

An abstract of a course of lectures on anatomy and physiology : as delivered by a professor of anatomy, in London.

Contributors

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A N

A B S T R A C T

O F

A COURSE of LECTURES

O N

Anatomy and Physiology,

AS DELIVERED

By A PROFESSOR of ANATOMY,
in LONDON.

UT AGER SIT, SINE CULTURA,
SIC ANIMUS, ABSQUE DOCTRINA.

CICERO.

L O N D O N :

Printed for the Author, and sold by P. BRETT,
No. 201, opposite *St. Clement's Church*, in
the Strand.

M.DCC.LXXXIV.

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A B S T R A C T

A COURSE OF LECTURES

Anatomy and Physiology

By A. PROCTOR of ANATOMY
in London

THE LANCET, LONDON
CICERO

LONDON
Printed for the Author, and sold by J. B. B. B.
The Strand, opposite to the Theatre Royal
the Strand
MEDICINE

TO
JOHN SHELDON Esq.
F. R. S.
PROFESSOR of ANATOMY, in the
ROYAL ACADEMY,
AND
READER ON ANATOMY,
in *London*.

S I R,

THE distinguished eminence
you hold in your professi-
on, had I no other motive,
would induce me to court your
protection, to this, my first per-
formance.

Your candour will, I trust, ex-
cuse me in making the attempt,
prompted by a wish, of prov-
ing in some degree useful, to the
gentlemen, Students in Anatomy.

At the same time, I embrace this opportunity, thus publicly to acknowledge the advantages, I have received, in this most essential part of my profession, from the instructions, and many improvements, suggested in your lectures. A desire that they may be generally known and frequented, has principally influenced, the dedication of this.

May your future labours, be crowned with the success, your preeminent talents deserve, is the wish of,

Sir,

With respect and gratitude,

Your obliged,

Humble Servant,

London,
Sep. 15, 1784.

The Author,



P R E F A C E.

IT may be necessary to apologize, for intruding on the public, a performance of this kind, when there are so many excellent books already extant, on every part of anatomy, and physiology.

The motives, however, that influenced the author to the publication of this, are such as will always give him pleasure, in whatever manner it may be received by the world.

To obviate a practice, so universally detrimental, of those gentlemen taking notes, who perhaps cannot afford themselves time, to attend more than two courses, must evidently be attended with advantages, if it can be accomplished.

The

The late Mr. Falconar was so sensible of this, that he published a synopsis of his lectures, but it contained scarce more, than the heads of the subjects, of which he was to treat; of course, so dry and unentertaining, as not to be read over, either previous to attending lectures, or after. The arrangement of the lectures, now delivered, added to the preceding circumstances, has rendered that performance, almost totally neglected. How far the present may answer, the candid public must judge.

The author has attended repeated courses, the accuracy of his notes are now put to the test; not but that some of the opinions advanced in it, and some of the inferences drawn from them, are his own, and others are borrowed from authors of respectability; though in a work of this kind, which is intended to be as near the delivery of the professor, as it well can, it was not thought necessary to mark the quotations.

In arranging the matter, unassisted by any person, the author has endeavoured to be as clear, and concise, as possible.

The dedication, and the work, are both entirely unknown, to the gentleman to whom

whom it is inscribed. The motives that induced them, have been already mentioned.

Should it answer the end proposed, the author will feel himself amply repaid his trouble, and intends completing the work, in two other sections.

If on the contrary, it meets neglect, and contempt, he will subscribe to the opinion of the public, not doubting it's justness, nor lamenting his fate, amongst those, who have endeavoured, though unsuccessfully, to contribute to the public weal, hoping it may be undertaken by an abler hand.



ERRATA.

Page 11,	line 20,	for <i>by</i> read <i>into</i> for <i>into</i> read <i>of</i>
48,	20,	dele <i>s</i> in <i>arises</i>
49,	27,	for <i>left</i> read <i>right</i>
53,	12,	read <i>vasa</i>
66,	18,	dele <i>and conglomerate</i>
67,	27,	for 1662 read 1627
96,	23,	for <i>condulos</i> read <i>kondulos</i>
108,	18,	confider <i>They</i> as beginning a fresh paragraph
109,	27,	for <i>expfoure</i> read <i>exposure</i>

N. B. The greek words are printed in Italics,
as they are pronounced.

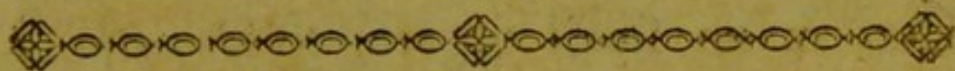
There are a few literary errors, and faults in
the punctuation, which the candid reader will
excuse.



LECTURES

O N

ANATOMY & PHYSIOLOGY.



The History of Anatomy.

THE Term, Anatomy, is derived from the greek words, *ana*, and *temno*, disseco, and simply signifies a section or division of any bodies into their constituent parts. It having been found, that vegetables have organs, as well disposed as animals.

It is divided into two kinds.

Anatomy properly so called ; and which gives the history of the human body :

And,

Comparative anatomy ; which gives the history of other animals, and also vegetables.

The term is now generally understood to signify, a knowledge of the structure of the human body.

To study this art, we are to consider it from it's beginning; and also to enquire after those men, who are distinguished in it. For these purposes, Monf. Portal's *Historie Anatomie*, in 7 vol. and the late Baron Haller's *Bibliotheca Anatomica*, may be read with advantage.

As the antiquity of a science, contributes in no small degree, to it's importance in the world; so teachers always wish to trace their's as far back as possible: to this we are now to proceed.

THE Antients knew but very little of it, and the greatest improvements and discoveries, have been made in the present century.

The sons of *Æsculapius* were totally ignorant of it.

The grecian physicians first paved the way to it's knowledge, but to Hippocrates are we chiefly indebted, for his division of phyfic and anatomy: in which latter he seems to have had some knowledge, but was certainly in several errors; confounding arteries and veins, and nerves
and

and tendons. He was not acquainted with the circulation, nor the animal economy.

A few years before Christ, Plato and Aristotle cultivated anatomy as a science. The latter of these, was the first who illustrated his descriptions by figures, the importance of which, is too obvious to need any comment.

We are but little acquainted with the eastern knowledge of anatomy. The two Ptolemys founded a college for the study of it in Alexandria.

In Galen's works we find, that Herophilus and Erasistratus were cotemporaries and were both men of skill and eminence in their time.

We are unacquainted with the roman knowledge: but the word, *medicus*, we remember to have heard in roman history; and that those men who practised it were slaves, not freemen. Anatomy was not practised there till after Christ. Celsus speaks of several anatomists, and recommends the study of the art.

Galen is supposed to have known the action of the heart, the muscles, to have understood the manner of the voice, and the use of the valves of the heart; and

his observations on the pulse, may yet be read with advantage. He divided the aneurism into two kinds, true, and false; his system was adopted for a period of 1200 years, but his opinions are founded on hypothesis.

In the twelfth century, by a decree of Philip of Spain, no person was suffered to practise physic, but who had studied anatomy.

In the fourteenth century, printing was discovered.

In the fifteenth century, Vesalius was born at Brussels. He was professor of anatomy at Padua, and was the first who gave names to the muscles.

Fallopian was a cotemporary, and made several discoveries.

Eustachius also flourished at that time, and his tables were more accurate than any of the others.

In the sixteenth century, several discoveries were made. Asselius observed the lacteals, and was convinced they took up the nutritive parts of the food; he also named them. Imperfect mention is made of them by Hippocrates and Herophilus.

Dr. Harvey, physician to King Charles the first, discovered the circulation of the blood

blood. He was succeeded by Fabricius, and others

Vanderlinden attempted to prove, Hippocrates understood the circulation; but it is certain he did not, as he compared the blood circulating in the body to a circle, and paid no regard to the pulse.

Galen was never mentioned as an opponent, though he came nearer the truth.

Erasistratus made several discoveries, but he thought, when the blood went into the arteries, a fever ensued.

Vesalius has some pretensions to the discovery, but, beyond all doubt, to Dr. Harvey we are indebted, for the discovery of the motion of the blood.

The pancreatic duct was discovered about thirty years after, by Wirtfungius.

And about the same time, the thoracic duct was discovered by Pecquet.

Ruyfch flourished about the same time, and made several useful discoveries.

The Royal Society of London, first introduced medicine amongst them.

Dr. Lower attempted to use the blood of one animal for that of another; but this was discovered by Abasius. In large hæmorrhages of the uterus, &c. this might be serviceable; but this doctrine
was

was hastily taken up, and as hastily laid aside.

WE now come to consider the state of the science in different countries.

In Italy, Malpighi was much celebrated, and first used the microscope; but at present, it is on the decline there.

In Switzerland there is but little done.

In France, Riolan's method was adopted, and societies established. Winslow, a dane, was the principal writer there.

In Germany, till lately, little was done: but the number and value of their works, is now, greater than that of any other country.

The most celebrated german professors are, the late Dr. Heister, the late and present professor Meckel, Scarpa, and others. Amongst them, Liberkuin; who first discovered the origin of the lacteals, the valve of the colon, and it's use: vide his works published by Sheldon.

The late Baron Haller improved the science, more than any man of his time.

In Holland, there were many excellent authors. Bidloo composed an original work; and the great work of Al-

binus is unrivalled.

In England, Glisson, Cowper, and many others have distinguished themselves: amongst them, the late celebrated Dr. Hunter, and Mr. Hewson. But here, ingenious experiments on the animal œconomy, are more cultivated, than anatomical descriptions.

It has always been customary for the professors of anatomy, to mention the best authors, on the different parts of the science, and they are allowed to be the following.

Keil, and }
Cheselden, } with Winflow as a dictionary.

Heister's Compendium of anatomy.

Leber prelectiones anatomicæ.

Albinus's edition of Eustachius's tables.

Bidloo's tables by Cowper.

Cheselden's folio with }
Zinn's plates ; }
Monro, and } On osteology.
Albinus, }

Weitbrecht on ligaments and cartilages.

Nesbit on cartilages.

Douglas, and }
Monro's edit. of Innes, } On the muscles.

Senac

Senac on the heart.

Haller on the arteries.

Winflow on the veins.

Rudbec's, }
Bartholin's } Works.
Nuck's, }

Monro, }
Hewson, } On the absorbents.
Sheldon, }

Eustachius, }
Meckel, } On the nerves.
Nabore, }
Monro, }

Haller's *elementa physiologica*, with
Malpighi and Ruyfch's tables, to study
the different organs.

Du Verney on the ear

Zinn on the eye.

Morgagni *de causa et sede morborum*.

Dr. Needham on the peculiarities of
the fœtus.

Dr. Nicholls's *anima medica*.

The best authors for comparative ana-
tomy, are Linnæus, Blasius, Swammer-
dam, Du Buffon, and Monro.

For surgery; Heister; Le Dran, Pott,
Bromfield, Warner, Sharp, Aitken, Bell
the *London Medical Observations*, and
Edinburgh Medical Essays.

um animale, without going through any process.

Animals have organs of sense, to be enabled to distinguish different objects, and to move from place to place.

Animals are made up of solids and fluids: the first continually wasting, the other supplying the waste. So if the solids are wasted in a greater degree (either by disease, or any other cause) than the fluids can recruit, an atrophy is produced. And if the fluids are increased, in greater proportion than they are used, an increase of bulk is produced.

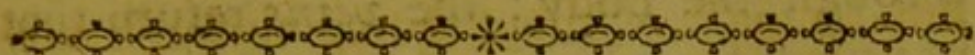
There are two kinds of power necessary for life.

Respiration, and Circulation.

The first, is a mixed involuntary power.

The second, is a natural motion of the fluids, of all living bodies, constantly in action.

They are both proper to animals and vegetables, and when they are extinct, death ensues. For example, if you tie a vegetable, or place it in the exhausted receiver of an airpump, it will die.



General Observations on the Fluids.

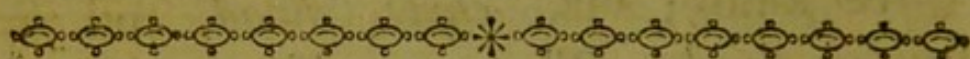
WE now come to consider the animal fluids. The *fluids* are of three kinds; viz. *chyle*, *blood*, and *secreted fluids*. There are also, two kinds of excrementitious fluids; *urine*, and *perspiration*.

Chyle, is made in the *stomach*, and *small intestines*; it is absorbed by the *lacteals*, (which originate from the *stomach*, and *villous coat of the intestines*) into which it enters, by capillary attraction, and the valves prevent it's retrograde motion: it passes on the **mesentery*, into the †*receptaculum chyli*; from thence, through the *thoracic duct*, into the veins; and through the right side of the heart, into the lungs. There the red blood is made, which is carried back by the left side into the heart; and by the *aorta*, circulated in the arteries

* Mesenterium, mesentery from the greek word *mesos* middle, and *enteron* intestine. It is a duplicature of the peritonæum; it prevents the intestines from twisting, and keeps them in their proper places.

† This receptacle is not always to be found.

through the body: the *veins* return that not used for nutrition. The *superior cava* returns all the blood, circulated above the *diaphragm*; the *inferior cava* returns all, circulated below the *diaphragm*, into the right auricle of the heart.



On the Blood.

BLOOD is given to all animals, for the purposes of nutrition, vivification, and secretion. When circulating in, or flowing from an animal, it appears * homogeneous; but it is not so. The first thing we observe after it is taken away, is coagulation. When exposed to the air, it separates spontaneously into two parts: viz. † serum, or watery fluid; and ‡ crassamentum, the red cake, or cruor, which is composed of the coagulable lymph, and red particles.

These are called, the essential parts of

* Homogeneous, from the greek words *omos* similis; and *genos* genus, having the same nature and principles.

† Serum, so called from its similarity to whey.

‡ The crassamentum sinks in the serum, but sometimes swims from the surface, becoming dry.
the

the Blood.

The colour of the blood in man, quadrupeds, birds, fish, and the amphibia, is red; in some insects, green; in water insects, colourless and transparent. Salt to the taste, of a gummy nature, readily mixing with water; does not appear saponaceous, or oily.

It's specific gravity by Boyle $\frac{1041}{1000}$

By Dr. Jurin $\frac{1054}{1000}$

the specific gravity is also much greater in health, than disease.

It differs in different animals, and in animals of the same class, from various circumstances; as health, disease, &c.

WE proceed to speak of the particular properties, of the component parts of the blood: and first,

Of the *red particles*, commonly, but improperly called, the red globules. These are more numerous in proportion to the perfection, and health of an animal, in the lower classes of animals, they are few; they give the *colour to the blood. Their
size

* Dr. Cullen says, when viewed singly, they have very little colour; and that the colour always appears of a dark, or bright red, according
ing

size in different animals is different ; they are largest in a skate, larger in man than an ox. In an human body, the 3240th of an inch, when laid in a longitudinal direction. Their shape in the human body, flat and round, like a piece of money ; in some animals, oblong, or elliptical. Each particle is a compound, solid body, flat and round, consisting of two parts : viz. a small solid particle, called the central particle ; and an external covering, or vesicle, in which the former is contained like a pea in a bladder. Blood kept till putrefied, and diluted with water, shews with a microscope, the vesicles bursting, and the particles rolling out. The particles may be made spherical, by an addition of water ; and, by a mixture with a solution of neutral salt, may be again restored to their original flat figure. They are not more oily, saponaceous, or inflammable, than

ing to the number of them.

Dr. Fordyce says, the colour is acquired in passing the lungs. When just past the lungs, they are scarlet, which is a mixture of modena red, and yellow ; they become darker, till they get back to the lungs again ; and that the colour is not capable of being changed by dilution.

the

the other parts of the blood. They do not form solids, or become organized; but are soluble in water, and other fluids, except the coagulable lymph and serum, which is prevented by the neutral salts contained in them. Their proportion in a healthy man, about $\frac{1}{8}$ of the whole mass; more in a sound state, than in a dropfy. They are sweet to the taste, inodorous, and void of stimulus; and heaviest of all the animal mucilages. The use of these particles is entirely unknown.

The * *coagulable lymph*, whilst in the course of the circulation, is supposed to be, of all other fluids, the most subtle. But when out of the course of circulation, or when received into a vessel, becomes a solid, on being exposed to the air. It gives firmness to the crassamentum, from which it may be taken out by continually stirring the blood with a stick, to which it adheres, and the red particles subside in the serum.

The coagulable lymph, when circulating in the body, cannot form a solid; but when out of the circulation, it forms

* *Fibra sanguinis* of Gaubius, and Malpighius; coagulable lymph of Senac.

the large masses in aneurisms, and plugs at the extremities of divided vessels, and by that means stops hæmorrhages.

The * *polypi*, formed after death (which is frequently the case) are by blood left in the pulmonary artery; from which the red particles subside, and the coagulable lymph forms a polypus.

Moles, vulgarly and improperly called, false conceptions, are formed in the uterus in a flooding, by the red particles subsiding, and the coagulable lymph adhering.

In a case of peritonitis, the coagulable lymph was thrown out by the exhalant arteries, formed a solid on the *peritonæum*, and became organized.

Also where it is thrown out from the lungs on the *pleura*, it adheres and becomes organized. Few people in this climate, but have an adhesion of the *pleura* and lungs, in this manner. The coats of the vessels have a plastic power, to change the mode and time of coagu-

* Polypus, from the greek word, *polus*, multus, many, and *pous*, pes, a foot, an animal having many feet, It is here applied to a concretion of blood in the heart, or in the large arteries near the heart.

lating.

When once it is coagulated, it is insoluble, except in strong acids, alkalies, &c. by which it's properties are destroyed.

It is also the nutritious part.

It has a fibrous appearance, especially when taken on a stick.

The *serum*, is a watery mucilaginous fluid; separates spontaneously from the crassamentum, is divided into serum, and serosity; colour in health, a blueish yellow; is homogeneous, coagulates in 160 degrees of *Farenheit's thermometer*, like the white of an egg, but leaves a small quantity of a fluid, which is called the serosity: this is the redundant part of the blood, thrown off by the kidneys. Mixed with water on agitation, by the experiments of Mr. Hewson, appears an opaque fluid, like milk: but we could not make it appear so. The inspissated, or coagulated serum, is the remains of the coagulable lymph in the serum, not separable; or it may be essential to the serum itself. It contains a neutral salt, composed of ammoniacal and sea salt: the use of which is, to keep the red particles in their proper form. When inspissated it

is soluble in water.

The milk-white serum, is owing to a reabsorption of the fat, or animal oil. A man, who had this disease several times, was always relieved by evacuations, which is the proper method of treatment. *

† Heterogeneous substances, are occasionally contained in it; as oil in the globules, and bile &c.

Chemical Analysis of the Blood.

It is decomposed by heat, according to the following experiments of Haller.

In 100 degrees of Farenheit's thermometer, produces a steam, with a volatile, subtle, particular smell.

200 degrees, ten ounces of blood were evaporated, and the mass left dry.

300, produces a volatile salt, with empyreumatic oil; and a black coal, and yellow earth.

The component parts of the blood, are

Earth, $\frac{1}{75}$

Air, $\frac{1}{25}$

* Mr. Wood, a miller, of Billericay in Essex, had this complaint, and lived many years on a pudding of wheat flour and water only.

† Heterogeneous from the greek words *eteron* alterum, another, and *genos* genus, kind.

Water,

On the BLOOD.

Water, $\frac{5}{6}$

Oil, $\frac{1}{25}$

Volatile salt, $\frac{1}{25}$

Iron, 10 $\frac{1}{2}$ grains in 10 ounces. This is by the experiments of *Dr. Raleigh* accounted for, by using iron instruments.

Haller thinks iron is a constituent part of the blood, but it seems rather to be taken by the water into our bodies, in which there is always a great quantity.

Mr. John Hunter says, there is a $\frac{1}{2}$ gr. of iron, in 63 oz. of ox blood, and that it is adventitious.

The french chemists say, the blood contains more phosphoric acid, than the urine, and the bones still more, than the blood.

In arteries, the blood is of a florid red bright colour.

In veins, dark and black: the venous blood by being long exposed, looks florid, which is by the phlogiston being removed. The venous blood contains more phlogiston than the arterious.

A surgeon being sent for to a man, who had cut his throat, from seeing the blood of a dark colour, concluded it was venous, and was in hopes of saving him;

but he had divided the internal jugular veins, by which he bled to death.

The blood, in the pulmonary artery, appears like venous blood. *Vide Hewson on the Blood.*

The blood has different appearances of colour in different subjects. Negroes, and mulattoes, darker than white people; and white, or european people, of different complexions, have different colours.

Dr. Harvey, in his Anatomical Exercises, says, the blood is a living fluid. This is asserted by Mr. John Hunter, in proof of which he says,

1st. It unites living parts. The coagulable lymph, thrown out by the pleura and lungs, is united; and as long as a part is capable of being acted on, by any stimulus, it is alive.

2^{ndly}. The power of resisting heat, and cold. Taken in cold air, it raises the thermometer, as much, as blood taken in the most sultry heat.

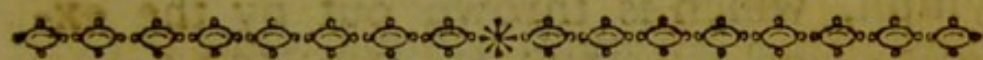
It coagulates later, when taken in disease, than health.

He mentions an extraordinary circumstance of this living power, in the testicle of a cock, introduced into a hen: it adhered, and became organized.

The

The blood is much thinner in inflammation, than in a sound state. This is not owing to obstruction, but to an increased action of the vessels, by which means, the red particles, which are specifically the heaviest part, subside first; and then the coagulable lymph remains uppermost, and constitutes the buff.

The blood is often found in the lymphatics after death.



On the Cellular Membrane, or Substance.

ALL parts of an animal body, are formed of *membranes, fibres, or inorganic matter*. Each of these are originally made from the *animal fluids*, by secretion, or some other process. The fibres of the body, differ in their degrees of organization, and all solids are not organized. By organization, we mean circulation; and when we say, a part is very much organized, we wish to be understood as meaning, it has *nerves, muscular fibres, and absorbent vessels*, as well as *arteries and veins*.

The solids which compose the body, are, the cellular membrane; muscular fibre;

bre; adipose membrane; ligamentous fibres; *elastic, and inelastic, nervous, and bony fibres, and cartilages.

We shall first treat of the most simple, and also the most extensive membrane, investing almost all parts of the body; and known by the name of the *cellular membrane*, or *substance*

The *cellular membrane*, or *tela cellulosa* of Haller, is made by the coagulable lymph, which is thrown out by the exhalant arteries. It is an elastic substance, and is found almost universally, in all parts of animal bodies. Except in the substance of the *brain*, and the *bones*, it is always found in the largest quantities, where a considerable degree of motion is wanted: as in the articulation of the *scapula*, with the *os humeri*; and in the *os femoris*, and *acetabulum*.

It is the most simple, and least organized fibre of the body; inasmuch as it is doubted by many, if it is organized.

Others say, it is organized: first,

By it's increasing, as the other parts of the body:

Secondly, If a wound is made in any

* The blood vessels are made of these.

part of it, granulations shoot from it.

It certainly may have a proportion of growth, and yet not be organized; as, for example, the *cuticle* and *nails* are inorganic, but the hair may not be so.

Haller is clearly of opinion, that this membrane is inorganic.

It is the common connecting medium, is exceeding ductile, allowing of easy motion; and has interstices moistened by a fluid, called *interstitial* * *fluid*.

It readily admits fluids to pass, from one part of the body, to another; as *water*, *air*, &c.

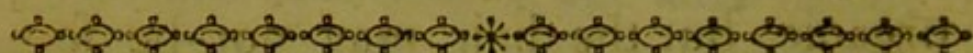
We may be sure a mortification has taken place below any part, when air appears in the cellular membrane.

The matter thrown out by *spiders* and *silkworms*, is the same as the cellular substance of animals.

This membrane, has by some been called, the reticular substance, or network appearance; but these names are now

* This fluid is the coagulable lymph and serum, thrown out by the exhalant arteries; and taken up by the lymphatics, it is coagulable, except in anasarca, when it will not congregate. It is the same as the fluid in the cavities of the thorax, pericardium &c.

laid aside : we mention them only, that it may be known to you, when reading authors on it.



*On the * Adipose Substance.*

THE next substance we are to consider, is a large gland of the conglobate, or lymphatic kind, filling all the vacant spaces of the body, and usually called the *adipose membrane* ; a name very improper, being evidently glandular.

It is formed of small † *cells*, which have no communication with each other. Each cell is surrounded by a network of arteries and veins.

It is wanting in the *scrotum*, *eyelids*, *penis*, *intestines*, and *lungs* : but there is a large quantity contained between the duplicature of the *peritonæum*, on the folds of the *mesentery* and *omentum*, on the *heart*, in the *orbits* of the *eyes*, in the *interstices* of the *muscles*, and in the external parts of the body.

* Adipose, from *adeps*, fat, the apparatus in which the fat is contained.

† Cell, a small bag or bladder.

In old animals, it is generally in the interior parts of the body; in young ones, in the exteriors.

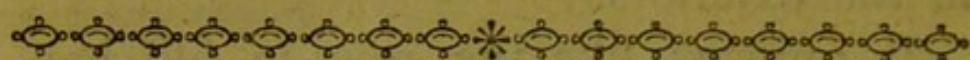
It appears like the rows in fish, having vesicles, for the purposes of containing the animal oil, which is secreted by the exhalant arteries, from that part of the chyle not immediately wanted, and taken up in the form of oil, by absorption.

It is fluid when the animal is living, and is contained in *molliculi*: this appearance may be very beautifully seen, in the *mesentery* of a kitten.

It's principal use appears to be, as a reservoir of nourishment, as in the case of animals, who live a long time dormant; these being supported by an absorption of the animal oil. In *ascites*, or *anasarcas*, the whole fat is reabsorbed: these are the only diseases, which entirely destroy it. The *pthisis pulmonalis*, does not so much so. All our animal oil is like lard. The experiments of Dr. Stark, prove fat to be the most nutritive of all other animal substances; one part of it being equal in nourishment, to five parts of lean.

It is harder in the *fætus*, than in the
D adult

adult subject; and is of all other substances the least liable to putrefaction.

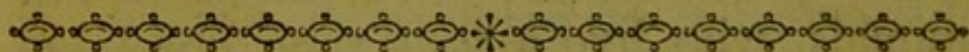


Of the Diseases of the Adipose Substance.

THE diseases of this substance are, the *milk white serum*, and *fatty tumours*, commonly called *wens*.

The first is caused by an absorption of the fat, and the cure of it, has been before mentioned, page 18.

The latter are sometimes formed in different parts of the body, and require extirpation.



Of the Diseases of the Cellular Membrane, or Substance.

THE diseases of this membrane are the following,

Anasarca,

Diffused Aneurism,

Abscess,

Emphysema.

The * *anasarca*, or *leucophlegmatia*, is

* *Anasarca*, from the greek words *ana* per, through, and *sarx* caro, flesh.

when there is a large quantity of water, in the interstices of this substance; and it is generally owing, to a relaxed state of the solids.

The fluid which is found, in this disease, is the *interstitial fluid*; which being secreted, and deposited in greater quantity than the *lymphatics* can absorb it, or than is necessary for the purposes of the animal œconomy, occasions the disease.

This disease may always be known by a tightness of the abdomen, and towards evening, an œdematous swelling or pitting of the legs.

The intentions of cure are various, but we have only to mention the chirurgi- cal part, the rest belong to the teachers of the practice of physic.

The operation to be performed, is to make a small crucial wound, deep on the instep, which readily drains out the water. Large wounds are very prejudi- cial, a mortification generally supervenes when there are many or large wounds.

Scarifications are always preferable to tapping.

The * *diffused aneurism*, is the dis-
ease,

* Diffused aneurism from the greek word *aneu-
reung*,

ease next to be considered. It generally happens from bleeding, an artery being opened, the blood is immediately diffused, through this substance.

The intentions of cure, are, to apply the tourniquet to the arm immediately, (if it is not at hand, a roller should supply it's place,) the artery should then be laid bare, and taken up, small incisions are to be made, as directed for the emphysema, and the parts lubricated with oil. If this is not immediately done, a mortification is generally the consequence very early.

The † *abscess*, is also a disease of this substance. It is formed by an inflammation of any part, which is owing to an increased action of the muscular fibres of the arteries.

It is here necessary to make a few observations, on the fluid contained in abscesses. It has generally been defined to be produced, by an erosion, destruction, or melting down of the solids. But this opinion is entirely erroneous; it is be-

veuno dilato, to dilate (in surgery) signifies a wound of the artery, and the blood diffused into the cellular substance of the limb.

† Abscess a tumor containing pus.

yond all doubt, a secretion; by the increased action of the vessels of the inflamed part, the coagulable lymph being thrown out (by the exhalants,) in greater quantities than the lymphatics can absorb it, stagnates: the heat of the part being also increased, prevents it's adhesion, and organization; and induces a fermentation converting it into pus; the mildness or virulence of the matter, is always in proportion to the states of the disease, by which it is produced. Undoubtedly, matter will, if suffered to remain on any part, corrode and destroy it. But abscesses in the cavity of the *thorax*, and also in the *eye*, in the disease called *fistula lacrymalis*, and the *gonorrhea*, sufficiently shew it to be *a priori*, a secretion only.

The difference that is perceived in the matter issuing, on the opening an abscess, and the subsequent discharge, is in consequence of the exposure of the part to the atmospheric air; a circumstance very detrimental to all kinds of wounds, and ever as much as possible to be avoided.

The thin fluid, which is sometimes found contained in tumors of this kind, is the coagulable lymph.

It is always to be remembered, that when matter is collected under any of the fascia, or near the large blood vessels, it ought to be let out as speedily as possible.

The best method of opening large abscesses, is by seton; for which purpose, first, introduce a *trochar*, or *hydrocele instrument*, (invented by Mr. Pott,) then several setons well oiled, and over them apply a tight bandage; by this means the discharge is gradually increased, and the ulcer soon heals.

On the face, and in bubos in women, where as much skin as possible should be preserved, the knife is preferable.

In men, bubos are best opened by caustic, (the cutting out oval pieces, is not a good method) for this purpose, the *lapis infernalis* is best, but the matter should be perfectly formed, before it is applied.

Abscesses of the breast, we advise not to be opened at all, emollient poultices being generally sufficient, and the best method of cure. To prevent the formation of matter in the breast, an ingenious * gentleman, to whose labours the

* Mr. Justamond.

world are much indebted, for many improvements in surgery, has advised a solution of crude sal armoniac two drams, in four ounces of hungary water.

The * *emphysema* is a disease, in which the air, that was before in a fixed state is let loose into the interstices of the cellular substance, inflating the † part. This disease is generally occasioned by a wound in the lungs, and more frequently from lacerated, than punctured wounds; in the former by a fractured rib, which irritating the wounded lung, throws off the coagulated blood, and the air rushes into the cellular substance. Vide *Lond. Med. Observ. Edinb. Medical Essays*.

It is also produced, by a wound of the trachea.

It seldom happens from a wound, occasioned by the puncture of a sharp instrument, or a musket ball. The blood which in this case issues from the wound, coagulates, and prevents an emphysema.

* Emphysema from the greek word *emphusēma*.

† The reason that drowned persons swim on the surface, is, by the air, which was before fixed, being let loose into the cellular substance consequently the body is lighter; and not from the quantity of water taken in, as was erroneously supposed.

We may be certain, whether it be air or water, contained in the cellular substance, by their different sensations; the air making a kind of crepitus, and the water leaving an œdematous appearance. It is not the air itself, does so much harm in the emphysema; it is the pressure of the air on the lungs, is the cause of death.

In the first place, the intentions of cure are, to let out the air, by many small incisions, made into the cellular substance, on all the parts which are diseased, lubricate your hands, and the skin with oil, and by this means the air will generally be evacuated. If it should accumulate again, cut down, and give a free vent for the air, externally.

The operation for the emphysema, is the same, as for the *empyema*, or abscess in the thorax, and the *hydrops pectoris*, and is as follows.

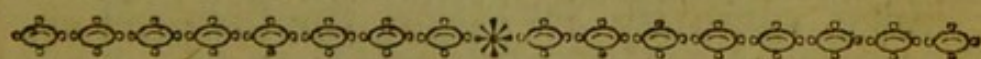
The patient is to be placed in an horizontal position, the side on which the operation is to be performed, inclining over the bed; the skin being then drawn up, as much as possible, the perforation is to be made with a scalpel, about two inches in length, between the sixth and seventh rib, reckoning from above downwards

wards, and in a valvular direction, as near the part first injured as may be. If that is too near the *spine*, or any thing indicates otherwise, it may be made about equal distance, between the *spine* and *sternum*: after evacuating the air, the skin is to be drawn over the part, and a bandage applied.

If the air occupies a small space only, then apply a tight bandage or laced waistcoat, and this we recommend in fractured ribs, to prevent their elevation.

There are instances of emphysema, in cattle, from putrid fevers.

Hydatids do not belong to diseases of the cellular membrane.



Of Ligaments.

WE proceed to consider another of the most simple, and least organized fibres of the body, known by the name of ligaments.

Ligaments are very universal, in the animal body.

The use of these substances, is, to connect the different parts of the body.

They are of two kinds;

E

* *Elastic,*

* *Elastic*, and
Inelastic.

Elastic ligaments are made of cellular substance, are of a yellow colour, have few blood vessels, and are but little organized. They serve as ligaments in the spinous processes of the seventh cervical vertebræ, and between the backs of the bodies of the vertebræ, and their spinous processes; in the ligamentum nuchæ colli, and on the brim of the acetabulum.

Their use is to assist us, in bending the spine and neck; for which purpose nature has put a large portion in those animals, which gather their subsistence from the ground. And in some animals, a large quantity is given for support to the intestines, by covering the muscles of the abdomen.

Their action has no dependence on the will, therefore is not fatiguing, or expensive to the constitution.

In a sound state, they are insensible;

* *Elasticity*, is a power, which some bodies possess, of constantly, and equally, endeavouring to contract themselves, to that form, from which they have been distorted; and is not confined solely to animated matter.

but

but in an inflamed state, exquisitely sensible, and attended with great pain.

Inelastic ligaments, are of a white colour, like burnished silver, and of great rigidity.

They are given to connect parts, where stability is required, as bones; also to prevent luxations.

Luxations are seldom attended with lacerations of the ligamentous fibre, unless the parts are diseased.

The inelastic is more vascular, than the elastic ligament.

It has nerves, but is little sensible in a sound state.

Diseases of this ligament are attended with great pain, the cause of which arises from the vessels being distended, and pressing upon the nerves.

The tendons are formed of the inelastic ligamentous fibre.

They are vascular, and have nerves; their external surfaces, are smooth and polished.

Their use is, to connect the muscles to the bones.

The *dura mater*, *periossteum*, and *tunica sclerotica*, are made of inelastic ligamentous fibres.

The capsular ligament, is composed of two layers, the one external, from the periossteum; the other internal, and exceedingly vascular.

The internal surface, forms a complete bag, and in a sound state, is perfectly insensible.

The fluid which is secreted in the joints, and which we call *synovia*, or the *synovial fluid*, is the same as *neat's-foot oil* in cattle. The use of this, is, to lubricate the joints, make the bones slip easy, and prevent abrasion.

The annular ligaments are bands, which bind the flexor, and extensor tendons, and keep the bones of the hand, and foot, in their places.

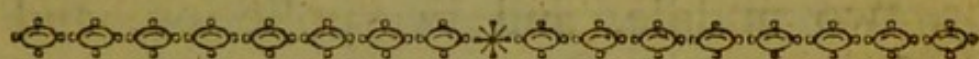
The intermuscular ligaments, between the *brachius internus*, is made of the inelastic ligamentous fibre.

The *fasciæ* or bands, by the ancients called, **aponeurosis*, (erroneously supposed to be an expansion of a nerve,) are ten-

* *Aponeurosis*, from the greek words *apo* de from, and *neuron nervus* a nerve.

dinous expansions, formed of the ligamentous fibre. They are found in different parts of the body; are vascular, and have nerves also, but are insensible in a sound state. Their use is to bind down the muscles, and keep them in their proper places; as in the thigh and arm.

Interosseous ligaments, as the perichondrium, supply the place of bones, and give origin and insertion to muscles.



Of the Nervous Fibre.

TO understand the properties of the body, depending on the influence of the nervous system, it will be necessary to premise, some general ideas of it's structure.

In all perfect *animals*, as *man*, *quadrupeds*, *birds*, and many *amphibia*, as *turtle*, *seal*, *crocodile*, and *flat* and *spinous fishes*, a *nervous system* is superadded. But this is not absolutely necessary for life, as it is wanting in *insects*; and we know that the circulation may be carried on without the *brain*.

The *nervous system*, is divided into two parts.

The

The first, *encephalon*, which is contained in the *cranium*, (note, *the human subject has more brain, in proportion to it's size, than any other animal*) comparatively it may be considered, the same to the *nervous system*, as the *heart* is to the *vascular*.

The *encephalon* is subdivided into *cerebrum*, and *cerebellum*; the first of which is subdivided into six lobes, two anterior, two middle, and two posterior; and these are all that can be seen in the cavity of the skull. On removing them we see the two lobes of the *cerebellum*, which lie posteriorly, and appear *vermicular*.

The lobes of the brain, are all covered by membranes, called *meninges*.

The first external covering is the *duramater*, and consists of two lamina; the use of it is, to prevent pressure on the brain.

The second, called *tunica * arachnoides*.

The third is, the *pia mater*, which goes between the convolutions of the brain, and is a double membrane. All

* *Arachnoides*, from the greek words *aracne*, a spider, and *eidos*, form, resembling a spider's web.

these membranes, go to make coverings to the nerves.

The brain has four ventricles, two lateral, one middle, one posterior.

These all contain water, secreted by the plexus * choroides. When this fluid is secreted in too large quantities, the hydrocephalus internus is produced.

The second part, is, the *elongation of the brain*, coming from both substances, and may be considered as a ninth lobe. It passes out at the *foramen magnum*, down the spine, guarded as in the brain, by the spine: this is called, the *medulla spinalis*.

From these arise, those white, strong, elastic chords, called *nerves*; distributed to all parts of an animal body, for the purposes of *sensation* and *motion*.

There arise nine pair from the brain.

And thirty-one pair from the medulla spinalis, making in the whole, forty pair of nerves.

Those arising from the brain, are the following,

First pair, *olfactory*; which are the

* Plexus choroides, is a production of the pia mater, spread over the lateral ventricle.

organs of smell.

Second pair, *optic*; and are the organs of vision.

Third pair, *motores oculorum*; these assist in moving the eyeball.

Fourth pair, *pathetici*; these express the passions.

Fifth pair, *sympathetic*: this is divided into three branches.

The 1st branch is the *ophthalmic*;

The 2nd, the *maxillaris superior*,

The 3rd, *maxillaris inferior*.

Sixth pair, *abductores*; they serve to draw the eye from the nose.

Seventh pair, *auditorii*; these are divided into two portions:

Portio mollis, and

Portio dura.

The first supplies the *vestibule*, *cochlea*, and *femicircular canals*, and is lost in the inner camera of the ear, in a very soft pulpy substance: this is the immediate organ of hearing. *Portio dura*, passes through *Galen's foramen cæcum*, vel *aquæductus fallopii*, gives branches to the *malleus*, and to the *dura mater*; and also to the muscles of the *head* and *neck*. It has by this means, considerable sympathy with the *fifth pair of nerves*, and *second cervical*.

cervical.

Eighth pair, called *par vagum*: gives nerves to the tongue, *larynx*, *pharynx*, and *ganglion of the intercostal nerve*. At it's entering the thorax, it sends off a large branch of each side, to make the *recurrents*; after these branches are sent off, it sends filaments, to the *pericardium*, *heart* and *lungs*; it also sends branches to the *æsophagus*, and *stomach*.

Ninth pair, *linguales*; are distributed to the muscles, and substance of the tongue. They serve both for gustation, and performing the motions of the tongue.

The others are subdivided into *cervical*, *dorsal*, *lumbar*, and *sacral*; descriptive of the places where they come out.

The nerves are a *sine qua non*, for muscular motion, and are the agents, by which the mind acts on the human machine: and by which it is again acted upon, which gives them a double capacity.

For first, they convey outwards, impressions.

Secondly, they convey inwards, impressions.

They have the power of volition, by which every thing is performed.

The *nervous fluid*, is not demonstrable

ble; but is supposed to be a modification of the *electric fluid*.

This is supposed to be carried from the *brain*, by the *nerves*, (which are the particular conductors) and acts as a *stimulus*, to make the muscles contract.

This is the exciting cause of action.

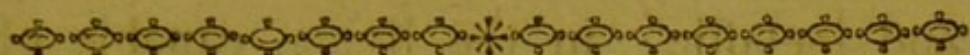
The smallest fibre of a nerve, in the retina of the eye, is the 32,400th part of a common hair: this is computed from the *minimum visibile*.

Professor Monro said, he could see the constituent nerves, by glasses.

The *torpedo*, or *skate*, has an electric property, and gives a numbness to any body touching it. Though the spark cannot be seen, it throws off the shock at two parts, in which the large nerves are situated.

By the *gymnotus*, or electric eel of Guiana, the same effects are produced: the nerves in it are very large.

A more minute description of the *brain* and *nerves* will be given, and their uses and several phenomena, will be explained at large, when we shew you their anatomical structure. We only wish to give you general ideas of them at present.



Of the Muscular Fibre.

FROM the preceding view of the nervous system, it is evident that the beginning of motion, in the animal œconomy, is generally connected with sensation. And the ultimate effects of such motion, are actions depending on the contraction of the moving, or muscular fibres, and this is called muscular motion; which is necessary to all living animals, and which, together with their particular structure, and organization, is now to be explained.

The *muscular fibre*, makes all that part of the animal body, called flesh.

It's colour in *man*, and *quadrupeds*, is red; in some *birds* and *fish*, white; in *insects*, green.

The red colour is not inherent in the muscle, but is owing to the quantity of blood, contained in it: as by washing and injecting a limb with water, and then making a transverse section, it may be made white. And parts may be muscular, though not red, as the *iris*.

The muscles in the dead body, are soft

and inelastic; in the living, capable of exerting great force, and become stronger, in proportion as they are more used; (for example, chairmen's legs are much stronger, than their arms; and watermen's arms, stronger than their legs;) and weaker, in proportion as they lie still: old, and bedridden people, are instances of this.

They have arteries, veins, nerves, and lymphatic vessels; also cellular substance. There are many ramifications in a muscle, and the vessels go from a circumference, to a centre.

The arteries run parallel, and by the preparations of Liberkuin, muscles appear nothing more, than a congeries of vessels.

It was generally supposed, that the arteries opened into vesicles, which made the constituent part of a muscle; and a distension of the part, was produced by this means, and caused a contraction.

If a muscle is exposed, it contracts, and is shortened. Vide Winslow.

The ultimate fibre of a muscle, is too small to be demonstrated.

The * *iris* of the human eye, serves to
illustrate

* The *iris* will not contract by the electric spark

illustrate this, and to explain the doctrine of muscular motion.

This is composed of arteries, veins, nerves, absorbent vessels, and cellular substance; which are the whole * apparatus necessary, to produce muscular motion, without any constituent muscular fibre, and which cannot be demonstrated here. So, as muscular motion is performed, without any constituent muscular fibre being demonstrable; hence we may fairly infer, it's absence in all parts; more especially, as the structure of the supposed constituent fibriles, is not understood.

The muscular power, is different from elasticity; it's action is not constant, but dependent on the nervous influence; and is exerted by stimuli, which are of different kinds, viz.

Mechanical,

Mental,

And, others of a specific kind.

spark, when the light is taken away it dilates.

The *retina*, and *coroid coat*, contract by light thrown on them.

* The *funis umbilicalis*, which has this, on being injected with a common injection of size &c. lost in right lines, one third of its measure, but gained one third of its measure, in contorted lines.

The

The first, is, the application of the powers and force of the body, to any object.

The second, is the irritability, or vis motrix.

The others are of various kinds.

The *nervous fluid*, is a stimulus, and the most natural cause, of muscular motion.

The *electric matter*, is a stronger stimulus.

The *bile*, may probably be the natural stimulus, to excite the peristaltic motion of the *intestines* and the *rectum*, to void the *fæces*.

The heart and diaphragm, are both involuntary muscles.

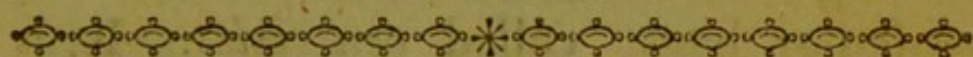
In mortifications, the vessels lose their vital or muscular power.

The properties of the body to be described here, as immediately dependent on, and connected with these parts, are the *sensibility*, and *irritability*

The *sensibility*, is a property of the body, by which applications to it, excite sensations in the mind. It is not a property of the mind, but the body, for the body is frequently sensible, when the mind is not affected: as for example, the
mind

mind may not be affected, yet the body may be very sensible; and, *e contrario*, an impression of the mind may remain a great time.

The *irritability*, is a property of the body, which takes place in consequence of certain applications to it, by which a motion in the moveable parts is excited, independent of the motion imprest.



Of the Vascular System.

THE next subject for our consideration, is one of the most important, in the animal œconomy; *viz.* the part which circulates the animal fluids, called the Vascular System.

The *vascular system*, consists of four parts.

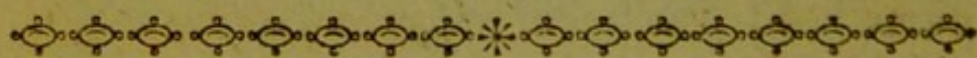
A heart,
Arteries,
Veins, and an
Absorbent system.

In all human and perfect animals, we find arteries, veins, and an absorbent system: the centre of these is the heart.

The * heart is an involuntary muscle,
of

* It's minute structure and organization we reserve,

of a conic form, situated transversely, between the two laminæ of the *mediastinum*, in the lower part of the cavity of the *thorax*; with it's base towards the right, and it's apex towards the left side, it's under surface flattened, towards the diaphragm. It is divided by partitions, as the *septum ventricularum*, and *septum auricularum*; and contains two muscular bags, called *auricles*; and two other muscular bags, called *ventricles*. It is covered by a very fine membrane, and is composed entirely of muscular fibres, which pass in every direction, and it has valves to prevent the retrograde motion of the blood. The heart is the chief organ of the vascular system, and from it arises, the two principal arteries of the body.



Of the Arteries.

THE * *Arteries* are designed for nutrition, and secretion, conveying

serve, till we give the *angiology*, or particular description of the blood vessels, and the circulation of the blood.

* Artery, from the greek words *aer*, aer, air, and *tereo*, servo, to keep.

animal

animal heat, and as a *sine qua non*, for muscular motion.

They were first named by Erasistratus, who supposed that they carried the finer parts of the blood, mixed with air, forming the animal spirits. They are hollow elastic tubes, beginning from the heart, to carry blood to the different parts of the body.

And are two in number, viz.

Aorta, and

Arteria pulmonalis.

The *Aorta*, or great artery, arises from the left ventricle of the heart, and gives off two branches, called *aorta ascendens*, and *aorta descendens*.

The *aorta ascendens*, sends off branches, to all parts above the diaphragm.

The *aorta descendens*, carries down the blood, and sends branches to all parts of the body, below the diaphragm.

The *arteria pulmonalis*, rises immediately out of the right ventricle of the heart, and goes only to the lungs, carrying the blood, returned by the veins, through the right auricle, into the left ventricle.

There are seven *veins*; *superior cava*, *inferior cava*, four *pulmonary veins*, and

the *vena portarum*.

The first returns all the blood, circulated by the different branches of the *aorta ascendens*, above the *diaphragm*; the second, all circulated by the different branches of the *aorta descendens*, below the *diaphragm*, into the right auricle of the heart; from thence the blood is carried into the right ventricle, and by the *arteria pulmonalis* to the lungs. The two right pulmonary veins, return the blood from the right pulmonary artery, into the left auricle, and from thence it is carried to the left ventricle of the heart. The two left, return it from the left pulmonary artery, into the left auricle also, and from it the blood passes into the left ventricle, whence the *aorta* originates, distributing it, by its branches, to every, the most minute part of the animal.

The power which circulates the blood, is the muscular power of the *heart* and *arteries*, and the elasticity of the arteries themselves. The blood is thrown out by the contraction of the arteries, which is called the *systole*, this immediately brings on the dilatation, or *diastole*; for when the heart contracts, the arteries dilate

late, and *vice versa*.

The *vena portarum*, or seventh vein, arises from all the chilopoetic viscera, and carries the blood to the liver; there acting as an artery, it secretes the bile, and after having performed this important purpose in the animal œconomy, it carries the blood into the inferior cava, to be mixed, and returned with the rest to the heart.

The branches near the heart, always go off at obtuse angles; by this means, the momentum of the blood, is considerably diminished. But at a great distance from the heart, the angles are very acute.

The course of the arteries is always in the centre of the part, in the bending sides of the joints, (as in the *axilla*, inner part of the *cubitus* of the arm, &c. which situation prevents their being stretched, or compressed, in the various motions of the body,) taking the shortest tracts, to the parts they are to supply. Independent of their giving off branches, they are increased as they proceed from the heart, and they are evidently inverted cones.

On some parts, they run convoluted,

(e. g.) the arteries of the *spleen, testis, uterus, and umbilical chord.*

There are two sets of arteries in the body; the one, deep seated; the other, superficial. By this disposition, if either set is compressed, the other may carry on the circulation; and the * anastomoses, which are found in all the large glands, and parts liable to pressure, are designed for the same purpose.

They are also divided into three classes.

Sanguineous,

Seriferous,

Lymphatic.

The first, are those, which carry red blood only.

The second, those which cannot carry red blood, but serum only.

The third, those which carry lymph.

In the cornea of the eye, we cannot discern red blood, except when it is inflamed.

There are also *capillary, and exhalent* arteries, in different parts of the bo-

* Anastomosis from the greek words, *ana*, per, through, and *stoma*, os, a mouth, by the antients understood to be vessels opening on surfaces, by the moderns a communication of vessels.

Mr. Falconar said there are none in the glands.
dy.

dy. The former are very fine tubes. terminating on the surfaces of the body; the latter secrete a fluid, for the purpose of lubricating the different cavities of the body, and are also found on the *lungs* and *uterus*.

Arteries have three coats, which may be separated.

The first, elastic, which has fibres in all directions, and a great number of blood vessels for it's support, called *va-vasorum*. Nerves are also distributed on it.

The second, muscular, with circular fibres. This cannot be demonstrated. On it depends, the sensation of blushing. It likewise gives them some degree of irritability: though this is much greater in the arteries of amphibious animals, than in those of the human subject.

The third, or internal coat, is a very fine, smooth, dense membrane; being intended to prevent transudation.

These coats are all connected together, by cellular substance.

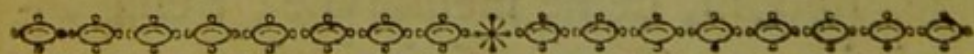
In the fœtus, there are two arteries, for the circulation of the blood; one of which is obliterated, after the birth, and degenerates into a ligament; when pervious,
it

it is called *ductus, vel canalis arteriosus*

The two vertebral arteries, ascend through the foramen magnum, and immediately uniting form the basilar artery, which makes an anastomosis with the carotid artery, called *circulus arteriosus Willisii*, from its having been discovered by him.

In an inflammation of the brain, the temporal artery may be opened with advantage. Eight or ten ounces of blood, obtained by this means, proves of more relief, than four times the quantity from the general system. It must be opened longitudinally, lest by a transverse section, the seventh pair of nerves should be injured, and occasion a locked jaw, and other disagreeable circumstances: an instance of which we have seen.

In order to stop the hæmorrhage, apply a compress above and below.



On the Pulse.

THE action of the arteries, is indicated by their pulsation, which has been called the Pulse.

Pulses are divided, by many physiologists

gifts, into a great variety; but this serves only to confuse the ideas, and perplex the memory of the student. We shall only mention the most general division, with a few remarks; leaving them to be accurately defined, by those persons, to whose peculiar province it belongs.

Fortis. We call it a strong pulse, when the artery vibrates, like the chord of a musical instrument.

Debilis. When it feels enveloped in some soft substance, we call it a weak pulse.

Magnus. A great pulse, is when the artery feels larger than usual; and *e contrario*,

Parvus. In a small pulse, the artery feels smaller. The small pulse from greater contractions, and that from the artery containing less blood, are easily distinguished.

Celer, tardus, frequens, rarus. These states of the pulse, indicate the different degrees of irritability in the system; and are those, which ought particularly to be attended to.

Durus. When the arteries act strongly, the pulse is in general hard, and this produces a variation in the blood, called
the

the buff. *e contrario*,

Mollis. When the action of the arteries is diminished, by bleeding or other means.

Plenus, vacuus. The quantity of blood in the vessels, is also shewn by the pulse. When the vessels are distended, we call it a full pulse; *e contrario*, when not sufficiently distended, an *empty*, or *small pulse*.

Regularis, irregularis, intermittens. These indicate the regularity, or irregularity of the contraction and dilatation of the heart; and the last is frequently a dangerous symptom, and a sign of death. Though it is to be noted, people have been born with an intermittent pulse, and have suffered no inconvenience from it.

The pulse has a peculiar feel, in people having an aneurism, near the heart.

Other peculiarities have been mentioned, but we are unacquainted with any definition whereby they may be distinguished.

The diameter of the arteries, is also known by the pulse; this we call the medium, between contraction and dilatation.

We shall here repeat the different kinds of pulses.

<i>Fortis</i> , strong;	} Or {	<i>Debilis</i> , weak.
<i>Magnus</i> , great;		<i>Parvus</i> , small.
<i>Celer</i> , quick;		<i>Tardus</i> , slow.
<i>Frequens</i> , frequent;		
<i>Durus</i> , hard;		<i>Rarus</i> , rare.
<i>Plenus</i> , full;		<i>Mollis</i> , soft.
<i>Regularis</i> , regular;		<i>Vacuus</i> , empty.
		<i>Irregularis</i> , irregular.
<i>Intermittens</i> , intermittent.		

Dr. Heberden has given some observations on the pulse, (in the Lond. Med. Transactions,) by which he proves, in how few cases, it can be depended on.

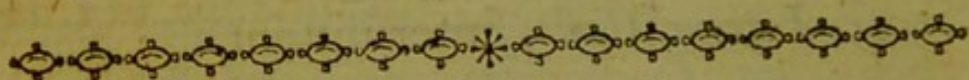
The pulse of a child, under two years old, should be felt whilst it is asleep; and the following are the mean rates of the pulse.

On the day of birth,	130—140.
First year,	110—120.
Second,	90—100.
Third, fourth fifth, sixth	90—108.
Seventh,	72—80.
Twelfth,	70, and a few more.

Adults, a little below 60—80.

A full meal quickens it, 10 or 12 pulsations ; a variation of ten, indicates disease in the system ; that number below the natural standard, shews an affection of the brain.

In an inflammatory fever, 120 is a dangerous pulse ; *except* in an acute rheumatism, the pulse rises to 120 ; and to 150, before the appearance of a critical swelling, without danger.



Diseases of the Arteries.

THE diseases of the arteries are,
Aneurism, and
Offification.

Aneurisms are of three kinds, viz, true, mixed, and spurious.

The first, is a mere simple dilatation of the coats of an artery ; consisting of a sack or pouch, containing grumous blood, and coagulable lymph ; and is generally produced by a loss of the tonic power of the vessels.

The second, is from a rupture of the first, and most commonly proves fatal.

The third, is the rupture of an artery, by some means, without the previous dilatation.

This

This is subdivided into three kinds. The circumscribed, or encysted aneurism, which generally happens from bleeding.

The diffused; this has been before mentioned, page 27.

The varicose; this species of aneurism, was first discovered by the late Dr. Hunter; and is, when an artery and vein are opened at the same time, the arterious blood runs into the vein, and goes on by the same channel. An instance of this we have seen, without inconvenience to the person, or requiring assistance.

Where an aneurism presses on a bone, it becomes carious, by the mechanical pressure.

The operation of the popliteal aneurism, so seldom succeeds, we wish to recommend to your consideration, the following attempt to obviate that complaint, and its more dangerous consequences, the operation performed for its cure.

Apply a tourniquet to the femoral artery, at a small distance below where the profunda branches off, and make it gradually tighter; by this means the profunda will have time to dilate, the circulation be carried on by it, the great branch be entirely obliterated by the me-

chanical pressure, and the aneurism, we hope will be lost.

Ossification of arteries. This disease is occasioned by too great a secretion, and consequent deposition of calcareous matter; and is more common in arteries, than in other parts of the body. It begins under, or in the internal coat; from thence it is continued to the external coat of the artery, and is a species of corrugation.

It is more common in old than in young people, owing to the impetus of the blood being lessened, and by this means the diameter of the arteries is diminished. This circumstance, enables us to account for it's being produced by aneurisms, from the pressure of the sack.

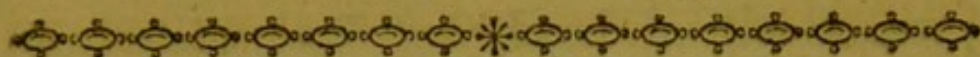
A mortification of the toes and feet, is generally in consequence of this disease.

It is very seldom seen in the veins.

Arteries are less liable to erosion, or absorption, than any other part of the body. Whenever an erosion or ulcer takes place, the internal coat of the artery never heals.

We have seen a case, of an ossification of the valves of the aorta, an ulcer in it's sinus, and an incipient aneurism.

Observa-



Observations on Hæmorrhages.

IN small vessels, the suppression of the hæmorrhage, is,

First, by the retraction of the ends of the vessels.

Secondly, by the muscular power of the arteries.

Thirdly, by the exposure to cold air; which has most power, in coagulating the blood.

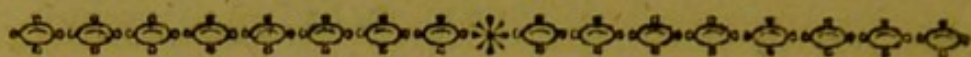
Spirit of wine, acts as a sedative, in coagulating the blood.

The method of suppressing hæmorrhages, by ligature, was invented by Johannes de Varico, and Ambrose Parey.

In the operation for castration, tie the artery, without any of the rest of the chord.

Never tie a nerve with an artery, if you can avoid it; as it sometimes occasions a lockt jaw, and other disagreeable symptoms.





Of the Veins.

THE *Veins* are hollow, elastic tubes, the reverse, and continuation of the arteries, are found in all parts of the body, of a conical form, the apex terminating in the heart. They may pulsate there, but this is unknown.

They are seven in number; viz. superior, and inferior cava, four pulmonary veins, and the vena portarum. A general description of each, having been given with the arteries, it is unnecessary to say more of them in this place.

The veins are more numerous than the arteries, there being two veins to every artery, (except the kidney, which has but one vein;) and their trunks are considerably larger.

The veins of the viscera always attend the arteries.

The blood in the veins, moves in an equal stream, unlike that in the arteries; which may be known by flowing out *per saltum*. We remember the relation of a case, where the artery lay so close to the median vein, that on opening the vein, the

the motion of the blood in the artery, threw out the blood from the vein *per saltum*, and the surgeon supposed he had opened an artery. But the difference of colour, between arterious, and venous blood, will always enable you to distinguish this; the former being of a florid, bright, red colour; and the latter, dark, and black.

They are divided into two sets; the one deep seated, accompanying the arteries; the other superficial, lying under the skin, called cutaneous: these two sets, are only to be found in the neck, and extremities. Their use is, to return the blood, when one of them is divided or compressed.

The two veins of the neck, are called *internal jugular sinuses*: they are also called *sinuses*, in the *gravid uterus*.

They are divided into three classes.

Sanguiferous,

Seriferous,

Lymphatic;

Corresponding with the three classes of arteries, and designed for the same purposes.

The veins have three coats, similar to arteries, which may be separated in the larger

larger ones; they are denser, and less elastic than the arteries; when cut through, collapse; they have muscular fibres also, and are irritable.

They have likewise *vasa vasorum*, and begin from the arteries, by continuity of canal; by injecting the arteries with mercury, this is demonstrated.

Fluids pass readily from the arteries to the veins.

They have *valves* to prevent the retrograde motion of the blood; (generally two in number;) formed by a duplicature, of the internal coat of the veins; are of a crescent form, the edges loose, the horny part fixed to the vein. When the blood is driven into the vein, the edges collapse, and prevent it's retrograde motion.

These are sometimes single, where a small vein enters; sometimes, double; and sometimes, treble.

And always to be found, where there is pressure.

There is one in the axilla, scalp, and coronary vein; and they are very numerous on the extremities, always making a swelling on a vein.

The great trunk of the vena azygos,
or

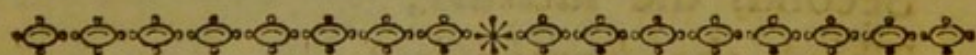
or intercostal vein, has no valves, but the small branches have valves.

The upper part of the veins of the bladder, and spermatic vein, have valves.

The valves are wanting in the veins of the *heart*, * *viscera*, brain, and *inferior cava* of the human subject, but are found in horses and asses.

The smallest veins are probably without valves.

The quantity of blood contained in the human body, is, on a medium, judged to be between twenty and thirty pounds. But this is uncertain, it is different in different people, and is most probably greater in fat than lean people; and is supposed to pass through the heart, at least, once in two minutes.



On the Diseases of the Veins.

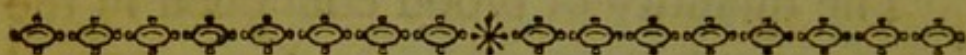
VEINS, from various causes, are subject to become varicose.

The *varix*, is a dilatation of the superficial veins, from inflammation or other causes, as the *cramp*, and pressure

* *Stomach, intestines, uterus.*

of the *uterus*. By these means, the muscles contracting, the deep-seated veins are compressed, the blood is forced into the superficial veins, which are consequently dilated, and then become varicose.

We have seen an aneurismal varix on the trunk of the *vena portarum*, which contained worms.



Of the Lymphatic System.

THE lymphatic system is generally divided into three parts, but we add a fourth.

First, the *thoracic duct*;

Second, the *lacteals*;

Third, the *lymphatics*;

Fourth, the *conglobate*, and *conglomerate glands*.

The *thoracic duct*, is the common trunk of the system; is first formed on the right crus diaphragmatis, and situated on the first vertebra lumborum, on the right side of the aorta, and left of the *vena azygos*: in human subjects, seldom larger than a wheat straw.

At

At the lower part of this duct, is the *receptaculum chyli*, near the beginning of the vena azygos. It was first discovered by Pecquet, anno 1661, and has sometimes been called Pecquet's receptacle, in honour of him. It is formed by the large trunks of the lymphatics, which enter at the lower extremity.

The thoracic duct has blood vessels, nerves, and muscular fibres; has three coats, similar to veins. It goes up at the back of the subclavian vein, and is sometimes found divided into two branches; but they are usually united again, and terminate by two, three, or four orifices in the angles, between the jugular and subclavian vein, on the left side; from whence the chyle is conveyed with the blood, into the lungs, and there assimilated with, and converted into blood.

There is a large gland, in the course of the duct, situate just under the origin of the aorta.

The *laeteals*, or *vasa chylifera*, as they are sometimes called, were discovered by Assellius in 1662; though we are informed by Galen, they had before been seen by Erasistratus in kids; but he did not understand their use.

Affellius supposed they conveyed the chyle, to the liver; for before the discovery of the thoracic duct, the liver was supposed to convert the chyle into blood. they arise by capillary orifices, from the internal surface, or villous coat of the intestinal canal, (but principally from the *stomach, jejunum, and ileum,*) which is destined to imbibe the nutritious fluid, called chyle.

They pass obliquely through the coats of the intestine, and running along the mesentery, unite as they advance, and form larger branches; all of which pass through the mesenteric, or conglobate glands, which are very numerous in the human subject.

As they run between the intestines and these glands, they are stiled *venæ lacteæ primi generis*: some of them escape the first set of glands, and go to the second. After leaving these glands. they are found to be more numerous; and being increased in size, are then called *venæ lacteæ secundi generis*. Those which escape the second set of glands, go to the third; by this means in scrophula, the absorption is carried on, and the person nourished.

They go under the peritonæum, and
in

in the longitudinal direction of the intestine. By this disposition, their trunks being continued longer, than if they went circularly, the fluid is altered; they terminate in the thoracic duct.

In their origin, they are called * *ampullulæ*, the arteries of which can be injected: these are only to be found in the human subject, and in a person just dead after a full meal, by lightening the lacteals. In the beginning they are bulbous, the blood in them causing an erection; by straining the intestine unwashed, through two rings, the mucus will leave the *ampullulæ*, and with a microscope, you may discover their orifices.

In the intestines, they act in a double capacity; absorb lymph and chyle too. They are sometimes varicose, but afterwards become more cylindrical. Their structure corresponds exactly with the lymphatics, next to be described.

The *lymphatic* vessels, arise by capillary orifices. We believe that they exist in every part of the body, (though they have not been demonstrated in all parts,

* *Ampullulæ*, a cellular spongy body, filled with blood.

as the *placenta*, and *brain*.) They are minute, pellucid tubes; which, like the lacteals, direct their course towards the, centre of the body, and pour their contents into the thoracic duct.

As they approach this duct, from the lower parts of the body, they gradually unite, and enter it by three or four large trunks, which form the receptaculum chyli; and the lymphatics from all the other parts of the body, pour their lymph into different parts of this duct. As it runs upwards, to terminate in the subclavian vein, except the lymphatics of the right arm, right side of the neck, and right lung, the termination of which are to be described hereafter.

They pass through the conglobate glands, the changes the lymph and chyle undergo here, are not yet ascertained.

Their coats are dense, and transparent; and are three in number, like the veins, but are too delicate to be separated.

The first, or external coat, is like the ureter.

The second, muscular.

The third, or internal, to prevent transudation, and form the valves.

They are irritable in a greater degree
than

than the arteries or veins; with which they have no communication, except in the veins, in which they terminate.

They have *vasa vasorum*, and retain their life longer than other parts.

They consist of two sets, upon all the intestinal viscera; one, superficial, external, or peritoneal; the other, deep seated, or internal. The external, lying immediately under the skin; the internal, accompanying the large arteries.

In the *liver*, immediately under the peritonæum, they are in great abundance. It has also a deep-seated set, which originate in the *pori billarii*. In the *uterus* also, when the peritonæum flies off, the lymphatics come off, and both sets communicate: they enlarge here, in the same manner as the veins.

There are two sets in the lungs. They here run in between the little lobuli, and form a chain of network, and are easily demonstrated in the lungs of a foetus.

There are two sets of lymphatics in the extremities.

In the upper extremity, the first or superficial set, run on the back part of the fore arm, and then become more deep seated. The second, or deep-seated set, accom-

accompany the arteries.

The lymphatics of the lower extremity, consist of two sets; superficial and deep seated. In the leg, the superficial come first, to the femoral gland. The deep seated come first to the popliteal, and then to the femoral, and both go to the inguinal, where the lymphatics of the organs of generation terminate. They then come up by several trunks, under the ligamentum pouparti, and go on both sides of the aorta, with those which come from the uterus &c. and join the lacteals which come up in the course of the superior mesenteric artery, and all terminate in the thoracic duct.

The thoracic duct, lacteals, and lymphatics, are furnished with valves, which are much more numerous in these vessels, than in the veins. These valves are usually in pairs, 5 or 6 pair in every inch of the tube. They serve to promote the course of the chyle and lymph, towards the thoracic duct, and to prevent it's return.

A ligature passed round the crural artery, in a living animal, by including them, will occasion a distention below the ligature, so as to demonstrate them
with

with ease. And a ligature passed round the thoracic duct, immediately after killing an animal, by stopping the course of it's contents, into the subclavian vein, distends not only the lymphatics, but the lacteals also, in the abdomen and lower extremities, with their natural fluids.

In the dead body, they are demonstrable, by opening the artery, ramifying through any viscus, (as in the *spleen*, for instance) and throwing in air, by which they will be distended.

One of them may then be punctured, and mercury introduced by a blow pipe.

The lymphatics coming from the right side of the neck, right arm, and right lung, open into the angle between the jugular, and subclavian veins, of the same side.

And those of the right side of the thorax, pass under the aorta.

The termination of the lymphatics of the heart, is not well understood. Lymphatics can be seen in large numbers, in the external part of the heart. For this purpose, put the heart of a horse in water, change the water once in two or three days; examine carefully, and you will see them filled with fixed air. When

you make the above experiment, tie up all the vessels in the course of the coronary artery.

The lymphatics of the kidneys may be demonstrated in like manner.

From the testicles, they go and join those of the kidney; but sometimes go into a gland, near the abdominal portion of the aorta.

This system is nourished after the same manner, as all other parts of the body; for even the most minute of these vessels, are probably supplied by still more minute arteries and veins. This seems to be proved, by the inflammation of which they are susceptible; and the painful swellings, which sometimes take place in lymphatic vessels, prove that they have nerves as well as blood vessels.

The lymphatics are the only system of absorbents; the proofs of which are,
1st. Their analogy with the lacteals.
2ndly. The ingress of poisons into the body; as the venereal, variolous, cancerous, &c. inflaming the glands through which they pass.

3rdly. The absorption of matter from ulcers.

4thly.

4thly. The fluid contained in the lymphatic vessels being similar to the fluids, contained in those cavities, from which the lymphatic vessels arise.

5thly. The existence of the lymphatic system in all animals.

The *manner of absorption*, is by the mouths of the lacteals and lymphatics, acting as capillary tubes, they absorb the lymph and chyle, in the same manner as a capillary tube of glass, (when immersed in a basin of water, is enabled to attract it to a certain height;) by this means it is probably conveyed, as far as the first pair of valves, which are near the orifice, and the fluid will then be propelled forward, by a continuation of the absorption. They are supposed to derive some advantages too, from their muscular coat, and from the pulsation of the arteries near which they lie.

The lymphatic vessels were first discovered, in Sweden, by Rudbec in 1662. About the same time by Bartholin, in Denmark; and Dr. Jolliffe, in England. In the year 1768, Mr. Hewson completed this discovery, by demonstrating the existence of lymphatic vessels in birds, fish, and amphibious animals.

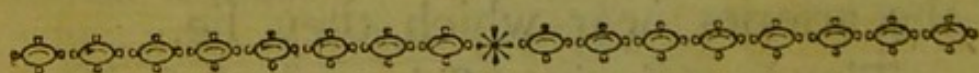
The *lymphatic glands*, are conglobate, and are situated in the course of the lymphatics, which pass through them; have arteries, veins, nerves, lymphatic vessels, and cells. The lymphatic vessels, in their way to the thoracic duct, enter and pass through them.

In the groin, there are two sets; inguinal, and femoral. The inguinal, are the glands which are affected by the venereal poison: there are however cases, of a secondary bubo, in the femoral glands.

There are lymphatic glands found also in the diaphragm.

The glands of the neck, are sometimes affected by a caries of a tooth.

Stumps, after amputation, and in abscesses too, we very often find the glands, in the neighbouring parts affected.



The Diseases of the Lymphatic System.

THE diseases of the lymphatic system are the *scrophula*, or king's evil, as it has been called. In children, it begins in the mesenteric glands, and is then continued on, into the lymphatic glands, which

which become indurated, and afterwards break out into ulcers. The matter contained in the lymphatics in this disease, has the appearance of earth and curds.

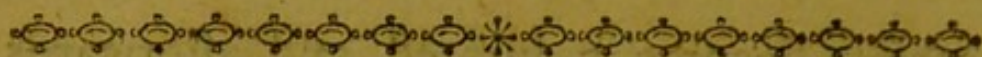
Consumptions frequently depend on this disease.

The lymphatics are too bibulous in the scrophula, and it is to be remarked, that where the absorbents lose their tone, the exhalants do likewise; and *vice versa*. For example, a *diabetes* has been brought on, by the lymphatics inhaling the moisture of the atmosphere.

The *sal fodæ*, or fossil alkali, has been recommended in scrophulous cases, but with what success we cannot determine. Neither are we acquainted with any medicine, which may be depended on, to cure this complaint.

Lymphatics are sometimes opened in wounds, discharging lymph from a fungous substance, of a yellow appearance. The best application to it, is the lunar caustic, and lint wet with spirit of wine over that.





*On * Glands.*

WE proceed to consider the structure and uses, of those parts of the body, which are designed to secrete the various fluids from the blood, for the purposes of the animal œconomy; called the secretory organs or glands.

A gland, is a circumscribed tumour, found in various parts of the body. They are divided into two kinds, † conglobate, and ‡ conglomerate. The lymphatic gland is conglobate, without secretion; the kidney is conglomerate in the fœtus, but conglobate in the adult.

By later § anatomists, glands are divided, into simple and compound.

The first requires nothing more than an artery, to it belong the *skin, pleura, peritonæum*, the membranes lining the

* *Gland*, from the greek word *aden*, glandula, an acorn, a term originally given by the greeks, from the lymphatic glands, resembling that substance.

† *Conglobate*, a substance externally smooth.

‡ *Conglomerate*, appearing like a number of small kernels joined.

§ Mr. Falconar,

nose,

nose, the *trachea*, &c. the latter of these two, secretes the fluid, expectorated in *coughs*; the other, the thin rheum, with which colds begin. These are all of them glands, *ex officio*, secreting the fluid necessary, for their own lubrication and defence.

A simple gland, with a reservatory, is called *folliculi*; to this head we refer the sebaceous glands.

The second set correspond with each other, in their general conformation; having arteries, veins, nerves, lymphatic vessels and excretory ducts. The arteries going to glands, are supposed to be more muscular, consequently more irritable, than in the other parts of the body.

The arteries of the *pancreas*, *breast*, and *salivary glands*, enter at all parts; this we call the ramification of the gland. These glands, with the testicle, are particularly affected by the nervous influence, and are nearly similar in structure, consisting chiefly of excretory tubes. They are most liable to *schirrus* and *cancer*, and very apt to secrete poisons. The part which secretes the poison in the *rattlesnake* and *viper*; is like the human salivary gland; and the part of the
mad

mad dog, which is primarily diseased, is that gland.

The *kidney* and *testicle* have each one centre of ramification; the former when injected, appears like a series of convoluted vessels.

The *liver* has two centres of ramification. and appears a congeries of vessels.

The veins return the superfluous blood, after it has performed it's office, to the common mass, to be with it carried to the heart.

The nerves are distributed to every part of the gland.

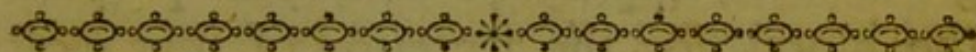
All the compound glands, have a proper capsule or covering, to connect their different vessels. They have likewise sometimes an external covering, derived from the membrane, lining the cavities in which they are placed.

The excretory duct of a gland, is made of a very hard, firm substance; and similar to the external coat of the arteries. It has muscular fibres also, and lymphatic vessels arising from it's internal surface, to depurate the fluid. In some glands, there are several excretory tubes, which pour their contents into one common duct, terminating in the receptacle
belonging

belonging to the gland.

The excretory duct of the *spleen*, has not been demonstrated, so that we remain totally ignorant of the uses of this viscus ; every thing that has been advanced concerning it, being entirely *hypothesis*. There can be no doubt of it's answering some important purpose in the animal œconomy, but at present, the lymphatics are the only excretory ducts, we can discover.

The *thyroid gland* has no excretory ducts, save the lymphatics ; neither has any excretory duct been seen in the *renales capsulæ*.



Of Secretion.

SECRETION, is the separating from the blood various fluids, to answer certain specific purposes, in the animal œconomy, and requisite to the preservation of life and health. Having given a general definition of the apparatus, necessary to perform this important work, we proceed to give you our ideas, of the manner in which it is performed. In order to this, we shall divide it into four

distinct heads; which are,

Preparation,

Chemical alteration,

Depuration, and

Excretion.

We conceive that the arteries, have a power to modify the blood, in such a manner, as to bring it nearly to the nature of the fluid, secreted by the particular gland, to which it is conveying it; this we call *preparation*. And we apprehend it especially to take place, in the artery going to the testicle; which, by it's being derived from the aorta. and by it's length, and circumvolutions in the gland itself, appears to modify or prepare the blood, for the secretion of that most important fluid, the *femen*.

With respect to the *chemical alteration*, the blood undergoes in the body; the secretion of the bile in the liver, clearly shews that such an alteration does take place in this, and other glands, as the blood when entering the liver, has the same taste as the other blood. This alteration seems very much to depend on the nervous influence, though we confess ourselves ignorant of the *modus operandi*.

Depuration, is the taking off from the fluid,

fluid, after it is secreted, the impure parts which are floating in it. This is performed by the lymphatics of the excretory tube, leaving the proper fluid free from any heterogeneous substances, to be carried by the excretory duct to the proper receptacle, or to be thrown out of the body entirely, and this last is what we mean by *excretion*.

The most universal secretion in the animal body, is the lymph; and the glands secrete different fluids, at different times.

There will always be a balance in the animal secretions, for as one is increased, another will be diminished; and *vice versa*, as one secretion is stopped or diminished, another will be increased: for example, *cold weather*, or the application of *cold water*, by diminishing the derivation of the blood to the skin, influences and increases the secretion of urine. In like manner, *fear*, by inducing a contraction of the capillary vessels, produces the same effects. This enables us to account for the large quantity of water, made by hysteric people. Wine has also a like effect. And in suppressions of urine, the patient is generally in a perspiration.

We have to mention here, the different parts of the body, to which the blood may be determined. They are the *skin*, and this is the most common determination of it, for the sensible and insensible perspiration.

The *intestines*. It is generally determined to this part of the body, after taking food of any kind, to assist the process of digestion, and the making of the chyle. This explains the reason of people, with good powers of digestion, complaining of cold in the external surfaces of the body, after dinner.

The *head*. The blood in cases of general inflammation, and from other causes, is determined to the head, but never with advantage, and sometimes it's effects produce death.

The *liver*. Under particular circumstances, the blood may be determined to the liver; but we believe this very rarely to take place. The jaundice is occasioned, by the blood returning into the *cava*, being tinged with bile; but this is generally owing to an obstruction of the excretory duct of the liver, either from gall stones, or spasmodic contraction, not from an unusual quantity of blood, derived

rived to the liver.

The *uterus*. In warm climates, we know that the blood is determined to the uterus by the appearance of the menstrual flux, much earlier than in this country.

All parts having more blood than is necessary for their life, are supposed to be glandular, and secrete some fluid necessary to the animal œconomy; and it is to be noted, that all parts, which have many blood vessels, have many nerves also: but the gums are an exception to this rule.

The glands on the mesentery of a fœtus, are four times as numerous as in the adult subject.

The abolition of the *thymus* gland, is owing to absorption.

There are two kinds of flesh in glands; foreexample, in the *kidney*, there is an external or cortical part, and an internal part, tubular. These tubes receive the urine, as fast as it is secreted, and then open into a common duct, forming the *ureter*, which terminates in the bladder.

Besides the glands which supply nourishment to the body, there are others which are destined to preserve clear, the functions

functions of it's various organs; and to carry out of the body, superfluous matters. We are to take some notice of these in this place, but they will be more particularly treated of hereafter.

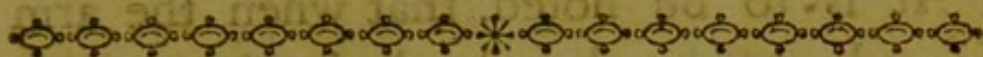
The *brain* is a gland, and the largest in the human body: it is supposed to secrete a fluid, for the influence of the various organs of the body.

The substance which is placed in the orbit of the eye, is the *glandula lacrymalis*; this secretes the fluid for the lubrication of the eye ball, and keeps the sight clear by it's ablution. This gland is evidently affected by the nervous influence, in the passions; and as we know that it's fluid is taken into the duct, by capillary attraction, and continually propelled forward by the nervous influence, may we not suppose, that this influence operates as a stimulus, not only to the secretions, but also on the ducts, to carry off the other fluids of the body.

The *kidney* is a large gland, found in all animals, for the purpose of secreting the superfluous water, from the blood.

The *joints* of the body, are furnished with a gland, to secrete a fluid for their lubrication, and to enable them easily

fily to perform, the various motions of the limb.



Diseases of the glands.

THE glands of the body are liable to various diseases, but they are more particularly subject to two, *viz.* *schirrus* and *cancer*.

The first is an indurated tumour, owing to an obstruction of the gland, and ought to be extirpated as early as possible, as all schirrous tumours have a disposition to become cancerous.

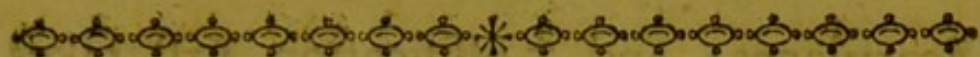
The *breast* and *testicle*, are the parts, which are generally the subjects of this complaint, and indeed all glands, having more excretory tube, than blood vessels, are particularly predisposed to it.

Cancer, is an unequal sore or ulcer, formed by the suppuration of the tumour before described, discharging a *fannies* from one or more openings. We recommend extirpation very early, as the only certain, and effectual method of cure; lest by contaminating the neighbouring

bouring parts, at length the whole system is affected, and the disease proves fatal.

It is to be noted, that when the arm is œdematous, the glands in the *axilla*, are affected, and ought also to be extirpated, or the disease will return.





Of the Formation and Structure of Bone.

HAVING given a description of those parts, which make the covering to the human machine, we shall here take notice of the principles, and general circumstances, belonging to that part, which forms the animal frame, giving shape, and support to the whole.

Bone is a hard inelastic substance, for the purpose of giving form, and support to the animal; to afford a lodgment for the soft parts, as the *brain*, *thoracic viscera*, and *spinal marrow*; and to defend them from injury.

All bones are of a fibrous texture, the fibres branch differently in different bones; in *flat* ones, the fibres are radiated; in the *cylindric* kind, they shoot towards the extremities; in those of a *spherical* shape, *quaque versum*. They form *lamellæ*, or plates, which are most conspicuous in young subjects, or growing bones, and are quite evanescent in old age; in it they appear compact, but the fibrous texture may be seen when burnt.

Bones shoot either in membranes, or

*cartilages; and † ossification first takes place in the centre, and is continued to the extremities. By this means we perceive why the *rickets* affect the joints principally, owing to the slowness of ossification in them, in general; and in a weak state, so much more so, as to occasion disease.

They are divided into a middle, and two extremities, the middle is called *diaphysis*, the extremities *epiphyses*; the latter form the joints, and receive the termination of muscles. By this means they afford a more advantageous attachment for the tendons, and remove the muscles from the centre of motion; in this manner, giving them a greater power of action, than could otherwise have been obtained.

Bones consist of two kinds of substance,
Animate, and
Inanimate.

The first, is the vascular part.

* Nesbitt is of opinion, they shoot in membranes.

Kirckstenius, Hewson, and Falconar, are of opinion, they shoot in cartilages.

† *Ossification* from *os*, bone, and *facio* to make the formation of bone.

The

The second is the earth, which is deposited in the interstices of the bones.

Of all other parts of the body, bones at first sight, have the least appearance of organization; they have by many been supposed to be mere concretes. They are not so, but are evidently organized.

They have arteries, veins, nerves, and lymphatic vessels. The arteries enter at all parts of the bone, and are for nutrition, and secretion; acting *ex officio*, as a gland, by depositing the earth. The absorbents perform the same office here, as in other parts of the body; may not therefore the *rickets* be sometimes owing, not to a deficiency of the secretion of earthy matter, but to a disposition of the absorbents, to imbibe too great a quantity of it? And as *rickets* and *scrophula*, are sometimes joined, we may hence reasonably infer this to be the case, especially in the last mentioned persons; the latter disease being a deposition of calcareous matter in the lymphatic glands, as being too gross to pass them.

The blood vessels of bones are demonstrable, by steeping the bone in vegetable, or mineral acid; for which purpose, the muriatic acid (i. e. *spirit of*

sea salt) is the best.

They are porous, for the admission of blood vessels.

Bone in the adult human subject, is of a white opaque colour, from the quantity of earth it contains; in old bones, the colour is different, from fresh ones; and the bones of young subjects are redder, as having more blood vessels in proportion to their cretaceous matter. In prepared bones, the colour is different, from various causes; and it is different, in different parts of the same bone. In some animals, it is green, as the *needle fish*; and in *birds*, yellow.

The colour is altered, by animals feeding on madder, which serves to prove to us, the very great vascularity of bone.

Chemical Analysis of Bone.

Bones yield the same elements, as all other animal substances, viz. phlegm, spirit, volatile salt, empyreumatic oil, and earth. If the * *caput mortuum* be burnt, in a close vessel, it gives ivory black; if

* *Caput mortuum* in chemistry, that thick dry matter, which remains after distillation of any thing but especially of minerals.

in an open one, a pure virgin earth, free of salt; hence it's use in making † cupils.

The earth, not only of bone, but of all other parts of the body, when it's other principles are destroyed, still retains a slight degree of adhesion. This is the reason, why *skeletons* found in vaults, appear perfect, but moulder away, on being touched or exposed to the air. And the solidity of all bones, is in proportion, to the quantity of earth they contain. The tenacity of bone is derived, from the other substances.

All bones are hollow, and contain animal oil, which is supposed to transfuse, to prevent the brittleness of the bone; but we are certain, it never does transfuse in the living body

They are made hollow, to make us lighter, and by being so, are more firm than if solid; the intention of nature, being to give greater strength, with the same number of fibres, and not for the lodgment of the marrow. Hence in birds, the bones are thin, the cavity large, and

* *Coppells* or *cupils*, vessels made of bone ashes for the purpose of extracting *gold* and *silver* from metallic substances.

annual plants, as corn, &c. are proofs of this.

When exfoliation takes place, it is from an injury done to the vessels, and not from an exposure to the air, as has been erroneously supposed; for example, the bones of birds are hollow, and contain a large quantity of atmospheric air, which is carried into the bones from the lungs; by which means they are lighter, both for flying and singing; they contain scarce any marrow, and no periosteum.

The cavities of cylindrical bones are cancellated, which is most compact in the centre, and more delicate towards the extremities; coarser towards the surface, and reticular, on the axis. In flat bones, as those of the skull, the cancellated structure, between the two plates, is called, diploe. In some subjects, and in many parts, this cancellated structure is wanting.

The cavities of the bones and their fibres, being at a distance, enables them to resist a force to break transversely.

Bones are not sensible in a sound state, but highly so in disease. The reason why bones are so little sensible is, because they have but few nerves, and because
sensi-

sensibility would have been inconvenient.

We divide bones into four *classes*.

In the first are all long bones, as those of the *extremities*.

The second contain those of the *head*.

These consist of two plates, and a middle substance, the first is the external, or cortical part, the middle substance is the *diploë*, of which we have taken notice before, and the other is the internal, or vitreous part.

In the third are included the spheroidal bones, *viz.*

The *patella*,

The bones composing the *hand* and *foot*.

The *ossa sesamoidea*, which are found near the joints.

These are all covered by a strong ligamentous membrane, to prevent a fracture by the muscles, which might otherwise happen, in jumping or other exercise.

The fourth class consists of the irregular bones, *viz.*

The *scapula*,

Vertebræ,

Os sacrum, and

Ossa innominata.

To these might be added, the *ribs*,
which

which are improperly classed with the cylindrical bones.

Bones have eminences of different kinds, which are distinguished by different names; we shall mention their names to you, and also the derivation and signification of them, as by these means, we hope they will be rendered, not only more clear, but also more easily retained.

* *Head.*

† *Condyle.*

‡ *Tuberosity.*

§ *Corona.*

|| *Spine.*

¶ *Supercilium.*

** *Labrum.*

Bones have processes, to give them the necessary shape, for articulation also, and

* A round process with a neck, this always denotes the upper extremity of the bone.

† From the greek word, *condulos*, properly applied to the joints of the finger, it also signifies an oblong process, from the fore to the back part of the bone, used in a ginglymus joint.

‡ A rough, knotty eminence.

§ A sharp, thin process; also acrist.

|| From *spina*, a thorn; a long, sharp process.

¶ A brow.

** A lip.

some of them are levers, for giving advantageous attachment to muscles.

The processes are,

* *Apophysis*, and

† *Epiphysis*.

There are also cavities in bones, the uses of which are, for *articulation*, and for giving lodgment to soft parts: they are the following,

‡ *Cotyle*,

§ *Acetabulum*,

|| *Glene*,

¶ *Alveoli*,

** *Fossa*,

* From the greek word *apophuo*, produco, a process growing out, from the surface of the bone.

† From the greek word *epiphuo*, accresco, to grow to, being a distinct ossification in young subjects, which afterwards growing to the body of the bone, makes it perfect.

‡ From the greek word *kotule*, a cup, a round deep cavity.

§ The same.

|| From the greek word *glene*; it properly signifies, the socket of the eye, but is also used to express, a shallow cavity in a bone, as cotyle does a deep one.

¶ The sockets in which the teeth are placed.

** Properly signifies, a ditch, but is used to express a deep cavity, between two bones.

†† Groove,
 ‡‡ Sinus,
 §§ Sinuosity,
 Hole,
 ||| Canal,
 ¶¶ Furrow.

Bones are combined in two ways, *viz.* articulation, and connection.

By *articulation*, we mean the forms of the parts intended to come in contact; and the relation they bear to one another

Connection, means the binding by some other substance.

Galen divided articulation into *arthron*, and *symphysis*; the first is again divided, into *diarthrosis*, and *synarthrosis*.

* *Diarthrosis*, signifies that kind of articulation, which gives to the joints considerable motion: it is subdivided into

†† A deep channel in any bone.

‡‡ A cavity in certain bones, the entrance of which is very narrow, and the bottom wider and more spacious.

§§ A series of bends and turns, sometimes jetting out, and sometimes falling in.

||| A duct, or passage, for any thing.

¶¶ The same as groove.

* From the greek words *dia*, cum, with, and *arthron*, membrum.

† enar-

† *enarthrosis*, *arthrodia*, and ‡ *ginglimus*.

The first is the term, proper to joints moving in all directions.

The second is the same as *enarthrosis*.

The third is a species of articulation, signifying flexion, and extension, in one direction.

The second division of *arthron*, is into § *synarthrosis*; this comprehends a species of articulation, having no particular motion: it is subdivided into *futura*, *harmonia*, and || *gomphosis*.

The first is applied to the articulation of the bones of the head.

The second, is, where the surfaces of the two bones, so exactly correspond with each other, that they leave no intermediate space.

The third is, where the bone is driven in like a nail, as the teeth in the jawbone.

The second principal division of articulation, is into ¶ *symphysis*, or *synthesis*;

† From the greek words, *en*, and *arthron*.

‡ From the greek word *ginglimos*, *cardo portæ*, the hinge of a door.

§ From the greek words, *sun*, and *arthron*.

|| From the greek words, *gomphos*, *clavus*, a nail.

¶ From the greek word, *suntithemi*, *compono*.

this denotes the connection, or binding of bones by other substances: it is divided into * *synneurosis*, † *synchondrosis*, and ‡ *syffarcosis*,

The first denotes, the connection of bones by ligaments, which were by the Greeks called nerves.

The second, is the union of bones by cartilage, as the epiphyses, to the bodies of the bones.

The third, is the union of bone by muscle only, as the *scapula* of the *quadruped*. But in the human body, we have no instance of this species of articulation.

It is to be observed, that great firmness in joints, and great extent of motion, are incompatible; and therefore one of them is generally found to be procured, at the expence of the other: for example, *arthrodia*, is weak; *ginglimus*, strong.

The different species of articulation

* From the greek words, *sun*, cum, with, and *neuron*, nervus, a nerve.

† From the greek words, *sun*, cum, and *chondros* cartilago, a cartilage.

‡ From the greek words, *sun*, cum, and *sarx*, caro, flesh.

being described, it may be proper to take some notice, of the diseases of the joints, in this place. They are generally, luxations, subluxations, and anchylosis.

A * *luxation* is the effect of a removal of the bone, forming any joint of the body, from it's proper cavity, or articulation: and it may proceed from several causes, either internal, or external. The internal causes are, disease in the head of the bone, or in any of the ligaments, or cartilages, by which it is connected; the external causes producing luxation may be various. Luxations immediately produced, and before any inflammation is come on, may be discovered by the direction of the limb; as for example, when the superior end is outwards, the inferior end will be inwards, and *vice versa*. It may also be known by the length of the limb.

In order to reduce luxations, in general, it is only necessary to place the limb, and indeed the whole body, so far as it may influence the direction of the limb, in the greatest state of relaxation, and by this means, and a gradual extension,

* From *luxa*, to disjoint.

the bone will be reduced.

In luxations, the capsular ligaments are sometimes lacerated, but in this case, the parts are generally diseased.

The symptoms attendant on luxations are various, but in general there is a defective motion of the limb, or a total loss of motion, a distention of some of the muscles, and a relaxation of others, attended with exquisite pain.

† *Subluxations* are the incomplete state of the disease, we have just described, and will generally yield more readily than the former.

In case of tumour, or inflammation, attending these complaints, they must be removed, before attempting the reduction of the limb; and after it is reduced, care should be taken, by rest and an easy position, to retain it in its proper situation.

The joints are particularly subject to a disease, called a *sprain*, occasioned by a violent distraction of the parts, surrounding the limb, and attended with considerable pain, and for some time with great weakness, owing to the very

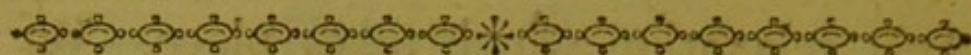
* Subluxations, partial dislocations.

great relaxation which takes place. We recommend an embrocation, with distilled vinegar, crude sal armoniac, and laudanum, to be used freely.

Substances are sometimes contained in the cavity of a joint, requiring an operation to extract them; to perform this, an assistant is to hold the extraneous matter, firm to the side of the joint, and you are then to make an incision, through the capsular ligament, and into the joint, in a valvular direction; with the forceps extract it, and close the orifice.

The * *anchylosis*, is very frequently the cure of a more disagreeable disease. In this case, nothing is to be attempted. The complaint is occasioned by the bones growing together, destroying the motion of the limb, and may be produced by various diseases of the limb. From whatever causes it may have arisen, it is very difficult of cure. If from a rigidity of the tendons, emollient applications, such as the *ol. ped. bovis*. may be tried. Dr. Lobb recommends the yolk of an egg and water, by way of liniment to the part.

* From the greek word *ankulos*, curvus, crooked.



On the Marrow.

WE are next to describe the substance, found in the cavities of bones.

Marrow, is found in the cavities of all bones, it consists of a congeries of cells, and forms a part of the glandula adiposa. It appears differently, in different parts of the same bone. Hence it's division into *medulla*, and *succus medullaris*; the medulla being that part which is solid, and contained in the middle of the bone; and the succus medullaris, the thin part, which is contained in the cells of the extremities. And it is to be noted, that these parts of all long bones, are more vascular than their centre.

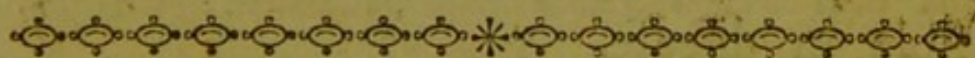
The cells in which the marrow is lodged, are surrounded by plexus's, of small blood vessels.

In a sound state, the marrow is not acutely sensible, but is highly so in disease.

It's use is, as a reservoir of nourishment, and not to prevent the brittleness of bone, as has been erroneously supposed. In proof of which, the absorption that takes place in long continued dropsics,

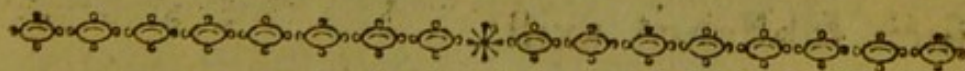
fies, in which disease, not one particle of animal oil is to be found in the bones, the whole being reabsorbed; and this is the only disease, that reabsorbs the whole of it. And untill the human subject is five or six years old, though ever so fat, scarce any animal oil, is found in the bones.

The marrow in human subjects, is the same as in hogs; it is said to transfuse through the bones into the joints; this is not true, transfusion never takes place in the living body.



Diseases of the Marrow.

THE *marrow* is subject to the same diseases, that all other vascular substances are, *viz. inflammation*, and *suppuration*: the *spina ventosa*, is in consequence of the latter.



Of the Periosteum.

THE next subject for our consideration, as an appendage, and immediately connected with bone, is the membrane

brane investing it, and called *periosteum*.

It's structure is of a white, compact, ligamentous, or tendinous nature; more vascular than ligaments, has arteries, veins, nerves, and lymphatic vessels, for the use of bone.

Mr. Falconar thought it consisted of different layers, the external he supposed adventitious, as being an expansion of the tendons and ligaments. But we are of opinion there is no true periosteum, that it is *ex officio*, a gland, having one centre of ramification. It has some sensibility in a sound state, and is very sensible in disease.

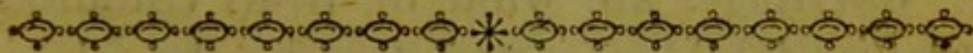
The periosteum has been said, to make a general covering to the skeleton, but this idea is not perfectly just.

Mr. Falconar said, it might be demonstrated in the internal cavities of some bones, and it very probably existed in all; hence an internal periosteum has been described, but we do not believe any such substance exists.

The uses of this membrane are, to give smoothness to bone, lessening the friction of soft parts, allowing of blood vessels to be divided into small branches, for entering the bone at all parts; it gives a
more

more commodious attachment to muscles, and being continued over the epiphysis's, firmly connects them with the body of the bone.

In the *silken fowl*, from the coast of Guinea, the periosteum is black.



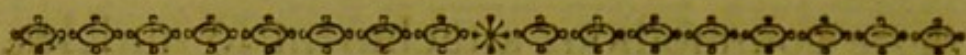
Diseases of the Periosteum.

THE diseases of the periosteum, are *inflammation*, and the consequences attending it; but it suppurates unkindly, therefore whenever there is a fluid under it, we advise you to let it out as soon as possible, to prevent it's thickening near the bone.

In venereal nodes, which originate here, cut down through it, with the knife, and dress with mercurial ointment, and black soap; the latter of which acts as a stimulus, and on this principle, brings on a suppuration and better discharge, than might otherwise be expected.

It sometimes sloughs, and the bones are affected in consequence of it.





Of Cartilages.

WE proceed to describe the last substances connected with the bones, viz. the *cartilages* and *ligaments*.

Cartilages are white or pearl coloured elastic substances, and supply the place of bone, and are of *three different classes*.

The first are those that supply the place of bone in the adult, as in the *ear, nose, larynx. &c.*

Those of the second, supply the place of bone, in the early part of life, till bone can be formed.

The third form articular cartilages, or those crusts, which cover the ends of bones, where they make a proper configuration of them, adapted to form joints. They are covered by a kind of membrane, called *perichondrium*, are moveable in the *lower jaw, sternum, and clavicle*; and in the *knee*, where they are called *semilunar, or razor-like cartilages*.

The structure of the different classes, is different.

Those of the first class, are covered with a ligamentous membrane, similar to
the

the periosteum; have blood vessels, which are small and numerous; have also nerves, are little sensible, and not subject to disease: they bear pressure better than other parts.

Those of the second class, are covered by that periosteum which afterwards invests the bones, and are very vascular, admitting arteries, veins, and lymphatic vessels.

Those of the third class, are very elastic and compact, and have no vessels, that can be demonstrated; yet probably, are not inorganic; have fibres that stand like needles at right lines, meeting each other; may be separated by maceration, are insensible, and have no perichondrium. The uses of these are, to give smooth surfaces, to make motion easy, to prevent abrasion, and to break the force of collision, on the same principle as coaches are hung. They are not subject to disease, but may be destroyed by diseases in the neighbouring parts; do not *pullulate*, but become black, and slough by exposure to the air; it is therefore necessary when they are wounded, to scrape them off, but not otherwise.

There is a species of *ligaments*, which
are

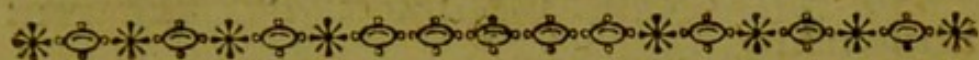
are immediately connected with the bones, to be described in this place.

They are distinguished by different names, adapted to their different forms, and uses.

Those of the joints are called, either round, or burfal; are white, tendinous, and inelastic; they are strong, and flexible, and are found only in the joint of the *knee*, and in the articulation of the *os femoris*, with the *os inominatum*. The burfal, or capsular ligaments, surround the whole joint, like a purse; and are to be found, in the articulations, which allow of motion every way. They contain the sinovial fluid, their structure is of the ligamentous kind, and consists of two layers, different in their nature and origin. These are distinguished by the epithets, external and internal: the external one, consists of the ligaments, which tie the bone together, and seems to be continued into the periosteum; the internal is a smooth, delicate, thin, reflected membrane, extremely vascular, can be traced to the edges of the articular cartilages, but probably is not continued over them.

It's uses are twofold, the external layer, gives strength, and prevents luxations; the

the internal secretes the sinovia, for the lubrication of the joints.



Diseases of Bone.

THE general diseases, to which bone is liable, we shall treat of here, but the diseases of particular parts, will be taken notice of, in treating of the different parts of the osteology.

The diseases of bone are, the *rickets*, *spina ventosa*, *mollities ossium*, and *caries*.

The *rickets* is a disease of bone, from a want of tone in the parts, and a due proportion of earth in the bone, as in this disease, they are chiefly composed of watery fluids. When the subject grows older, the earth is secreted in larger quantities, than is necessary; and this appears to be the reason, why rickety subjects are most liable to the stone; a complaint, which we believe to be owing, to an absorption of the earth of the bones.

The *spina ventosa*, is caused by an inflammation and suppuration of the marrow.

Mollities ossium, is a disease, in which the bones become so soft, as to ply to
any

any form ; and the patients generally void a large quantity of calcareous matter in their urine, previous to the complaint's appearing.

Would not any diet, containing a larger proportion of earth than common, be of service in this disease ? And might not *magnesia*, as the least objectionable *testacea*, be given with advantage ? especially as we know, that the earth in the bones, is constantly changing ; the impure parts being continually absorbed, and new matter deposited in it's room. In proof of this, Mr. John Hunter fed himself with *madder*, and during the time he was eating it, he observed his urine deposited calcareous matter, tinged with the colour of madder.

Caries are divided into a great variety, by many authors ; but we shall only mention, the complaint as it most commonly occurs, without giving the detail of the different species, which has been very accurately done, by Mr. Petit, and the late professor Monro.

The symptoms attending this disease, are generally, a deep-seated pain in the bone, with a livid colour, and sponginess in the teguments ; an ulcer continuing
long.

long near the bone, with the granulations appearing of a pale colour, spongy, bleeding, without pain, and easily penetrable by a probe ; the thinness, brown colour, disagreeable smell, and larger quantity of matter discharged, the bone feeling scaly, and unequal.

A speedy, and safe separation of the corrupted part, is the proper treatment ; and this may frequently be effected, by the compound elixir, or tincture of myrrh with aloes, When this does not answer, the bone may be laid bare, and the part taken off, by a proper instrument.

End of the First Section.



long near the nose, with the granular
ions appearing of a pale colour, from
bleeding without pain, and easily
removable by a probe; the throat brown
colour, the lips thick, and the tongue
dry, and much enlarged, the horse dead
the day, and natural.

At first, and late repetition of the
crouped, and the proper treatment;
and the horse, therefore, he should be
the compound, with a mixture of myrror
and honey. When this does not answer
the horse is to be bled, and the part
to be cut off by a sharp instrument.

THE DISEASES OF THE HORSE