of the Venia, & doubted whether it was possess'd of such power of adding to the number of its Joints. I shew you a most pernicious Animal that fixes itself into the Alimentary Canal of Horses.

By dividing Animals into Classes, Orders, & Genera we are enabled by selecting a few Examples to give a general Idea of the Structure of the whole, & following the order I have mention'd begin with the Mammalia, and tho' a contrary method had been observ'd by Authors, we wo.d have done so, because we have already fully examin'd the human Body one of that Class. — A Naturalist might perhaps to have taken a different method, beginning with the most simple structure, he wo.d gradually ascend, nearly inverting the order of Linnæus. But now as we are fully acquainted with the human Body, there is room only here for a few cursory remarks: especially as I avoid detaining you by shewing matters of mere curiosity,

unless we can make some application of them, or that we can throw some further light on the human Structure or Physiology by attending to them.

In the first Case the first thing to obtain us will be the digestion of the Animal, for they agree in every essential Operation, in the manner of taking in y^e^ prepar'd nourishm^t^ of circulating it, or in the operations of the nerves, but in the digestion there is room for a great deal further Enquiry. That man is intended for a mixture of the Animal and Vegetable food, appears from the structure, whether we attend to the Organs preparing, or to those receiving y^e^ food, to the Animals that agree in Structure, or to the practice of all nations. But other Animals live in a more equable manner, using only one particular kind of food, many feed not only on Vegetables alone, but on certain parts of them, the foliage chiefly whilst others never taste it, unless when compelled, or habit contrary to nature has been introduc'd. So we cou. compare the Herbivorous & Carnivorous Animals with Man, we shall take two orders as remote as possible the Pecora of Linnæus, & the Feræ, w^ch^ joind to man serve to illustrate y^e^ manner of digestion in y^e^ whole Class. Examining the Pecora we find the Teeth altogether wanting in the upper Jaw, before, in the under Jaw we find 6 thick set & sharp, looking deeper into the mouth y^e^ Dent. Canini are wanting, the Molares are numerous, have a number of sharp points & Edges, & the Enamel disposd to perpendicular plates. If next we apply the fingers to the palate, & the Tongue & Throat, we discover a number of transverse ridges with the points turnd backwards, so that we can upon [illegible] for a mixd element.

the whole determine from the structure, the kind of food the Animal is fitted for, the upper Jaw is fitted for the laying hold of foliage, or Grass, they a slight tost of the head the Grass is readily cut away from its root. the Molares are evidently intended for a great mastication such as the foliage requires, & the parts are so disposed as to bring it back into the throat, Examining the Dog, again we find of fore teeth in both Jaws remarkably sharp, and behind two very long tusks, from wch our teeth are nam'd Canini; farther back we find a number of very strong molares sharp in the edges, made for cutting and teazing, but then the crust of the Enamel is upon the surface, and is not made for such constant use as the former order, so we determine from viewing the teeth, what he is made for the cutting of flesh & he is capable by the strength of the teeth & muscles of the Jaws to break the Bones of Animals. In this respect the divisions of Animales serve in some measure the purpose not only of Anatomy but Medicine, by pointing out the Animals wch feed on Vegetables, & wch we may take with the greatest safety. When next we compare man wch these two Orders, it is evident that he stops in between them, & that upon the whole he approaches most to the carnivorous Animal, we find his fore teeth sharp for cutting, tho they are not so well calculated for the tearing to pieces, nor is that necessary, than the long & sharp in miniature, & our Molares are made for grinding, they are sufficiently fitted for dividing flesh, but they differ from those of the dog in being much flatter, & they are equally calculated for grinding farinaceous & more prepar'd parts of vegetables: so we conclude that Man was design'd for a mix'd Aliment.

We trace the food farther down into the throat & here we find a circumstance or two that merit attention. — In the Quadruped the Uvula is wanting, in man it seems to be found on acc.t of his Erect posture, to prevent the food from falling by its weight down into the Lungs, it serves as a Monitor, that when the Bolus is brought back the throat may be irritated, & the Glottis may contract to prevent it from entering, so the Uvula is more sensible than any part of the velum pendulum palati, now in the horizontal posture of other Animals the danger of this is not so great, but in y.e Quadruped we find that the Epiglottis has a muscle for raising it, as they swallow the food more voraciously, & from its nature it is more apt to stick & entangle the Epiglottis, while man can give assistance with the finger, if a piece of meat stops in the Glottis, he can reach it with the fore finger.

Next pursuing the food into the Stomach, we shall first see coming near to Duvernies obs.s the structure of y.e Alim.y Canal in the Carnivorous Animal. In raise the Stomach of the Dog w.ch is larger in proportion to the Animal, & is more evidently muscular than in Man: next we follow the Intestinal tube, w.ch is laid down as in man at the upper end for supporting the Stomach, then it floats loose makes a large turn very different from the human, & is fix.d back again to be tied pretty closely to the Spine. So in the horizontal posture the food must ascend contrary to its weight, & in our erect posture somewhat of the same kind happens. So Nature evidently intends to retain the food in the Duodenum, as undergoing partic.r changes in that organ. Wader. the Gut thicker than ours, & that it possesses a power of contracting very considerably; the Intestine is also much shorter than

in man, while in a Sheep &c. it is vastly longer, and the Coats are less muscular than in man. Where the small Intestine ends in the Colon we find a long Int. Cæcum, & in some Animals this makes a great number of very intricate turns, in the Sow it makes many Spirals, then the great gut makes a short turn, in the Carnivorous Animal the Sigmoid flexure is wanting, & where the small and great join together there is a very accurate valve, so we are not to apply what we obs. on injecting Air into the Intestine of a Dog &c. to the human Body, on the whole therefore we obs. That the Alim.y Canal is much shorter, but more muscular than in Man, & that the stomach is more capacious, w.ch is rather perhaps from a necessity of nature, the Carnivorous Animal having not always the food at hand. The thicker coats of the Animal seem to be especially intended for the more accurate Expulsion of the Contents, & we find there a vast Quantity of slimy substance, to defend it against y.e putrescent nature of the food, as well as against the sharp substances such Animals take down, the assisting Chylopoetic viscera of both kinds have a similar structure, & y.e whole are covered with a long extended Omentum w.ch reaches to the Pelvis, while in the human body it scarcely reaches the Umbilicus, w.ch clearly points out the intended difference of posture; we can take out the pancreas w.th more ease in the Dog than in man, & tie it, hence there was room for De Graafs Experim.t The Liver is only divided into a greater number of Lobes, on the acc.t of y.e slight motions of the Animal, & this Lobe in w.ch the Gall bladder is lodged sends as many branches to the hepatic duct, as any of the other Lobes, so that in the Quadrupedes, hepato-Cystic

Ducts are evidently wanting, & the Bile comes directly from the Hepatic duct, by regurgitation into the Cystic. Now so much of the Alimentary Canal & in general of the Assisting Physiologie vivcara in Quadrupeds.

Let us next take a view of the Stomachs of the herbivorous Animals, as that of the Sheep.

The muscular structure of the Oesophagus is very evident, & follow the tube we find that it enters just where two sacks join together or two Stomachs meet, the largest of w.ch is on the left side, & it has a very curious structure, a number of processes which are rounded at the top, & w.ch increase the surface of it greatly, we call it the venter, or ventriculus, or Ingluvies w.ch may be compar'd to the Crop of Birds. The other Stomach has a still more curious structure, resembling very much a Section of a Honey-comb, & perhaps the best name for it is Honey comb or 2.nd Stomach, this leads us to a third Stomach on w.ch we find a Number of beautiful processes, & on every one of them a number of papillæ, or we find a number of plicæ, & hence this is last nam'd the 3. stomach or many-plies, now the last Stomach or.ch more nearly than any of the rest resembles our own, it has a number of Valvulæ Conniventes dispos'd longitudinally, & w.ch are more remarkable here y.n in Man, then this ends in the Pylorus: & we find half a Canal leading thro' the second into third, and a similar passage leading directly into the 4.th Now you

will recollect what all of you have observed that a Cow or Sheep, after feeding a certain time, lies down & appears still to be eating, or chewing, & you also, a ball thrown alternately upwards & downwards in the throat; The creature makes an effort, then the Ball rises, then chewing a certain time the Ball is swallow'd, & the motion is so rapid that the Eye scarcely follows the Ball; the Animal takes then in a suffict. provision, receives it into the first stomach, & having lain a certain time; it is brought from the first stomach into the mouth, & we must suppose that it returns not into the first stomach but into the 2nd. from the second into the third, & from the 3. into the 4th. When drink is taken, we do not observe that the Animal receiving the drink into the first stomach, brings it to the mouth & so back again, but taking a large Quantity it fills the first stomach, & makes it pass by degrees into the next, & all does the same with Milk: may it may run directly from the Oesophagus along the Canal into the 4th. Stomach; now we see at once the intention of nature in bestowing so many stomachs, that it is to enable the Animal to convert the most gross parts of vegetables into Aliment, that nothing may be lost, & you know that the dung of a Horse wt. does not ruminate is a much richer manure than that of a Cow, the nutritious part being more thoroughly taken from it. But we apply this farther still in physiology, first we have the clearest proof of a living principle, superior to reason and Experience, operating upon the active parts of Animals, we see the stomach acting in various ways, according to the utility with it. The Animal knowing more of its inward make

When we do, we see evidently that every Stomach posses=
=ses a different organization. ——————

Now the conclusion we wd. draw here is that we are
by no means to conceive that the Liquors we receive
from the mouth & Stomach serve merely for dilution,
but that they act as Menstrua, for if a greater
extension of surface only was necessary the same
structure wd. serve in all, but every Stomach
performs by its Liquors as a Menstruum a certain
Operation: & 15. years ago I made some Experiments
wch put this matter in the clearest Light: After
keeping a Dog without food 30. hours, I gave him
pieces of the thigh bone of a Sheep wash'd in the
flesh, having weigh'd them first, and killing
him the next day, there was not the smallest
vestige of the most part of them to be found,
so the action of the Stomach is much more complex
than it is generally imagin'd, & Mr. & Dr. Hunter
has thrown farther Light upon that Subject in
the Philosophical Transactions. ——————

Lecture 114th

We have obs^d that the Alim^y canal of the Herbivorous Anim^ls is much longer than that of the Carnivorous: so farther changes need to be made to render the food like to the Constitution of the Animal, & safe to be receiv'd, & the changes happening in the last part of the canal are necessary for the crude nature of the Aliment in the upper end, & we are far from yet knowing the powers of the Intest. Cœcum. In the human body I am much disposed to consider it chiefly as an Organ preparing slimy matter, but in many of the Quadrupeds, especially those living solely on herbs we find it of very great size, nearly equal to the stomach itself, in the Rat it is to be full larger than the Stomach, so a very great deal still remains in very part of the progress of Digestion to be discover'd by plain experiments, in opening Animals at diff^t times, after that we have given them food the nature of which is known to us.

The food is taken in here as in Man, & conducted thro' the Lacteals into the mesenteric Glands, & y^r only circumst^ce here is that the sev^l Glands are collected together near y^e root of the Mesentery w^ch is more transparent than in us, the fat following the course of the principal vessels; now this circumstance led the Inventor of the Lacteal vessels into the mistake of supposing y^t they terminate in the pancreas, hence a term of the Pancreas Asellii, by w^ch we are to understand the mesenteric Glands sticking together in one Cluster; after the Lacteals have passed thro' these Glands, they pass upwards in the usual

manner till the nourishment gets into the circulating mass, tho' after it gets there we can still see it floating upon the surface of the blood for some time, so that Authors who have supposed that the Lungs and other Organs contribute much to the mixture of the Chyle with the blood, tho' proceeding on Conjecture have really proposed true Opinions. ——— Next we find the same genl. Structure of the heart & of the Lungs, only the Heart is plac'd straight almost in the Thorax wth the Apex downwards, & the Mediastinum has its joining near to the Septum Medium of the heart, & hence it is properly divided into right and left Auricle, & Ventricle, whereas in the human body, by the point being turn'd over these are improper names, for we find that the right is more Anterior & the left more posterior, next the heart is at a distance from the Diaphragm, instead of resting on the middle and tendinous part of it: from the oblong shape of the Animal a large motion of the Diaphragm being necessary to give a suffict enlargement of the Thorax, so how the Cordis to wch the mediastinum is connected has the principal motion on the whole of it, pushes down the Abdominal Viscera in an uniform way. ——— The Lungs of the Animal are divided into a greater No. of Lobes to allow the parts to accommodate themselves to the shape of the Animal, & of greater motion performd especially in bending its Spine, & we may here correct an Error that is apt to mislead one

When the Lungs of the human body are taken out, true
attempt to fill them with Air, & to keep them distended, it
escapes very readily, hence a notion has prevailed that the
Air passes thro' holes to get between them and the side: &
in some Species of Animals, as the Birds such holes are
demonstrated with the utmost Ease, & on open.g the Thorax,
it has been alledg'd that the Lungs are not found contiguous
but that a stratum of air is perceiv'd outwards: even Magagni
has proposed an Experim.t of that sort, & Bamburgerus, a
Physiologist of Germany has pretended to give an
Argumentum Baconi, that if you open the side of the
Thorax of a Quadruped, & examine the Mediastinum in
w.ch there is no perforation, you can perceive the Air between
the Mediastinum & the Lungs of the opposite side;
but the fact is that the lower part of the Mediastinum of
the Quadruped is semi double, there is an open.g behind the
Vena Cava, w.ch receives a small Lobe of the Lungs into
the right side, so in opening the Thorax that lobe w.th the
Air collapses, and we seem to see a Bale of Air on the
opposite side, but it is in reality on the same side; & if
we open the left side instead of the right there is no such
appearance, besides we constantly find the Lungs con-
tiguous to the pleura, & when we open the Thorax under
water not a bubble of Air appears unless the Lungs are
wounded. ——— From the length of the Diaphragm in the
Quadruped Barrelotomy comes to be an easy operation,
as we can chuse our place, avoiding the Thymoid Gland,
& farther the Thymoid Gland is here divided into 2. Lobes,
or rather there are two Thymoid Glands, now these in-

proportion to the Animal are vastly smaller than in the human body, & this circumstance renders more doubtful any supposition found about that Fluid of its being necessary to the formation of principal parts of the general Mass, we would be more inclin'd to suppose that it serves some local Office, than that it contributes to the good of the whole. Having seen that the general circulation is the same as in Man, we will follow the Arteries from the heart outwards, then we found the reason of the names, Aorta descendens & Descendens, the Aorta in some Animals dividing nearly into two parts, as in y.e Cowkind following the Circulation, we may next observe, that y.e Animal has nearly the same Functions that we have. We find the Kidneys situated in a similar way but rounder than in Man, when the weight of the other Bowels seem to flatten the Kidney, as in the human Foetus it is rounder than in the Adult, & composed of a greater number of Lobes viz.t Eighteen & some are compacted together; we find here the Cortical & Medullary Substance more evidently seperated than in Man, but the same general structure takes place. In the Carnivorous Animal the Bladder is thicker & more muscular than in the Herbivorous, & it is seldom much distended unless when the Animal is confin'd, the muscular structure serving for a quick & accurate Expulsion, now this proves that the Acrimony of y.e Urine

continues this life, & that the Coats are not merely effected by their distention, & Dr. Whytt proposed that the blood by the Arteries nature of it might solicit the heart to contract, as much as by its distention, wch I find controverted, but not on good grounds, so the urine when accumulated in the Morning solicits more to a discharge, than the same quantity does when it is of a more watery nature, here the peritonæum places over the whole of the Bladder, as from the horizontal Situation the Urine gravitates towards the Diaphragm, while in us it is mostly thrown over the Bladder to prevent the want of the other Bowels from bearing upon it, this too may explain why the high operation of Lithotomy was so long in being thought of, Theory not leading to this operation whilst the human structure was imperfectly known

The Excretion by the Lungs is nearly the same here as in us, as also that by the Skin, there is however a circumstance of very great curiosity takes place, particularly in the Dog kind, that they perspire we know from the particles smelt wch all Animals have & that one Dog can readily trace another by the smell, but it is impossible to make a Dog sweat: instead of it he discharges a vast quantity of Saliva from his mouth; so this leads to doubt whether perspiration & sweat be discharged from same vessels or if we are to consider sweat as a secretion performed in a very different manner, & with different effects: further it will be found that the dog kind alone are liable to the Rabies, wch we commonly name Canine, now whether are we to suppose that these two Circumstances are connected

That the Animal is disposed to the discharge thro' the skin, it has been alledg'd in proof of this, that those persons in the Warm Climates who sweat with difficulty, are most exposed to the most dangerous fevers, & supposing the Babies to have been communicated by a dog to two others, and suppose a Cat; probably the Bite of the dog wo. be the most dangerous, because of the natural determination wch. the acrimonious parts of the mass seem to have to the Salivary Organs.

We are next led to the nervous System & we discover that the number of ways in wch. the impression is made, is the same as in Man, & feeling excepted y. several senses are more acute, they taste, smell, hear, & see in general, & some Individuals possess one or all of these powers, in a higher degree than we do, the use of their doing so is abundantly evident, to enable them to find their prey readily, to wch. we are directed by reason, & that they want y. power of making the same Experiments to judge of the safety of substances to be taken; nay we can go farther than the final Cause, we seem to discover the Structure on wch. that depends, In the mouth of the Quadruped there are a number of papillæ disposed on the inner side of the Cheek, as well as the Tongue, so that the surface of the Organ of taste is more extended. In the mouse, in a still greater degree we observe the same thing, in a Sheep or

Dog There is a very curious Convolution of the Bones from wch we understand the name of Os Spongiosa turbinata, Now without saying, what perhaps is true, that every part of the surface of either Organ has a more acute feeling by its nerves, the extent of the organ is greater, the impressions multiplyd, & this has nearly the same effect as increasing the sensibility of the nerves; just as we smell more accurately with two nostrils, & see more distinctly wth two Eyes: In like manner the quadruped turns the Cone of his Ear directly towards the sounding Body, & receives y. impression with both Ears at the same time, so if you observe a string of Hounds in the Evening the foremost has his Ears set forwards, the next trust to their Companion, but the hindmost is attentive & turns his backwards: & what we observe of the External muscles we wd apply to the internal, that there are said to that particular action wch gives the chain of bones the necessary tension, In the Eye too there is a large muscle for fixing it more steadily on the Object, & we find a large Membrana Nictitans you will observe that Linnæus is only able by this to seperate the Ape from Man: now we have this in miniature, so that distinction fails him: besides the Pupil of the Quadruped is accommodated to the Object he is in quest of, such as feed on Goats take in a large field & see it more exactly from the figure of the Eye, while the Cat kind that seek their prey, changing its situation from the Ground to a Tree perhaps, has its pupil perpendicular. Next with less motion than we they shut the pupil more accurately, by its being fixd down in two points, so if

you expose the Eye of a Cat to a very strong light, you can observe a prodigious motion of the pupil, besides they are enabled to see a small quantity of Light, from a bright color found in the bottom of the Eye, wch throws back the rays of the Light wth considerable force, & must impress the nerves more strongly, next they exercise their muscles wth more strength & steadiness than we do, as the dog, which can pass over a much greater space of Ground wth out fatigue than we can do, a Question to occur here therefore, are we to suppose the Brain wch we possess larger, to serve merely for sense and motion? I apprehend we must suppose it somewhat farther, without our being able to conceive clearly what we mean, but the Brain of the Animal is the medium between the body and the living part, and other powers than these are exercis'd of sense & motion; tho' it in a manner we shall never be able to comprehend, by a greater bulk of Organization the powers of the mind are better communicated modify'd & extended.

We wd next consider the manner in which the Species can be continu'd, beginning with the Male Organs, In the Dog the Vesiculæ seminales are wanting, the reason of this I can't conjecture but a consequence of it is that the Copulation is tedious, as time must be given for the Semen to be carried round from the Testicle through the Ducts, now this shews us that there is some power

at one time determining that motion wch more
than another, & not the uniform impulse of the circul-
-ation, or vis a tergo, the Cremaster muscle may grasp
the testicle, but the tubes themselves must also possess
the living power, may swellings of the tubes have been
brot on from passions of the mind. The means by wch the
copulation is rendered tedious is very simple, ye Animal
has a second Corpus Cavernosum, at the root of the
Glans penis, that is received in the vagina, and the
Corpus Cavernosum of the vagina is larger than in
other Animals, hence the Animal is retained, and as
when they turn averse to each other the urethra is in
danger of being twisted, we find a Bone in the Penis
with a furrow to conduct the semen, & wherever we
find this Bone we may conclude that the vesiculæ
Seminales are wanting. Hen the progress of the peri-
-toneum wch is found in the human body in the fœtus
state remains even open, so that there is a constant
communication between the Abdomen & vaginal coat of
the Testicle; & from this we can understand ye manner
in wch that kind of Hernia which has been called
Congenita forms: where the Bowels cover ye Testicle,
& the shutting this process in man evidently shews
that the erect posture is intended, & as ye quadrupeds
sometimes rises erect, & there is a degree of danger, to
prevent that a very curious valve is found wch consists
of a fatty substance & is not exhausted however lean
the Animal may be.

Let us next attend to the appearance of the Gravid uterus, as that of the Sheep. We first obs. the change in the ovarium, and Corpus luteum, in the multiparous Quadruped the uterus has Cornua in wch fœtus are lodg'd as well as the body of it: We perceive a vast number of placentulæ, & Glands corresponding to them in the uterus before conception, we find next to the uterus the Chorion, & connected wth it the placentulæ, the processes of wch enter into the hollows of the Glandulæ, & from the Glandulæ a milky like substance may be squeez'd out, we also find a very curious Bag fill'd with Liquor, the urine of the Animal and what has been call'd Allantois, it is thin & totally without vessels, & there is often in it a half solid substance, a sediment of urine: we next come to the Amnios wch contains the Liquor in wch the fœtus swims, now from attending to this structure we wd. infer that the uterus contributes much to the formation of the placentulæ, or it is scarcely to be imagin'd that a certain defin'd number of them tumbling about in the uterus wd. be so accurately applyd to it, & in the human body the surface of the Ovum is at first pretty uniform, & every part of it is equally calculated for forming the placenta: the manner of connexion of the uterus of the Quadruped to the Ovum is very different from what takes place in the human body, we find a milky Liquor in the

Glands, whereas instead of that we find considerable vessels in the human body entering into the Placenta, so there is a real difference in the manner of the Nutrition, tho' we could prove therefore that there was no communication by circulating vessels between the Fœtus of the Quadruped and the mother, yet our proof wd. be far from applying to ye. human body. And we are more confirm'd in this from finding an Allantois, containing the Urine in Quadrupeds and in Birds. In the human body there is an equal necessity for ye. Fœtus getting rid of the Urine, yet nothing of it is to be found in ye. Liquor Amnii: so the proper Excrementitious parts must pass off into the Mother, next in the human Subject we can demonstrate vessels in the Cotyledons, so we are at a loss to determine whence the Liquor Amnii comes. But in the quadruped we discover vessels in the Amnion wch. lead to little knots that are deriv'd from the Umbilical Chord, so this Liquor is secreted by the Fœtus itself, the Question therefore with respect to the nourishment of the Fœtus, whether it is by ye. umbilical Chord or by what it swallows vanishes. All is deriv'd from the Chord, & it cannot be wanting, it is essential to ye. life of the Animal; & only a seperate Question remains whether the Fœtus swallows the Liquor Amnii? This is a very improbable Opinion, & yet the late Dr. Fleming found hairs in the Stomach of Calves, the only ca. obs. I have when the Calf had got hairs on the skin, but admitting ye. fact it does not alter our Ideas wt. respect to the nourishment of the Fœtus. ——— I shew you that the Viscera of a Fœtus sink in water as readily as the Viscera, look almost as solid, & are of a darker Colour, whereas

after the Air is thrown in they swim, so by this circum-
stance we judge whether Children are still born, but we
ought to be careful that nothing has happend to introduce
the Air into the Lungs, as the blowing it in by a malic-
ious person, or its being drawn by an unguarded motion
of the Child, or that the parts have grown putrid, when
the may become Emphysematics & swim, and if the
Lungs sink & have that dark Colour we ought to con-
clude that the Child has not breath'd.

Lecture 115th

The next Class of Animals, the Birds, agree w.th the former
in material respects, for like them we find 4. Extremities,
the feathers resemble the hairs, so that the principal
outer mark of distinction is the Beak instead of teeth, the
material operations are carried on nearly in like manner
likewise, so that the principal difference is to be found in the
manner of generating that they are all Oviparous, i.e. the
nourishment is prepard for the young before we distinguish
it, & the young incrase with.t any connexion w.th y.e mother
When we view the outward form of a Bird stripd of its
feathers, its Extremities seem ill placd for y.e balancing
of the body, the Legs seem to be too far back, but when the
Animal carries its body obliquely, whilst the Leg but w.ch
is in reality the foot, makes a great Angle forward,
so the Base is thrown sufficiently under y.e comon Center
of Gravity, the wings in like manner seem to be placd
too far forwards, but when the weight of the Animal in

flying is in a great measure supported by the tail, tho' it is chiefly us'd for the direction of the flight. Attending more minutely to the structure of the Extremities, we obs. 1st. y. muscles w.ch manage the wing are vastly strong: Hence we see the vanity of imagining that man can by any contrivance be made to support his body in the air, for either the force is want.g or if the mechanical powers are call'd in, & proper Apparatus contriv'd for striking the air; when a bird flies he moves his wings as we do the oars of a Boat, & as the long feathers of the wing are inclined backwards the body is much better supported than it appears to be, when the tail is spread out, that whilst it serves chiefly the purpose of a Rudder it at the same time makes a resistence & supports the posterior part of the Animal, the Structure of the foot, or what is call'd the Leg is likewise simple, but excellently adapted for its principal Office; for when we extend the foot upon y.e Leg, the Toes are drawn inwards, & set in the circumference of a small Circle, & the Extremities of the foot toes are so short that in making this motion they are bro.t to the full stretch, so on drawing the foot towards the Body in water the breadth is greatly lessen'd, but on pushing y.e foot backw.ds by means of a Web w.ch is extended between the toes in the water fowl, the water is pushed with greater force; if again a Bird of prey endeavours to lay hold of another Animal; when he descends, by clapping in the wings he spreads out his feet, as soon as the Talons fix on the prey, the weight of the Animal shuts the Toes strongly upon it, or in those kinds of Birds that suck Seeds and Insects upon the Surface of the Earth, they spread out the foot, & throw a

great deal of it off at one stroke, & shall here make the Experiments formerly mentiond of imitating the voice of the Animal by blowing into the wind pipe, even after we have made a hole in the neck, or intercepted the communic.n between the Larynx & the Breast, & blow in air, & on pressg it out again we hear a sound nearly resembling that of the Animal when alive the cause of this comes to be examin.d in the Course of the Dissection, wch we begin w.th observing that this Animal is intended by nature to feed nearly in the same manner we do, upon the more prepar.d parts of Vegetables, with a mixture of Animal food, yet from the want of teeth you will expect some farther Apparatus, & in the Cavity of the mouth we find Salivary Organs, the inferior maxillary Glands, but we want a covering for the Cracha, & there is plainly a large arena leading into the Nose & Larynx, because from the want of Teeth, & lubricating the Animal takes in little danger of falling into either, Going further back there is a very wide Gullet, and the Glands of it are much more evident than in man, a vast quantity of Liquor seems to be pour.d out from y.e Larynx we are led down the Oesophagus wch is likewise large, because the food passes with.t Mastication, downwards we are led to the Larynx of wch is placed on the right side of the wind pipe at the lower part of the neck, in the Larynx we find Liquor pour.d out in very great plenty. From the Larynx the passage leads to the Stomach but with.t our finding any partic.r Canal for conducting the food directly downwards, tho' the drink may perhaps pass directly into the Stomach, & this opens into the third Cavity, in the 2.d Stomach we perceive distinctly a number of orifices coming out

from Bags, there is no clearer proof to suppose a Gallicle than in this part, Bags containing a Liquor, & discharging it from a small Orifice in the side of the Bag, In the Carnivorous Bird, the 2. Stomach resembles that in a Dog, but in the Granivorous it consists of very thick muscles joined together by strong Tendons, & the whole is lined by a very thick membrane w.ch tears of very easily, so y.e description of Pliny's is very distinct one, the Ventriculus Callosus Carnivorus; from this Stomach the duodenum comes out in ordinary; next to judge of the effect of these several parts in digestion we must slit them open & examine their contents, If the Animal has got the grain intire it remains so in the first stomach the Crop, in passing thro' the 2.nd it seems chiefly to receive a mucous matter: in the third we find the grain broke down, & there is mixd w.th it many of the very hardest pebbles, nay with these if you feed them on Grain unbruis'd they are not sufficiently nourished, It is evident therefore that the third stomach supplies the place of teeth, that by it the food is triturated, & the effect of it is powerful beyond all doubt to what we do expect.

Baumeer found a Cylinder of Iron w.ch he cut into 2. equal pieces, & threw one of them to a large Bird, w.ch it swallow'd down, & examining the stomach soon afterwards, he found that the Cylinder was squeez'd flat, & then laid weights upon the other half, & found that it required the weight of 480 ℔ & upwards to have the same effect, now the force of the Stomach was the double of this, Baumeer commits a mistake, because it made not only the pressure but the resistence; the food then is broke down by force in the last Stomach, but the compleat digestion of it, the solution

and the rendering it like to the Animal is performd
by all the Stomachs concurring in proportions not yet ac-
certain'd by Experim.ts from the stomach the food descends
thro' a very long tract of Intestines in the Granivorous Birds,
in wch we observe confirm'd what I formerly mention'd res-
pecting the duodenum, that in all Animals the food is pur-
posely retain'd in that part of the Canal, after the Bile and
Liquor of the Pancreas are added. ——— From y.e Situation of
the Pancreas in Birds, its duct was discover'd before we
made the discovery in the former Class, about the middle
of last Century; at the end of the small Intestines we find
two Intestina Cæca, abt half a foot in length & these are
turn'd upwards, that the food ascends in them contrary to its
gravity, wch shews that the Intest. cæcum is an organ of more
importance than is commonly imagin'd, & in the beginning
of the great Intestines of Animals the food undergoes some
process, not yet sufficiently understood, this too point out
the power of the living principle over the Organs, & that these
do not act merely from irritation being apply'd, y.e they do
not act from necessity, because an irritation is apply'd in
a certain manner, for were this the Case the food wo. never
enter the Intest. Cæca, on their mouth being irritated they
wo. shut, but at one time the food is directed upwards,
again that motion is reversd, when it is fit to be discharg'd,
The Associating Chylopoetic viscera are the same as in the
other Class, we find a large Liver & generally a Gall bladder
tho' Pigeons &c. want it, this is merely a variety in the
manner in wch the Gall bladder receives its Liquor, the
Cystic & Hepatic ducts opening seperately into the

Duodenum, while the Gall bladder is supply'd by
the ductus Cysticus. — The absorption of the Chyle is
performed by Lacteal vessels in the same manner as in the
former Class, only tracing these we do not find Conglobate
Glands in the Mesentary, & Mr. Hewson has observed that
the Lacteals of this Class never grow white but that the
Chyle is colorless, the Alim.y Canal of Birds is tyd down
very closely by membranes, on acct. of the great rapidity w.h
w.ch the Animal is carried thro' the Air to keep y.e bowels
from being shaken, next following the Chyle & blood, we
find the same general structure of the heart, & the fowls
breathe alternately as we do, & may be killd in y.e same
manner, & tho' nearly by stopping the respiration, the
passage into the Lungs are different, we find the true
Glottis not in the common place, but at a distance from
it within the breast, so that we can imitate the voice of the
Animal after cutting the Trachea, the bottom of y.e Trachea
resembles the reed of a Hautboy, & w.h distinct muscles
w.ch make the true Glottis, tracing the Trachea into the
Lungs, we obs. that a number of its branches go thro' them
& pour the Air into Cells as it were passing betw.n y.e Lungs
& the pleura, & from these it has been extended farther than
has been commonly imagin'd. Mr. John Hunter has lately
obs.d that the air passes into the cavities of the bones of a
Bird: hence the Lungs are supported by Membranes, and
fix'd in their place that they may not collapse, the prin-
cipal use of the Air thus passing into Cells is to render
the body of the Animal specifically lighter, & its entering
into the Bones serves the same purpose y.e its entering

into the Composition of the feathers, wch contain Air w.
in them, whether some further purpose may be answer'd by
this mechanism we are as yet uncertain; the Animal may
perhaps be thereby enabled to live with less respiring: at the
same time a Bird is kill'd by hanging as soon as y.e Class
Mammalia; the Aorta here divides in a particular way, we find
two equal Branches produc'd instead of a Trunk, & these
again equally subdivided into two more, that an equal
quantity of blood may be sent to either wing, as any
preference here wo. have been hurtful. From the circulating
System we find the same general Functions as in y.e former
Class, only the ureters descending from the Kidneys open
into the common Cloaca, or they discharge the urine along
with the faces, so that in Birds in gen.l there is wanting the
Vesica urinaria, the Urine has a very singular appearance,
it is the chalky like substance upon the dung of fowls, &
such being receiv'd into the Vesica Urinaria might have
grown into a solid, We might here enquire why fowls
have the urine so partic.r while they seem to drink freely?
Now I cannot explain that, without supposing y.e appearance
is in a great measure owing to the feathers, that there is a
vast separation, & waste of an Earthy substance, & a
large Elaboration from the feathers, so in a case where
the Bones of the human body grew soft, for a number of
weeks, the urine had a plaistery sediment, so I have
thought that if perhaps the feathers of a fowl were pull'd
off, we shd. perhaps find the[m] like they came to be reparid y.e
the appearance of the urine wo. be alterd.
With regard to the Sentient System very little is to be dec.d
for exercising Taste in the mouth we have scarcely long

papillæ, from the want of mandueation we may conclude that Birds possess taste less accurately in general than the former class; — In the nose we find a very beautiful structure, the Osa Spongiosa are very much convoluted, & it is well known that Birds smell their prey at a very great distance, in the Ear there are remarkable differences, y. cavity of the Tympanum is very differently shaped & covered, the Membrane of the drum instead of being concave is convex, & supported on an Elastic substance, at the Bottom of the Ear there are semicircular Canals, but it is alledged that y. Cochlea is wanting, but we find the same gen.l circumstances a membrane of the Drum, 3 male Bones, semicircular Canals & Nerves spreading out upon them, the two Ears communicate under the Brain so while a Bird listens with one Ear he is turning both to the sounding object; in the Eye we observe much more easily here than in the former Class the source of the tears, there is one large duct w.ch pours them out: they have over the Eye a very beautiful curtain directed by muscles w.ch can cover the whole of it, & this is necessary when they fly in the Air, without protection from the sun; the Eye upon the whole is flatter, & the Chrystalline here seems likewise somewhat more dense, for collecting y. rays sooner, Here we find the Membrana Nictitans w.ch shuts the Eye entirely, concealing the whole Ball, Behind y. Crystalline here we find a Conical shaped substance of a Black Colour, call'd the Black purse, & some have supposed (D) that it conveys or absorbs y. dark parts of the humours: while others again suppose that it serves to turn aside (D) Objects from falling upon the entrance of the Optic Nerve

by altering the situation of the nerve: but tho' the Axis of the Lens were changed the Focus wo. still falling in the same place, so that the way it is to be that when y.e Animal is to examine Objects that are near to his Beak the rays of Light fall so obliquely upon the Lens that they are reflected from it, but by means of this substance the Marsupium Nigrum, he turns the Lens more to the Object, & the Rays fall more perpendicular upon the Eye. The Brain itself is smaller than in the former Class, & we find a great difference in the appearance of many parts wch have been supposed principal; we scarcely shd. also pass Callosum the Fornix is wanting, the ventricles are differently disposed; & yet the general powers of the Animal are the same nearly, but perhaps in an inferior degree; tho' in many instances Birds shew a great deal of cunning & sagacity, so we know very little of the functions of particular parts of the Brain. In the Bird the decussation of the Optic nerve is very manifest. ——

It remains to examine the manner of Generation, the circumstances on wch more especially this Class differs from the former, & I shall begin with the Male. ——

The Testes are situated higher than the Kidneys, which shews that the change supposed by Boerhaave to be made by the urine is not so necessary before the Spermatic Arteries co. take their rise. —— Following the Vas deferens from the Epydidimis it is gradually enlarged, but with. vesicula Seminales, y. dilatation of the Extremity serving that purpose. ——

The Vasa deferentia, end by 2 pillo in the common

Cloaca, or the prostate Gland is wanting, wch shews that it is but the secondary use. Next wth regard to the female, we have seen the Ovarium or bed of yolks on the Back Bone, & it communicates with the uterus by the Fallopian Tube, the beginning of wch is turnd towards ye Ovarium, but it opens wide into the Cavity of ye Abdomen The Uterus is of the same shape & size wth the Egg, the small end is turnd upwards, & on squeezing ye Uterus, Air goes out from the Big end, wch is shut by a muscular substance, & the passage or the Vagina is not exactly in the middle but towards one side. Next let us Examine the structure of an Egg, wch is more curious ye' perhaps you are aware of. Between the skins wch line the Shell at the great end, there is a Bag with Air, wch is a little to one side, & the whole shell is lind with ye same kind of Membrane, next the Shell has within it a great deal of Glairy substance commonly nam'd the white; & in the middle we find the Yolk, the yolk has a white spot upon it wch is always uppermost, now that is the sack wch lodges the Chick call'd Amnios, the Yolk has Halaza, or bits of Glair coagulated by heat. If we boil the Egg, & cut the Yolk we find a hole in ye middle wch was supposd to be the place of the Chick but that is a mistake, a Chick about the full time of hatching is roll'd up so as to take up the least room possible, & has the Yolk between its Legs, & there is a duct from the yolk wch leads into the Cavity of the Intest. Ileum into wch the whole of it passes, these are the usual facts, let us next see the Explanation of them.

The yolks form in the ovarium & with it is con-
=nected the Animion, & they are conducted to y.e uterus
by the uterine Tube, w.ch by its muscular power
throws itself around one of the yolks, the only doubt-
=ful power point is, whether the tube after having
thrown itself around the yolk causes a particular
yolk to swell & grow large, or rather y.e yolk after
it has come to be of a certain size, the Tube lays
hold of it. The necessity of its doing so appears from
the structure of the membrane y.t contains the yolk,
w.ch is like a Sacculus, hence the yolk wo.d fall into y.e
Cavity of the Abdomen, & putrifying might kill the
Animal, in the descent into the uterine tube
the white is added, w.ch is merely a secretion from
the Tube, & is added to it just as any soft Ball
roll'd among snow becomes larger; then they
fall together into the Cavity of the Uterus, where
the finer parts are absorb'd from the surface,
w.ch consequently becomes membranous, &
at the same time the shell is secreted from y.e
internal Coat of the uterus, while the Air bladder
is wanting; the Animal by an Instinct of
Nature, opens the uterus or vagina & admits a
certain proportion of the Atmospheric Air, whereby
the Air-bag is formed nearly opposite to the
Vagina, now in what place the impregnation is
made, or how the Male influence is conveyed
we do not know exactly, especially if

Harveys Explanation be just; that Copulation is sufficient to impregnate the Egg for 20. Days or a Month, this might lead to the suspicion of a something being added to the general mass of Blood, but if the Uterine Tube be obstructed, there is no impregnation, so it is either carried up thro' the uterine Tube to be successively applyd to the Egg bed, or it lurks within the Uterus, & affects the Eggs as they descend into it, & that thro' the intervention of the Cicatricula of the Egg, after the Conception is made the vessels elongate, & spread out on all sides, then various changes take place both upon the Membranes & humours, the Membranes of the shell put on the appearance of the Chorion, branches of vessels are dispersed over all, & spread thro' the white, w.ch is gradually consumed, & the young w.ch was at first a Bag containing an oily kind of matter, grows, & the Air bag is added to keep the Chick from being tossed about the shell, so it comes at last to fill a great part of it. It has been thought that the Air was supplyd afterwards from the Atmosphere, & that the same air dilated it self, but I find that it is not merely raised, & tho' you rub the broad end w.th a greasy substance you will not prevent the enlargement; neither can you by a condensing Instrum.t draw the Air out of it with.t bursting the Egg, so the air is created from the vessels dispersed upon the membranes, as in the feathers of Birds, or from Vegetables under

water. After the Chick has come to its full vigour by an instinct of nature it disengages itself first breaks a hole into the Air bag, so that we can hear the sound before the Shell gives way, and soon finding a want of fresh air, it breaks the Shell round in the most regular manner, the mother generally lending her assistance: After the hatching the yolk is taken in by the umbilicle intestines, the organs of the Animal not having sufficient strength for the food which it takes naturally.

January 9th 1776. Edinburgh

Lecture 116th.

I shall explain the manner of making observations w.th the Microscope. With! question the most simple is the last, where we secure the Object on a piece of Glass, or any transparent substance, or we slide in a Tube which confines a Liquor: We then hold a Microscope towards a clear Light, there are few Objects w.ch acquire the direct Light of the Sun, the clear Sky is better, or the Light of a Candle answers tolerably well, & are enabled to take a near view of an Object. To examine y.e surface of an opaque object we may apply a common magnifying Glass, throwing a greater light upon the Object by means of a Concave mirror; for this kind of Microscope we are indebted to the Ingenuity of the late Dr. Rivercombe, who is also the Inventor of another kind w.ch shews objects to a No. of People at once, wch gives a very entertaining tho less accurate view than the former, we exclude the Light from the Chamber & fix our Machine in the Window Board, the Light passes directly thro' the Tube, & putting in the Object the picture is thrown behind the microscope upon a sheet of paper w.ch we may oil to make it more transparent, or we may have Plaister of Paris. The Globules of the Blood in that way, appear like Musket Balls, & we see them moving with rapidity, where we cannot direct the Apparatus to the Sun, we have a Mirror w.ch throws the Light of the Sun upon the Tube, the Sun alone having light enough for making Experiments in this manner.

The next Class of Animals is the Amphibia, & I exclude the Nantes primati from it, referring them to their own place with fish. Of two orders only remain the Reptiles Rodati & Serpentes, the first order comprehends 3. Genera, viz. the

Tortoise, Frog & Lizard, for the Doctor of Linnaeus is only a Lizard with wings, with regard to the second order of Serpentes we may speak of it, as not admitting of farther subdivision, one general structure taking place thro' all: Now the chief circumstance wch we may attend to are these, the organs of digestion agree wt the former class, being longer or shorter according to the food of the Animal. But transmitting the Chyle into the blood, we find it disposed in a very different way, & in proportion to the difference of respiration of the Animal varied: Let us begin wth the Tortoise, & wth some of the larger Lizards & Serpents, we find an appearance of two hearts, & we find as in the Veal, large receptacles of Blood in the Vena Cava, both above and beneath the heart, & examining the heart more accurately, we find two distinct Auricles So that Linnaeus is mistaken in supposing that they have only one, the ventricles appear to have the same shape, but ye Aorta as well as the pulmonary Artery come out from the right ventricle, so there must be a passage thro ye Septum Medium, & the same thing seems to take place in the larger Lizards, & in many of the Serpents, the Blood then circulates in this manner, one part goes to the Lungs & another to the rest of the body, drove by both ventricles concurring at the same time, so a portion of the mass only passes thro' the Lungs, & the surface of these is less extended, the blood is returned to the left Auricle, from that to the left ventricle, from the left to the right, & from that into both Arteries wch receive their Blood at the same time, so this Animal is not under the same necessity of breathing alternately with the former Class, a part of the blood only going by the Lungs, & receptacles being contrived for containing the

Blood before it reache the cavity of the heart, & in the
other Genera the structure is still less complex, as in the
small Lizards, or common Salamander Aquatica, & in y^e Frog,
where we have but a single auricle, ventricle, & one artery from
the ventricle, w^ch supplies the Air vesicle & the rest of y^e body, &
as only about 1/3. passes thro' the lungs, they can live longer than
the former Class without breathing, so a Serpent can be hanged or
drown'd in half an hour, but it requires 3. or 6. hours to drown
a Frog, & there is no reason to suppose with Hales, y^t the blood
moves with such a rapidity in the air vesicle of the Frog, for
it is pusht on with one force thro' it & thro' the rest of the body:
the lungs of the Frog do not collapse, nay if you press out the
air from his vesicle, he can again distend it, w^ch he does by
means of a particular structure of the nostrils, w^ch he can shut at
pleasure, & pressing with the muscles of the Jaws he squeezes
the air mechanically into the lungs. ———

Attending next to the organs of the senses we find y^t these
are exercis'd by the same general means, only the origin of
the nerves is gradually more extended, so that we are told that a
Tortoise can live & move its body 6. months after the head is cut
off. ——— With regard to the generation here they are alle
viviparous producing Eggs like Birds, only some of em hatch
the Eggs within the body, while others deposit them. In the
male the Testes are plac'd high up in the body, & open into
the common Cloaca, & in the female at the side of the In-
testinal Canal numerous convolutions of the uterine tubes,
of w^ch there is one, on each side, the beginning of the Tube is at
the Membrane w^ch represents our diaphragm, that is at the
beginning of the Ovarium, w^ch in Frogs is plac'd on the Back,
so the Tube cannot be applyd to the ovarium to occasion y^e

-ripening of the Ova, but they ripen to such a degree with-
-out an Operation, & their manner of reaching the Tube is
incredible, but it has been observ'd a hundred years ago by
Swammerdam, the ova burst from the ovarium into the
open Cavity of the Abdomen, & float loose amongst y.e Intestines,
till by some power w.ch we cannot explain, they are thrust into
the beginning of the Tube, and in the youngest female before
there is any room to suppose any application of the Male
influence, we observe dark colour'd substances in y.e ovarium
resembling the Tadpole which is the young Frog.
We next consider the fish w.ch apply the pure water naturally to
their Lungs, & w.ch move by the assistance of fins in it, By this
description we exclude the Whale kind, w.ch from the Structure
of their Heart & Lungs are properly included w.th y.e Mammalia.
The Shape of the fish is excellently calculated for dividing the
water, & if we were to study their shape we might perhaps
improve the figure of Shipping. The Skin of the Animal is pro-
-tected by a Quantity of Slime, w.ch is convey'd by a black Line
or duct, & there is a system of lymphatic vessels w.ch appear
jointed, but really have not valves. — The fish is push'd for-
-wards chiefly by his tail, but he has a number of other fins
on the back & belly, to keep him streight in his course, there are
observe at the lower part the feet of Animals, & with.t doubt
they in some measure serve that purpose, while the others
are rather intended for turning his body. if a fish turns to
the left side, he lets down the right pectoral fin, & keeps up
the left, whence the body turns round by the Resistance of
the water. — We next examine the inward texture, most
in order to render their bodies specifically lighter, & allow them
to descend, have a Bag filled with Air near the back bone, &

in many there are communications between that Bag & the Stomach, as in the Herring where the Stomach is conical, & ends in a small tube wch goes into the Vesica aerea, yet the air does not come from the Alimentary Canal, but is rather discharg'd from the Bag into it, & shew you a red substance wch I suspect to be a Gland that separates the air, for we constantly find such a substance, while in many there is no outlet to be seen from the Bag. — Having their inward structure instead of a pancreas we also a number of Intestinula cæca, but there is no room for any particr remark. — In the circulating System we also a very remarkable differce there is one auricle & one Ventricle, from wch a single Artery comes out, & is entirely lost upon the Gills of the Animal, I shew you the Skate as a general instance, the veins wch correspond with this Artery meeting together form one Vessel wch does not return to the heart, but form the Aorta, or Canal, from wch all the rest of the body is supply'd, & wch runs down the Haunch, & is accompany'd wth the Vena Cava, wch returns the blood to the heart; Now as the Nantes primath of Linnæus have the whole blood dispers'd in the Lungs like the other fish, they cannot have the pulmo Arbitarius, but must breathe in a regular & Alternate manner, & some of them can breathe air instead of water, as the Carp, next we also that the whole mass of Blood has the water applyd to it, & as fish can't live in water deprived of its Air, I formerly inferr'd that besides the carrying off somewhat hurtful, wch might be done equally well by the water, we receive a somewhat useful from the Air; in the Heart & Lungs there red globules are intimately mixd with the others, but in the rest of the Body the red globules are excluded, or we have a clear view

of a descending Series of Arteries; so we do. conclude w.th Boerhaave against Haller, that the Arteries divide into descending Series; next the vena Cava is large in proportion as in the former Class, so the colorless veins return to y.e heart by the Cava, & there is little reason to suppose that these form the Valvular Lymphatics. ——— With respect to the Senses there is nearly the same Organization as in the former Class. Fishes smell very acutely, the Eyes agree only Palpebræ are wanting, & the Crystalline Lens is more nearly Spherical, & of a harder consistence, for the Rays necessarily receive a less turn in passing from water into the Eye, than from air; so they need a denser substance to give them the necessary turn, & from the Spherical figure the Eye is fitted for taking in a larger field, which may compensate for their wanting the neck. We find a very odd appearance about the Ear, the Cavity that is behind the Brain, in w.ch there is a stony substance much used by Ladies in making their Shell works lying as hard as stone, it swims in a Liquor with.t any connexion w.th y.e neighbouring parts, & it receives Layers in proportion to the age of the Animal; now that is the only substance w.ch in fish we can compare to the Ear, there is no passage in it, & we have only the Analogy of Situation, for we do not find Nerves for receiving the impression. The Brain itself is in proportion to the Size of the Animal, a great deal smaller than in the first Class, & yet they feel as acutely, & exercise their muscles more violently than we do, this confirms us in the Opinion y.t the Brain exercises powers beyond those of Sense & Motion, in all fishes there is a quantity of water between the Brain and

Membrane that lines the Skull, whether the Humor of the air is conveyd by means of this to the Bone mentiond is uncertain. ——— Here we evidently see the decussation of the Optic nerves. ——— In the generation of fishes the only difference is, that many of them thro' a vast number of minute Eggs into water, whilst others have the organs more resembling those of Birds, so in the Skate kind we find a load of yolkes in the back of the Animal, & an uterine duct leading down, wch adds the Chair, while in the uterus a horny substance like the Shell of a Bird is added; So if we suppose a division of fish into 2. orders, we may prefer the Cartilaginous primates to ye. second order from this difference in their generating.

In the remaining Classes of Animals I find very little to observe, I need not detain you wth. What endless divisions and subdivisions wt. are put to Insects & Worms drawn from their external form, it is enough for our purpose that you understand the general Structure in those parts of the Animal wch. are essential to life, or to the propagation of it: Now taking the Lobster or Crab as an Example of an Insect, we find the Circulation carried on by the force of the Heart, & we also. The same thing of ye wt. of the worms, as ye. common black Snail, or Sprout fish, & in some of them Branches only supply the Lungs; so in the Lobster & Crab we find the Pulmo Cubitanus, & that the motion of it depends as upon the Cervale feet wt. they have: next in many we find a Brain, wch is deny'd by Linnæus, & I believe it is a gen.l rule in Nature that wherever you can shew Eyes, & adutes to the Head; you can trace thro' the Optic nerve, a Brain, or a substance wch. when hurt produces Convulsions, and violent pains to the Animal; still lower we find the

heart itself in perfect; in some Worms as the Sea Egg, & could never discover an Organ pushing on the blood: descending still lower as the Polypus the Animal can be divided into a number of parts, so that probably there is no general heart nor Canal serving to push on the Mass: next with regard to the nervous System, in some we find a Brain situated as in us, but in several worms, as in the Sprout-fish there is small knots & threads going from them to the muscles & touching these they produce convulsions, so they are organs serving the Office of the Brain, & the whole origin of the nerves is not collected in one place, till at length as in worms there is no particular spot from wch the nervous influence can be supposed to come; so when you break a Sea Egg upon a Table, every part of it moves may perhaps if we were to be allowed to reason upon it, we cannot see why the Brain is found in Man, but that the organ is tender, & the Animal is not cover'd with any firm substance, so that it needs a defence, but here where the Animal is cover'd w.th a shell, the Extremities of the Arteries can actuate the nerves or perhaps produce them.

Next with regard to Monsters, some believe that a Monster is produced by two perfect Animals being equally mechanically within the Mother, while others conceive that no Monster can be produced in that manner: but both circumstances take place, for two Animals originally perfect may adhere, & make one within the body of the Mother: but in such cases the changes are slight, & when there is but one hand to two bodies, or one heart & one Stomach, & the Aorta divided equally to both, or where there are 2. hearts forming one Aorta &c. Certainly no Situation

of parts &c. produce such appearances, but these parts must have been originally so formed, I would call such Monsters just as we &c. call the Mule a Monster, where from the first production of the Animal the appearance is nearly the same as we find it afterwards.

I have thus given you such an account of the comparative Anatomy as tended to throw farther light upon the human structure; to have gone farther would have been needless.

Lecture 117th

I have spend attempting to explain some material circum-
-stances of Animal Oeconomy wch require assistance from
comparative Anatomy, or from other Sciences, those however are
so few in number that I am at a loss to give them an ap-
-pearance of connexion. But I shall endeavour to do so, & to
hint in a general way, a method in wch our Physiology
might be perhaps studied with advantage, & in wch we might
proceed like Mathematicians, from more simple, to the
more complex facts: for the most approved Systems of Boer-
-haave & Haller are liable to Objections: Boerhaave traces
merely the course of the Chyle, by wch he is led to describe the
texture of our Fluids in a regular manner, but he is far from
doing so with respect to the Solids of the Body, & likewise from
being sufficiently aware of the powers of the living principles,
attempting to reduce every thing to mechanic principles,
often concealing difficulties, whilst he seems to explain them,
The system of Haller is still more faulty in point of method,
& its Author is abundantly sensible of this: He follows mere-
-ly the method wch brings under one view every circumstance
wch respect to an organ, just as a Writer on the Materia Med-
-ica instead of laying down his plan founded on the virtues
of the several substances, attempts to give an explanation of
them as he occurs in the Alphabetical Order: so look into
Haller & you will find that he supposes that you are acquain-
-ted with Irritation, Sensation, & many of the most complex
Operations, even before the heart, the vessels, or Structure
of the Brain has been explained.

Now after distinguishing the Animal from the Vegetable Kingdom, & if the human Oeconomy be our main Object, we ought to begin with understanding y. texture of it. In the strictly anatomical part of the subject we examine the fluids & solids of the Body: we after that ought to endeavor to observe the different actions of wch. y. machine is capable, & here we observe merely the powers of y. head without at present considering the cause of Alternate motion, & so of the other Organs. When the Organs are understood we proceed a step farther, to determine the immediate effects wch. the actions may be supposd to have, & lastly we obs. the connexion between the living principle, the mind and the body of the Animal; & investigate the various ways in wch. in consequence of it the body may be influenced, so far we wd. observe these powers on wch. the being of Animals depends, we wd. perceive their vital powers. But next for the Continuance of these powers a supply is necessary to repair the waste: & lastly we wd. examine y. propagation of Animals, the powers by wch. they are enabled to continue their Species. Keeping this method in view I shall proceed to the Operations y. remain to be explaind. I had formerly examin'd that the Animal Kingdom was readily distinguish'd from the Vegetable by the will, the Volition, wch. the Animal exercises, we can now add a more evident and Anatomical Character, that all Animals receive the Supply within the body, where it undergoes in an Organ similar to our Stomach certain changes before it is fitted to be received, we observe in the Lythophyta & Zoophyta of Linnæus wch. ought to be included under one order y. Lithophyta

for as to such producing plants, there flowering and producing animals, there is no good ground for.——
We find the regular figures to be either constituted by the Animal, after it has acquir'd a certain degree of perfection or it may be found that animals increast vegetables or vegetable matter, so that the same kind of animals produce figures of diff.t appearances. The Kingdoms being seperated & our view directed to the human Economy we shd. next enter upon the Anatomy of it, & we have already examin'd fully the Structure of every organ, & likewise y.d principles of the circulating mass. — We are also acquainted with all the powers of motion w.ch y.d anim.l exercises; & I have likewise consider'd the effects of that motion, & it only remains on this subject to mention the discoveries Authors present us with respect to the powers of the heart. —— The power of the heart is evidently very great, as it assists in pushing on between 60. & 50. pounds of blood, as we learn by eying the parts of Animals, or from bleeding finding as in the Experiments of Dr. Hales that you can draw off from a wound in a large vessel of an Animal 1/10 part of its weight, so a man weighing 200. pounds, will. only die after he had lost 20 pounds of blood, & after death the muscles very nearly retain their Colour, may when Hales fixd a Tube in the Carotid Artery of the Animal, the blood rose to a consid.le height, so we must suppose more remain'd than was drawn off. Then the motion of the blood is with consid.le velocity seen in the veins of the Animal, next the heart being supposd to be the only mover, it lifts as it were the weight of the parts of the Body, pushes the blood into the

Body, and even overcome the pressure of y^e Atmos=
=phere. —— As our vessels proceed we find 'em divided
into numerous branches, & these are not placed in streight
lines, least a great part of the force of the heart is lost by
the different turns of the Arteries, Then at last they divide
into branches w^ch not only escape the naked Eye but are
difficultly seen with the Microscope; tho' containing
red particles, & if we may credit calculations made, the
diameter of the last of the red Arteries does not exceed the
8000. part of an Inch, so the surface against w^ch the blood
moves is continually increasing, & entering into calcul=
=ation we are astonished with the number of vessels, & w^t
the surface over w^ch the blood moves in every stroke of
the heart. You have seen that the Ventricle of y^e heart
is able to contain at least 32. of blood, to suppose 32.
thrown out at every stroke, it passes from y^e heart
into a vessel very near an inch in Diameter, the Aorta:
we shall suppose that a transverse Section of it, to be
equal to a square inch, now 60. such strokes & upwards
are given in a minute, or 120. Ounces of blood passes thro'
the heart in a minute, & measuring the blood 2. Cube
inches are nearly equal to an ounce, therefore at every
stroke of the heart 4. Inches in length of the Aorta may
be completely filled: now we can calculate the real
velocity of the blood in the Aorta w^ch cause the heart emits
in a single minute supposing 60. Strokes, 4. times 60. or
240 Inches in length, but the whole of the motion is
communicated in the very instant that the heart is in
action w^ch is only the 3. of the time, so the velocity is 3.
times greater than is commonly calculated, following

such principles. Now so far the number of Capillary vessels are very much out of sight, so let us next find a way of making such a Calculation: the Diameter of the Capillary Artery upon the lowest principles is equal to the 3000. part of an inch, that's we can disprove on the sides of this Column of blood 3000. diff: Arteries, & there wd. be the same number on the other hand, so the number of such arteries as wd. fill the Square Inch would be 3000 × 3000 = 9 000,000. If the extreme branches of our arteries put all together were of the same size with the Aorta, there would be 90. Millions of Capillary Arteries in our Body: but as by the Area of the Arteries is continually increasing, that the branches of any together, make a much larger bulk than the Trunk, then we must know how much the Area of the Ultimate branches exceed the Trunk to complete the Calculation. We do this by observing the rapidity of the Circulation in a transparent part in one of these ultimate branches: & viewing this with a Microscope Hales alledges that a red particle in a single stroke of the heart moves about the 100. part of an Inch, so to carry it thro' 12 Inches 4 800. strokes will be necessary, so multiplying the number we have got by 400. we determine the number of Capillary Arteries to be 3. 600,000,000, & I do not doubt that their number exceeds this, because there are many of a descending Series. Now the very mention of that number, & wt. carries along with it an Idea of the surface to wch. the blood is applyd given the most striking proof of the very great power of the heart & the other Agents promoting the Circulation, & it prepares us for judging of calculations wch. have been instituted on that subject, we find various methods by Authors for determining the force of the heart, but of none of these have approached the truth appears from this, that the disagree very much, some reducing the force to a few

Ounces or pounds, while according to others it amounts to many thousand pounds; but that wch is most generally rec'd & to wch no proper objections have been made is that of Dr Hales. His method by many has been thought conclusive, & at first sight it appears very much so; He fixes a Glass Tube in the carotid Artery of an Animal, observes the height to wch the blood ascends in the Tube, now that being found says Hales, action & reaction being perfectly equal, we have only to determine the weight of the Column upon the Surface of the heart, for the heart pushes up the blood wth the same force wch the blood tends to fall down upon the heart, this principle is no doubt very just: hence he next cuts open the Heart, & observes how many Square feet, or Inches there are in it. Now let us make a small number in order to explain the subject more easily. I suppose that on spreading out the ventricle of the Animals Heart I find it to contain 2. square inches. I have only now to obs. the height call it 100. Inches, it was to 8 foot & more in a horse. I see then how many Cubic Inches wd. rest upon the surface, it is evid. that there wd. be 200. Cubic Inches. I then calculate the weight of these & I find it equal to 200. Ounces, so Haller concludes that the heart acts wth the power equal to 200. By the reason of determining the surface of the whole heart, & by making the calculation of the whole height, is that in any Cistern wth a Spout from the roof of the House, if we fill the Cistern with water & then fill the Spout, the pressure on the bottom & sides of the same, as if we continued a vessel of the same size to the roof. And we likewise do admit that merely arising from the weight of the Blood upon the heart, his conclusion is just. But we cannot apply it to the action of the Heart, for with the pressure wch the heart makes there is a stroke given, the powers of which we certainly cannot calculate, so if I want to find

a Nail in a board with a Hammer, & do not apply the head of the Hammer & press on the nail, but give a stroke; In like manner the action of the heart resembles a stroke, the effect of wch is vastly greater than that of mere pressure, & take it for granted it however vastly exceeds what Hales has calculated. Next we wd. compare the force of the Heart & of our Arteries together, but we shall find it difficult to do so, farther than to shew that when the heart is in motion, the blood is thrown from an Artery of middle size with greater force than when the Artery is cut, but we are not to conclude from this that the heart is more powerful in promoting motion than all the Arteries together: for the Arteries to their ultimate branches are active; & we can't say to what degree that activity powers on the blood; so in a fish the whole mass of blood by the power of the heart is thrown into the Gills, but coming from the Gills it passes on thro' other vessels wch do the office of Arteries, like our vena portarum. Nay in the System of the Abdominal viscera of fish, the veins of the 2nd Circle uniting form the Arteries of the B. Now as the stroke of the heart is lost in the Extremities of the first System, we must ascribe much to the Activity of the vessels. We add the effect of muscles in promoting the motion of the blood in the Arteries as well as in the veins. ——— Understanding now the manner of the motion of the general mass & the force of the Organs by wch that is performd, we wd. next proceed to consider all the uses wch it may serve, but these I have formerly explaind, excepting wch I enter upon now wth reluctance, from my extreme difficulty of drawing any certain conclusion, how far that motion & the heat of Animals is connected, or how far the heat of Animals may depend upon it. We are in reality so little acquainted wth the genl cause producing

heat, that we must find ourselves greatly at a loss to determine the particular causes operating in the human Body, thus we are very sensible that heat on y.e surface of the Earth is much owing to the Influence of the Sun, & yet it is very doubtful whether there be more heat in the Body of the Sun than on the Earth, In like manner we attempt to discover causes of heat, we are apt to say that the friction of Bodies on one another, fluids as well as Solids, or these running together produce heat: & yet I find the very Authors, who entertain these Ideas, propo= =sing Experim.ts so far like in appearance to us, that we wo.d imagine the consequences of all ought to be the same: & yet in making an Acid, there is a violent motion & heat produced, but in making others, as in dissolving neutral salts in Water, the Acids with the Alkalies in general, we see similar motions, & expect similar Effects, but are disappoint= =ed & find extreme degrees of cold produced, what account then are we to give of the heat of Animals? Various Opinions are propos.d wch are plausible at first sight, & yet examining further they are loaded with difficulties and Objections. — 1.o The Putrefaction, is propos.d by some as the principal Cause, we find the Vegetable substances heap.d together contract heat, & being afterwards put into a Retort and distill.d they approach nearer to the texture of Animals than they did before, & Animal Bodies run into putrefaction after death, may & have no doubt of. animal substances very much putrefy.d do likewise, like a Hay stack produce heat; so on cutting into the heart of a Whale wch had been a fortnight under water, & found a heat wch I ascribed to a degree of putrefaction: but in smaller subjects expos.d to

putrefaction we do not observe that because y. Atmosphere of other bodies around carry off the heat perhaps as fast as it is generated, or nearly so. But we are surely not to apply this for explaining the heat in our bodies in a healthy state, for if y. were the Case, & that the heat is check'd by the vegetable Substances we are continually throwing in, we sh. also in very different degrees at diff.t times, according to the having taken or wanted food for a length of time, or according to the kind of food; whereas we are sensible that when we have taken or wanted food for a length of time, or according to the kind of food, that when we have taken the most Antiseptic Substances, as a large Quantity of Wine or Spiceries &c. the heat of our body is increas'd, or we find that after an Animal has fasted very long there is no great increase of heat, then don't we find that we can at pleasure increase the heat of our body by running a few yards & that on stopping it cools, whereas if this was owing to a putrefaction of the humours, it wo. increase, & in like manner heat is generated in particular places where the whole body is not affected, whereas it wo. be equal in all if it was owing to the putrefaction of the circulating humors, So tho' a tendency to putrefaction disposes to it, & assists in a certain degree I am far from considering that as a principal Cause. Next some have had recourse to supposed properties of nervous fluid or Energy, to an Ether, an Electric matter, a Phlogiston &c. where we have very little ground from Experiment to proceed on, & particularly it is supposed that in the Lungs this heat is produced. Now I think that perfectly evident, that heat at least does not depend altogether on respiration, & that it can be produced independant of it, for tho' an incubated Egg needs y. addition of the heat of the Mother, there is more heat in y. Chick

than in the humours of an Egg exposd to the Air, &
in wch there is no conception, & apprehend that this will
be found to be the Case, that the Fætus to a certain degree
can generate heat, we find the heat can be generated very
suddenly in any part of the body, if a Person blushes he
feels an increase of heat in his face, & that is not a false
Sensation, for another Person applying the hand &c. be
sensible of the same effect, so I apprehend you'll find
that heat is connected with the motion of parts. — The
common way of speaking has been supposd that it is ow.
to Attrition; but in accounting for it from attrition the
various facts have not been laid in view. Authors have con-
=tented themselves with the effect of one Globule or part of
the Blood rolling upon another or against the vessels thro'
wch it passes. But the motion of the body has a farther
effect, there is a general activity of parts, in wch every fibre
& every particle of the fibre plays upon another & the heat
is found the greatest where, whilst the general force of the
Circulation is maintaind the partic. Arteries act wh their
full vigor, it is produced instantly, & supported for a conti.
of time by the Activity of parts in a manner I do not pre-
=tend to understand, but every circumstance seems to shew
this, thus the general motion thro' the Heart & larger
Arteries is one Cause, for if this Languishes, for if the
Arteries languish, the Heart does so too, or we diminish
the heat in an inflamd part by lessening the rapidity of
the blood thro' the Arteries, So when an Artery is tied up,
tho' the nerves exert their powers fully, the Member
becomes cool, tho' there is as much motion
as is sufficient to preserve life: whereas

Symptoms of Jaundice, as the yellowness, these depend upon the Bile having been first secreted and then returned to the Mass.

if we produce a distended state of the vessels by a Topical Stimulus, whether of the Septic, or Antiseptic nature we find that heat is generated, so upon the whole & upon the whole we shall find that heat depends chiefly upon y. activity of the Vessels. Whether the nerves operate in a primary, or secondary way, we are at a loss to determine. But we are not to say they operate in a primary way because a palsied Limb is cold, for that cannot happen without a loss of Activity on wch the heat depends: from this view we may understand in some measure how the heat of the body remains pretty equally in Summer & in Winter, or why it is not increased enormously in a warm bath, when the Body is not losing much, because the heat of the Bath has an effect like to that of the weakness of the Nerves. From the operations described formerly, & adding y. influence wch heat has upon the body, we perceive the necessity of secretion, by wch we do not mean merely the Separation of the component parts of the blood, but with this, further changes wch these by glandular structure undergo, as I endeavourd to prove formerly in opposition to Haller. If his Idea were just, the detaining any of the secreted Liquors in the mass, or forcing them back after they are seperated wo. have the same effect; there we know that the Semen in a Bull alters the appearance of the body, & produces a fator of the flesh. Now if that depended upon certain principles in the general mass we obtain these by Castration, so instead of fator being diminish'd it wo. be encreas'd, & all the other effects of it wo. be more manifest. ——— In like manner the Bile when detain'd by a obstinate Liver does not produce y. common

Lecture 11th

Hitherto we have considered the human body chiefly as an Hydraulic System, we are now proceed to trace y. connexion between the Body & the living part, & to understand the ways in wch the living principle is rendered sensible of impression made, or injury done to it, & the means by wch in consequence of such Impressions it performs its motions: & I shall as a supplement to our course take one of the Organs of our Sense the Eye, & formerly took it for granted that a picture of the Object we look at is formed on the bottom of the Retina Eye. So I would now consider the manner in wch such an effect can be produced, for unless every circumstance with regard to the Eye be understood, cases occur where you can neither judge of the Cause nor the Cure in a proper manner; You know that any luminous body as a Candle, scatters its Light on all sides, particles of Light are thrown out from it, wch run in streight lines, for if any object be interposed, as a Crooked Tube, we can't see thro it. as it proceeds then, it gradually grows fainter, because it scatters, & that in proportion of the Squares of y. distance, Next the light falls on a Body, wch it does not penetrate, as a plate of Silver or a Mirror, it rebounds from it, or is reflected in the same direction in wch it falls, just as when one strikes a Ball on the Ground it rises at the same Angle on the opposite side, But if the Substance allows the Light to pass thro' it, & if it pass streight upon the Substance, it keeps its direct Course, but if it strands it is found by experience that it makes an Angle, where it enters inwards towards the perpendicular, if it passes into a deeper Substance, & the turn is with a few exceptions proportioned to the Density

of the substance. Now you all know that with.t having made much reflexion about it, for if a streight Cane is dipped into water it appears crooked, or if you fix a Shilling with a bit of wax to the bottom of a vessel then walk backwards, till the bottom of the vessel intercepts your view, on pouring on water it immediately seems to rise near the surface: or if you look to a fish in water, he is always deeper then he seems to be, so if a person is to try to shoot a fish under water he must point lower than it, now as the ray passing from Air into water is turnd towards the perpendicular, so when it passes from water into Air it is turnd away from its perpendicular. Now on that circumstance depends the power of the Eye in collecting the rays of Light, & we can readily trace from this the Crystalline Lens, the middle line falls perpendicular, but the rest fall in a slanting direction, & y.t only difficulty here is to find the perpendic.r to do this we draw a line from the Centre of a sphere & wherever y.t strikes it must be exactly in the middle, & in this way we find the focus of all the rays, & we may form the figure of any object, with all the humors of the Eye, collected upon the retina at the bottom of it, & we also y.t figure inverted, cutting of a part of the Sclerotic Coat behind.

Now let us in the Eye trace the rays of Light, & obs. the use of every part, suppose them coming from a Dart, or any thing from two ends different, one ray falling perpendic.r passes directly thro' the Eye & comes to the back part, the other rays undergo turns. If a ray falls very obliquely it is perhaps cast of altogether, but suppose that it penetrates at the very entrance into the Eye, the

principal turn is made by the Aqueous humour:
yet we speak and justly, of the Crystalline lens,
as being the principal Organ that makes the turn,
because if it had occupyd the anterior part of the Eye,
the turn wo. have still been greater, now to find
what turn the ray I am tracing makes towards
the perpendicular I have only to get the Center
of the Cornea, & draw a line representing a
perpendicular. Now as the lens is more dense
than the Aqueous humor, plunging to y. bottom
of water, & has more of the Oily sulphureous
matter, so will give the rays a greater turn ther
in proportion to it's density, there is a second turn
made as the rays enter the lens towards the Centre.
Next the ray passes into the Vitreous humour and
rather prevents the rays from meeting, being more
rare than the lens; but 2dly. elsewa first that
the more different these are in density the greater
the turn must be. The vitreous humor is dense
rather from necessity than from the choice of natwe;
for merely to give the rays their proper direction
Air substituted wo. have made the turn greater;
but a tough substance was necessary for a Cush-
-ion to support the lens, the density however is
less in such a proportion, that the turn is envied.
for the Ray runs away from the perpendicular
turning still more inwards. Now considering
it in this manner we explain a circumstance
wch tho' described is not accounted for, that the
posterior parts of the lens make a greater

Curve then the Anterior, for in proportion to the curvature the turn increases, so all the rays are brought to one point, & here we have the head of the Dart accurately represented we suppose, & we might trace the Rays from the point in like manner, as the Darts situated opposite to y. middle of the Crystalline Lens, on the outside of the Optick Nerve, & you observe that the object is inverted. How comes it then that we see the dart in its true place, or comes it that every object is not inverted? The solution is simple, & most Authors have perplexd themselves to no manner of purpose: The Explanation has been given by Des Cartes, by the comparison of a Blind man searching his way with a couple of Sticks, if you take a couple of Straws and cross them, & touch one substance with the one, and another with the other, tho' that w.ch is undermost affects the uppermost hand; you know that it is undermost from the direction. In like manner I know by an instinct of nature with.t reasoning, that no ray can fall from an Object on the bottom unless the Object is above it, so we judge entirely from the Situation, & direction in w.ch the Rays have come from the Eye.

Next you know Images grow less in proportion to the greater distance the Object is remov'd from us, but when view'd thro' magnifying Glasses they remain equally distinct. Why then do we see a near Object better than a distant one? Porterfield &c. acc.t for it from y. Substance floating in the Air intercepting many of the Rays. But I have no doubt that the Effect wo. be the same in Vacuo. The reason is that the Impression is multiply'd, if the Distance be double, the same picture from the nearest distance is painted on four times the Space

and in every part of that space y^d impression is as strong as where the size of the picture is diminished, so 3 times the surface of nerves is impress'd & multiplying the impression is the same as the increasing the sensibility of the Nerves. ——

We next consider the way in w^ch the Eye adapts itself to objects at different distances, some have denied that we see an Object perfectly in any one place, because they cannot see Instruments by w^ch any change can be made. Others suppose the Nerve to alter its shape by means of a muscular power in its Layers & Fibres, others again, that it is lifted forwards by the Ciliary processes, others acc^t for it from the Iris altering the convexity of the Cornea &. but these operate very little in vision, & I suspect it will be found y^t there is not only an alteration, but those who have had the Crystalline Lens couch'd see nearly as well as others, that is we accommodate the Eye chiefly to the distance by the action of the Iris allowing more or fewer Rays to enter the Eye, that there is a real change of the Eye is clearly proved by Porterfield, tho' he has mistaken the manner of the change, He makes two Slits in a bit of Card, & the partition between them not more than the breadth of the pupil, now if you shut the left Eye, & look thro' the hole with the Right, you see one Candle only in one situation, but in every other you see two Candles, now this seems to be one place of perfect vision, & in all others the Vision is imperfect. But now if, while the

head is so situated you open the left Eye, you have a single appearance, & there is a real change of conformation made on the first: or place two pins in a streight Line, & looking at the nearest you see the parts of it distinctly, but the parts of the other become obscure; & fixing your Eye on the farthest off, the parts of y.e nearest become indistinct, i.e the Eye has altered its conformation Porterfield alledges that it can adapt itself accurately within 27. Inches, but I find that the limits of distinct vision extend to the distance of 10. or 12. feet. but as to y.e means of alteration every one of these cannot have the supposed effect, the muscles act unequally, y.e Sclerotic Coat in some Animals is Cartilaginous, so we cannot suppose the smallest change to be made in the Eye, but all Animals possess the motions of the Curtain, w.ch is exercised in a more extensive way than is commonly imagined, but when you view minute Objects near to the Eye the motion of the Iris can be observed: the effect of this you will judge of very readily from trying to lessen the Aperture in viewing a near Object: thus if you bring a small printed Book near to the Eye the Letters are intermixed, but if we clap between the Book & the Eye a Card with a small hole in it, I read y.e Letters distinctly Hence the purpose of a Microscope by cutting off the superfluous rays w.ch fall obliquely, & disturb the clearness of the picture, so this Power of the Eye chiefly depends upon the Motion of the Iris.

Now after explaining what is proper to one Eye, you understand the reason of short & long Sight, Elderly people are longsighted, others again are short Sighted, &

we can discover this by looking at the Eye, there is a greater roundness in the Cornea, so the focus falls before the Retina, between it and the Crystalline Lens, & they must bring the Object near to the Eye, by w.ch they throw the focus farther behind the Lens; now if a person professing y.e 2d degree of sight, was all at once short sighted, Objects w. appear much larger to him, as in viewing an object w.th a Microscope w.ch only enlarges our Conceptions with regard to it, we know that we can see an Object at a moderate distance, of 6. 7. or 8 inches, distinctly, If then I see any object very distinctly, I conceive it is at that distance, & if the Object can't be seen at such a distance, we conceive that it must be of a cert.n size, so we suppose it magnify'd with the Microscope; if again my Eye is too flat, the focus falls behind the Retina, so daily people assist themselves with a Convex Lens to bring the rays near together, whereas short sighted people use a concave Lens, that the Eye may collect them in the proper place. Now why have we two Eyes, since we can collect y.e picture & distinguish Objects with tolerable accuracy, 1.o accidents are guarded against by the Decussation of the Optic nerves, 2.nd the impression is multiply'd, we see better with the two Eyes than with one. Reading Haller who has y.e misfortune of being short sighted, so brings Objects so near that he can use one Eye only, he wo.d persuade us, that we only use one at a time, but we use both, & reap the advantage of seeing much better, & of judging w.th more accuracy. Besides a farther use is alledg'd by Porterfield, That we judge of the distance w.th one & judge of the magnitude, supposing the distance equal, but by directing the two Eyes to the same point, we take the Angle w.ch is formed, & from an instinct of nature

we judge of its distance. So you may try the Experim. of shutting one Eye & trying to pour out a dish of Tea, or to introduce a crooked stick into a Ring, you will do it difficultly with one, & this is not from the want of habit, for the person with one Eye never does it with accuracy, tho' better than we do upon the first trial. If the Eyes happen not to fit exactly, if the one has a conformation different from the other, we use but one, or the Person from this Circumstance gets into the habit of squinting, tho' this may depend upon a real dislocation of the parts of the Eye, from the Crystalline lens being plac'd too much sideways &c. but generally there is not the smallest room for alledging this, for on shutting one Eye the person can look straight with the other, he only turns one aside when both are open as confounding the impression: now if y.e is attended to it leads to an attempt of cure, as that y.e strong Eye tells by Habit the weak Eye acquires equal properties, & in this way we may succeed in curing y.e Complaint.

The last Question here is. How it comes that with two Eyes Objects appear single? I imagine that a great deal has been wrote upon this Subject to very little purpose. Nature from y.e first moment of seeing teaches us to judge in y.e way, we are conscious that the Eyes are directed to the same point, by an Instinct of nature we turn them to the same Object, as our 2 Eyes serve as one, besides we see the same appearance, the same sets of points present in the same situation, & it is impossible to conceive two objects absolutely similar, & we trace the rays from the place where the stroke is given. By habit indeed a further circumstance is added, that impressions are made on the same parts of both Eyes, so tho' we are looking at one Object, if one Eye is convulsed, & the muscles affected, we seem to see

two objects, the impression coming in a place y.t has not been us'd to it, just as when we cross the fingers on a pea & roll it, we judge there are two, because it comes to touch parts to which naturally it would not be contiguous.

Lecture 119.th

The various Operations we have consider'd wearing down the Solids of Animals, & continually altering & dissipating the fluid parts, render a fresh supply necessary for y.e continuation of their Life, & this you know is sought for from y.e vegetable, or from the Animal Kingdom. Wisely nature seem intended for both, this appears whether we confine our views to the Structure of the Body, the general custom of nations, or Analogy w.th similar Animals, you already know the mechanical Operations w.ch the food undergoes, & the gen.l appearance of the Liquors w.ch are mix'd with it. It only remains y.t I attempt to explain the manner in w.ch the food undergoes we take in, in its being dissolv'd & at the same time render'd safe for being receiv'd or assimilated to the connexion.

You will be entertain'd in considering this subject, to find nearly the same opinion propos'd 2000. years ago w.th regard to digestion, that are given by the present Writers, upon the whole the following Circumstances seem chiefly to occur.

1.st Our food often undergoes considerable changes by y.e Arts of Cookery. Next we join to the food, a certain pro=portion of drink, whilst it passes thro' the mouth, besides the mandication it undergoes, there is a consid.ble mixture of Saliva, & Mucus with it: within the Stomach it is in=corporated with the drink, & it is there subjected to not only the action of the muscular Coat of the Stomach, but

to the agitation of the Arteries, running upon its Axis,
& to the alternate motions in respiration. At the same time
it is exposd to the heat of our body, wch. joind to moisture &
motion we must suppose to have an effect to a certain extent.
But we are by no means to conceive y.t the circumstances
I have mentiond are the most Essential, for with.t almost
any of them Digestion takes place, in one or other of the
kinds of Animals. The chief cause is the humours of the
Stomach acting as menstrua. Thus Dr. Young has shewn
in his Thesis de Lacte, that the humours of the Stomach of
Animals before they have tasted of food. i.e. in the fœtus
state, possess the power of curdling milk, he shewd this
even in those Animals that never of taste of milk as their
natural Aliment, as the Birds, So this gives a suspicion
that this humour is materially different, from y.e merely
watery parts of the Blood. Next Anatomists of the last
Century have observd in fish, the parts of the lesser kinds,
even the Bones melting down in the space of a few hours,
that the part included in the Stomach was dissolvd whilst
the part lodgd in the Œsophagus remaind entire: I have
mentiond the Experim.t I made on a dog, of giving him hard
Bones wch. were dissolvd. In the ruminant Animals again
we find the inner coats of the several Stomachs differing from
one another, & we find the food in different states within
these: next we have seen that the Appearance of y.e Stomach
in different kinds of Animals varies according to y.e nature
of the food, & in fact it is found to possess very diff.t powers.
So Baumeus inclosd grain & flesh in Cylinders of Iron
perforated with holes, & gave them to the Carnivorous and
granivorous Birds, the flesh in the Carnivorous soon

milled, and the grain in the Granivorous, but removing the Experiment the change was much less perceptible, so the Liquors of the Stomach evidently act as powerful Menstrua, To this Mr. Jn.o Hunter has added very consid.e weight, by having observ.d that in the Stomachs of Malefactors, the Coats of the Stomach itself were dissolv.d: from this he justly infers that this power of the Liquors remains after death: but he has carried the matter too far in supposing y.t it never acts but upon the dead body. I have observ.d the destruction of the Coats of the Stomach in a few persons, but I consider this rather as the effect of the disease not conceiving that y.e Quantity of the Menstruum wo. have so great an effect after death. In one case there was great reason to suppose y.t the change had begun during Life, a Lady of abt. 70. years of age had considerable Oppressions & pain abt. the Stomach & died suddenly, the body was open.d 30. hours after her death, & the Coats of the Stomach were found destroy.d, so I suspect that this might happen before Death: and parts of living Animals, as eels, have been found dissolv.d in the Stomach of fish, while other parts remain.d alive in the Throat: so this may be a source of disorder, at least the circumstances will merit attention. To the several Cases mention.d I think there is reason to add the effect of the progress, w.ch for want of a name sufficiently expressive we call fermentation. On this Subject the Experim.ts of Dr. Macbride are y.e most satisfying. Sir Johan Pringle has suspected an Acetous fermentation, & Vinegar to be found: but the first Effect of the fermentation is to produce a sweet substance in Opposition to sours, & this forms new combinations in the food, & assimilates it to the Constitution, & the changes on our food

are much more sudden than in the imperfect imitation of Sir John Pringle; In the rest of the Alimentary Canal y.e food continues to undergo similar Operations as appears from the different length of the Alim.y Canal, in the Herbivorous Carnivor.s. for if the process of digestion were compleated in the Stomach the different lengths wo.d not be so observable, & in the herbivorous kind, the Intestines receive the addition of some Liquors that seem to resemble those of the Stomach, it receives a farther supply of Saliva from the Pancreas, & a quantity of Intestin.l Liquor from the Extremities of the Mesenteric Arteries, like that in the Stomach. & farther it receives the Bile, but the use of that is so little understood, y.t I wo.d avoid saying anything about it. the Canal by means of it is solicited to contraction, but farther in all Animals the Duodenum is larger than the Continuation of it, it descends & returns again & the food is purposely stopp'd. but such impediments may by no means necessary for stimulating the Canal only. —— After the food has undergone the proper dissolution it is taken into the Constitution by y.e Lacteal Vessels, & mix'd with the mass of blood, & all the farther changes made upon it have been mention'd as far as can be done w.th tolerable Certainty. After the Digestion of the food we are led to consider two other Circumstances w.ch were equally with for the growth of Animals, I mean first the somewhat w.ch from the Experim.t mention'd on fish we seem to receive from the surrounding Element. The other Circumstance is the State of Sleep, w.ch is intended for recruiting the Animal as much as Digestion itself, But on this I shall make only a few Observations, sensible of y.e difficulty when we attempt to go far. What I mean to allege is that the proximate cause of sleep is very gen.l misunderstood

Physiologists seek for it in mechanical Circumstances, whereas these merely induce a disposition to the State: if the Animal receives a quantity of food tho' of the mildest nature, it soon grows drowzy, & from instinct disposes itself to Sleep: And the Inclination to sleep continues for a consid.ble length of Time, like we might suppose that the Crude humors receiv'd have been subdu'd by the Vessels of the Animal: next you know that bodily labour brings on Sleep, & that attention of mind on the contrary quite throws disposes to a wakefullness, but it disposes to these & does not produce them: The proximate Cause of Sleep is somewhat we shall never comprehend, it is an Instinct of nature, by w.ch we relax mind as well as Body from y.r full Exertion of their powers, we relax every power w.ch is essential to life. We can therefore go no farther than to shew the Circumstances w.ch give the disposition, & it is unnecessary to mention more than the most common. — When we now review the Operations of the Animal & recollect that the heart & Brain act upon each other in a Circle, that we are at a loss to distinguish Cause from Effect, & now we observe that the Animal possesses not only the power of repairing the real waste of its Substance, but of relieving the Solids of y.r body, from their full exertion, & allowing them to recover their tone reasoning in this manner we wo.d conclude an Animal to be made for immortality, & we learn the Contrary more from Experience, than from reasoning: but supposing that not only from the general Appearance this Conclusion were just, but the Animals were so constructed, that the waste & the repair shd be exactly

made to balance each other, still we see the necessity of Animals possessing the power of generating their like, or continuing their species. Extern. accidents do render this necessary: but to take things as we find them, that the different genera & species of Animals are limited to a certain duration, only w.e the power of the Creator is more manifested, than in the former supposn. of all lasting for ever: because the waste is measured out in a nicer manner, that to a certain period of life the repair generally increases it, then from the middle period downwards the contrary is observed: but taking things as we find them, the Creation is more diversified, appears more beautiful; & one Generation is armed with rearing the succeeding, so the race of Animals is not maimed with the unavoidable accidents of long life.

Lecture 120.

In Generation some few Animals produce their young by shoots, as vegetables do, where the heart & brain are wanting. In some others an individual possesses the powers of generating its like. But for the most part two Animals, Male & female assist & cooperate, where the Animals are Hermaphrodite, as in the case of most of the Worms. In former parts of the Course I have so particularly explained all the facts & deduced conclusions with respect to generation, that very little now remains, except that we consider how far the Rudiment can be supposed to proceed from the Male

or from the Female, & as connected w.t Generat.n
of we consider the Cause of the Menstrual flux
in Women. ——— The Rudiment of a fœtus is so
exceedingly small that we must judge as much by
reason & Conjecture, as from direct Experiment; many
have supposed that the rudiment comes entirely from
the Male, that the Female furnishes merely a lodge-
ment to it: while others suppose the rudiment to
pre-exist in the Female & to be.n into life by the Male
influence: now the first opinion was in a great
measure founded on the appearance of y.e Male Semen
set before the Microscope. We obs.d in it Corpuscles
shaped very like to Tadpoles, with a round, somewhat
oval shaped head, & a tail nearly in proportion to it,
now these possess motion, move with rapidity and the
motions they perform are accompanied w.th vibrations &
bending of the tail, if two Corpuscles met together
they turn sideways, may the same Corpuscle beyond
a doubt alters its Course, after running a certain way
forwards it turns again; So that any one seeing them
has the same belief of their being living Animals y.t
he has on seeing fish move in a River. And I w.d obs.e
that the History given of them by Buffon w.th m.ch seeming
Accuracy, is from beginning to end a mere Romance.
I deny that there are any such evolutions or changes
as he describes, but in the first instant they appear
the same as in the last, & when in an hour or two after
the motion ceases, the Corpuscles are seen, they remain
in the Liquor: after a longer period they disappear, but
no others come on in their place. Nay tho' I believe

that they are living animals, yet I do not imagine that each of these is a foetus in miniature, y. motion is too violent and rapid, the figure is different & suppose that we co. not perceive any thing like these in the body of a female, I wo. not conclude that y. rudiment was from the Male. There may exist in y. male semen as a fit medium for them, just as we find Eels in Vinegar, with. supposing that the acidity of the Vinegar depends upon the Eels. But Buffon if his experim.ts may be credited, has seen the very same appearances in the Ovarium of a female. So the very foundation of this Opinion is set aside, & we must judge from other Circumstances. Upon the whole in one particular Genus of Animals, as the Frog, I obs. that there are Black substances in the Ovarium perfectly corresponding in their Color & gen.l shape w.th the Tadpole, & this before conception in very young frogs. From this the Idea of Haller that the Rudim.t exists in the female, in this Genus receives a fair proof: at the same time if we are to speak in general & more especially w.th regard to the first Class, I wo. doubt of the Opinion very greatly, for this plain reason y.t if from accid.l Experim.t or disease, there be any interruption in y. passage leading to the uterus from the Ovarium there is no Conception. Next we never obs. y.t from an imagination of the female however strongly operated on in time of sleep, a conception arises. Next there is a resemblance to the Male as well as the female in the foetus. We might conceive the Rudiment to come from the Male alone, & yet to resemble the female

from the lodgement and length of time it is connected. but if it comes from the female alone, there is no means left for explaining this circumstance; We observe the likeness in all kinds of Animals, in some more remarkable than in others, or if different Species of the same Genus engender together, we find that the fœtus is a perfect mixture of the 2. & I have no doubt that the same thing wd. happen without any of the external senses of the Animal intervening, as Mule that is blind wd. produce as an Ass a Mule as certainly as one that sees. There is therefore reason to believe that at the very Instt. of Conception there is a real mixture of Male and Female Influence in the manner we shall never be able to comprehend: but it is as necessary to the production of a fœtus, as the Mixture of an Alkali with an Acid is to produce a Neutral. —
The other Circumstances remaining now to be mentiond relates to the Cause of the Menstrual Flux of Women, You know that Generation happens only the Continuation of it. ——
Before we enter upon the Cause let us recollect a few Circumstances demonstrated of the Structure. Some of the Skinwise most accurate Anatomists, as Magagni have given wrong Ideas of the structure of the Uterus, we have found in it Arteries wch. in some places are very much Convoluted, and wch. at last end by opening mouths within the Cavity, while the Lateral Branches from y. Artery communicate

with corresponding veins, & these communications are so small that we do not perceive 'em w.th the naked Eye. We likewise find branches of veins opening into the Cavity of the Uterus, so we observe a structure a good deal resembling that of the Corpora Cavernosa of the Penis, or of the Clitoris. The Circulation may go on between the Artery & the vein with.t an effusion into the Cells of the Penis, but whilst it goes on there may be an effusion into the Cells, & a passage of the blood from the Cells into the veins: now this is allowed also in the Uterus; for there are no Sinuses such as Morgagni & others have spoke: They imagine that an Artery goes into a larger Cavity, & that a vein comes out from that Cavity, & from the Sinuses a Canal, leading to the Cavity of the uterus, but we can trace the Arteries Cylindrical, the whole way, as also the Veins. —— Some have supposed the Menstrual blood to be Venous, & if a violent exertion be made the blood may be pushed back from the Trunk of y.e vein into a branch, & the order of Circulation for a moment inverted, but for ordinary we must conceive that Menstrual blood to flow from the Extremities of the Arteries: & as it has no Receptacle, that it is pure & of the same kind with the rest of the circulating mass. Next let us attend to the Phenomena. It begins generally in this Island about the 15.th year it is preceded by a general uneasiness, the body being at the same time in a state of growth, & not yet come to its Acme. The Appearance is altered, the face changed, they complain of uneasiness in the breast, pain in

the head, & Complaints about the stomach, while later they feel shooting pains down the limbs, with an uneasy griping pain in the Intestines, & heat about the Regio-Pubis. —
Then the flux succeeds, at first more irregular in its appearance, but soon coming to be remarkably regular, and generally happening in every Lunar period, about 13. times in the year. In many it is preceded ever afterwards with the Symptoms described but in the greater number these are very slight, that the flux happens before the person is aware of it. — or she is only aware of it a few hours before. In time of the flux there are evident marks of Languor and debility, the Eye appears hollow, the face pale, & there is a colour around the Eye. —
This appearance of Languor ceases, nearly, with the flux, & when it is over, there is no Symptoms of weakness felt. Women that live full & take little Exercise discharge a much greater quantity of blood than others do, & sometimes the periods are more frequent; if a woman gives suck the flux generally ceases, tho' there are some instances of women who menstruate & give suck at the same time, & that without any bad consequences. —
Now what cause are we to assign for y.e disch.e
The frequency of the periods corresponding with the Revolutions of the Moon gave rise to the Opinion among the Ancients, that the flux

immediately depended upon the influence of that
Body, & Soon it is not easy to reject this, & wd. allege
that many more women menstruate at the new & full
Moon than at any other period. At the same time as it
appears at every period of the Moon, & that we find y.
it is not menstrual with many, but happening twice
in the Month, or once in 3. weeks, there is still some
more essential Cause: I avoid causes that are but
little attended to, as evidently wanting a proper found
=ation, as the Venereal Appetite &c. I shall chiefly state
two Opinions wch have chiefly divided Physicians.
The most Ancient & the most genual is that the menstrual
flux is owing to a fullness of the Blood-vessels of the body,
or to a plethora of the whole System, whilst others imagine
that the cause depends upon a local or uterine plethora, y.
the Uterus by its structure accumulates the blood with
the rest of the body being primarily & principally affected:
Now before saying any thing on either Opinion, I wd. obs.
that the Arguments on either side have been stated wrong.
It is admitted by Authors as a fact that men as well as
Women are subject to Plethora. But I can't believe that
Nature orders any thing in vain, & I see no ground for
supposing that men are disposed to too great a fullness,
they have that wch is useful to them & no more: nor do they
argue as our vessels were a mere System of Hydraulic
Tubes, without attending to the powers of Motion, and the
consequences of this. Keeping to the most material Ar=
=guments, I shall begin with stating the Objection to the
genual plethora. They tell us that instead of finding

Symptoms of Plethora at the time of the flux there are evident Symptoms of great debility, now the signs of debility never precede the real beginning of the flux: they only attend it, perhaps the Languor and Oppression are felt before the Menstruation but I apprehend not before it has made its way into the Cavity of the Uterus, which possesses an Exquisite Sensibility, capable of disordering the whole Oeconomy, & here two circumstances are to be held in view. 1st. the effect w.ch the blood in an unusual manner trickling down into innu surface & distending it: the other is the effect which a fullness any where in the vascular System is apt to bring on. So robust persons have nearly the same languid look while blood is flowing from a vein, tho' the quantity is small, & they themselves not under the smallest apprehension. Next they tell us that the quantity discharg'd is not so considerable as either to produce or remove the bad effects of plethora, not exceeding 2. 3. or 6. B. but we every day in feverish disorders obtain great relief from letting that quantity of blood. We are not merely to say we take in more drink, the effect of the drink & of the blood may be opposite: the one may heat & irritate and the other may serve to cool the body. They observe next that the same discharge sh. take place in every female Animal; but this equally makes against

the other Supposition of the uterine plethora without adding that in Animals at the proper time for conceiving there is in reality a discharge, besides a real difference w.ch I remark'd between the connexion of the Tubes to the quadruped, & to the human body. Next they tell us that if there was a general plethora we would be able to prevent the flux & every bad consequence attending the want of it by letting a few ounces of Blood. Now this Argum.t will only apply to the Hydraulic Machine, but it is not conclusive when we speak of a living & animated Substance professing the powers of our Machine, where the repair is in proportion to the waste. Suppose that the vessels of the Uterus have yielded to the general press.e & fullness, an irritation & thrown into a more violent action, & letting a few Ounces of blood from the arm is not sufficient to remove the Irritation any more than the cutting an irritated nerve is sufficient to remove all the Symptoms w.ch the irritation of the nerve has produc'd, & tho' about the middle period we let a quantity of blood, the menstrual flux comes on at the usual time, for unless our bodies nourishm.t in proportion to the drain it would never recover the loss of Substance And if the period of the flux be near, women in general are averse to blood letting because the general Experience has prov'd that it is hurtful. Next we are told that persons in whom there is no plethora, as Phthisical People, menstruate very readily. Now first, supposing this to be a fact, tho. not we make allowance for y.e gen.l relaxation of parts w.ch then takes place, the Uterus has a larger Bed than any other Organ, & being in a relax'd state the Blood readily forces its way tho' it, still more so in the Phthisis when there is a degree of putrescency in y.e humors

& the whole System is irritated, we must make an allow-
ance for the force of habit, wch is very powerful; & in fact
the Menstrual flux very often ceases in persons that are
much reduc'd & weaken'd by disease. & in like manner they
tell us that after a woman has been deliver'd there is a great
loss of blood, & yet that the flux soon returns, but the time is
more distant than is alledg'd, never almost till a Month,
6. or 8. weeks, & the surprize is rather that it is too late,
because habit at least during the pregnancy has constantly
prepar'd more than is sufficient for itself. They next observe
that if the menstrual flux be obstructed, the uneasiness
produc'd goes off in a few days, an attempt returns again
a Month after, there is a struggle and uneasiness for some
days wch too ceases. Now if it depends upon a general
Plethora the Oppression should increase in a gradual pro-
portion, because the blood wd be more accumulated, but
the very disorder of the body in the struggle has in some
measure the effect of the flux: and to shew that wch struggles
may proceed from plethora & go again, & again return with-
any discharge, if a person is in the habit of drawg blood
at regular times, he feels an uneasiness wch goes off again,
but again returns. Next they alledge that this Plethora does
not answer its purpose, because if but 5. or 6. ℥ of blood
is accumulated, that in 9. Months makes but ℥45. where-
as the Fœtus weighs three times as much. Now this
Objection will vanish when we consider 9. consequences.
Supposing that the full quantity, & in due proportion had
been discharg'd each month, there wd have been 9 days
in the first months, when the Fœtus was not able to con-
sume it, an Abortion must have taken

place, whereas by striking a Medium, the fœtus does not enlarges increases the power of the Mother in collecting what is necessary; now so far of the Objections against a general plethora. Next I shall mention a few Objections against the supposition that the plethora is merely uterine & that the rest of the body is not affected; I begin with observing that the very Languor admits of a more better Explanation, on the former supposition, at least those who adopt the latter have taken no manner of pains to lessen the Objection, why the rest of the body, is so much oppress'd. Next how happens it that the flux comes at the very time the whole body is increasing in a remarkable manner? is there not then a general push upon every Organ, & the flux connected with the effects upon y. rest of the System? or how do we explain the previous Symptoms? for if the uterine plethora be natural & useful, why does that produce such a general disorder? Why does the head & the most distant parts suffer before it appears? Or how does it happen that Nurses do not menstruate? & how is this uterine Plethora transferr'd sometimes to the lungs or to the nose? A. But I w. bring an Argumentum Baculis, a very plain Anatomical fact; that there are no receptacles in the uterus for lodging a quantity discharg'd: I find not in the uterus of women who have died during the flux, any distention of the vessels, nor any place for lodging the Blood, the difference of bulk is not sensible, so cannot exceed ℥j. & the fever ℔j. must come from the general System, & they come with advantage to Women, so more blood must have been contain'd in her Vessels, then was useful, upon y. whole

Therefore it appears that as women are intended to nourish for a number of months the Fœtus as well as their own Body, their Constitution is fitted by Nature in a manner we do not understand for preparing more blood & nutritious matter than is necessary for themselves: hence a necessity of this arises that a portion of this shall from time to time be discharg'd, & that an outlet be given, or we find that larger vessels open into the Cavity of the Uterus, than in any other Cavity arising as an Outlet to the Body. Next the Fœtus in the human body is nourish'd in a manner proper to it, vessels are produced &c. we may compare to the vessels arising from a fresh wound, that stretch out & mix with the parts of the Ovum, or membranes connected with the Fœtus. Hence on this accot likewise we find open mouths of vessels, and as nature is ever simple in completing her purposes, the discharge is made and the Fœtus nourish'd by the same vessels, & unless the Fœtus was apply'd to the vessels, these by giving way, wd. prevent the accumulating of nourishment, & the preparing it in sufficient quantity in y. last months of pregnancy: the full quantity of blood necessary is not discharg'd, but a medium is struck, the Fœtus being as little able to consume &c. in the first months, as in y. last it is able to live upon b. and once the vessels of the Fœtus are entangled by the vessels of the Mother, by the drain the quantity is increas'd: For the vessels connected with the Placenta, whenever the Organ fixes, come to be the largest, just as in the Breast by y. sucking of the Child the Lacteal ones come to be enlarg'd, so every Circumstance in this view seems to be consist-

ent

and the only point doubtful, is whether the Uterus is somewhat better calculated by its structure for accumulating blood than the other Organs: they may be the Cause but there is no receptacle to contain the Quantity of five or six Ounces of Blood. —

Having now finish'd all that I propos'd in the beginning of this Course, and tho' the whole I have made it a rule, considering it as a Duty incumbent on me, to explain myself on every Subject, without the smallest regard to the mere Opinion or Authority of Authors; I hope you will think I have endeavour'd to do so without Prejudice or partiality; & the Freedom I have thought it necessary upon me to use with great names has not been misunderstood, I perswade myself, you are far from thinking that I meant to point out the Authors as more erroneous than others: this is so far from being the Case, that I wod. wish to recommend them chiefly to your perusal, as the Eminence they have justly acquir'd invites: but I thought you wod. be more in danger of being misled by them, than by others, I wish'd to convince you of the necessity of thinking freely for yourselves on every Subject: unless you do so you will neither detect the Fallacy in reasoning, nor clearly perceive the force of Truth. Now that we are about to part, it is quite unnecessary to say anything as a Spur to your future Conduct & Industry, you are surely by this time sufficiently convinc'd that the Profession you have undertaken considerd as an agreeable Science, is an extensive

as important in its Consequences, and that the application to practice will be often found, as difficult to the Physician as it is critical and interesting to the Patient. And as after all the pains we can take to acquire improvement we are often perplexed with doubts, and hurt with disappointment, wch must be embittering to a feeling mind, if there is the smallest reason for supposing that if we had been more attentive, and seizd the proper Opportunities, we would have been better enabled to have discharged the trust of our Friends: but any observations of that kind & well know are unnecessary; your attention all along wch I must chiefly attribute to your own desire of Improvement is a sufficient proof of it: I wish you success in all your several undertakings, and if I can contribute to that, if you will freely let me know, I will always consider such an Opportunity as an Additional

Favour. ——

Finis. ——

Edinburgh January 11st 1776. ——

Index

Index to the 2d Volume —

Monro Lectures

100: 2:

293

Royal Ordnance Medical Library,

JANUARY 10, 1815.

The Time allowed for keeping each Book.

A Folio - - - - - - - - -	3	Weeks.
A Quarto or Octavo - - - -	2	
Smaller Books - - - - - -	1	

N. B. If the Volume is not wanted by any other Subscriber, the Period may be renewed.

The undermentioned Fines are imposed for keeping Books beyond the Time specified.

A Folio - - - - - - - -	3d.	each Day.
A Quarto or Octavo - - -	2d.	
Smaller Books - - - - -	1d.