Vesalius,
Born at Brussels, 1514. Died at Zante, 1564.

"In my opinion he was one of the greatest men that ever lived."

"He discovered a new world before he attained the age of twenty eight."

Portal, Michel de l'anatomie.

Senao. Tract, du cœur.
THE ANATOMIST'S VADE-MECUM.

CONTAINING THE
Anatomy, Physiology, Morbid Appearances, &c.

OF THE
Human Body;

The Art of making Preparations, &c.

THE FOURTH EDITION,
REVISED AND ENLARGED.

BY ROBERT HOOPER, M.D. F.L.S.

LONDON:
PRINTED FOR MURRAY AND HIGHLEY, FLEET STREET.
1802.
TO

SIR CHRISTOPHER PEGGE, KNT. F.R.S.
REGIUS PROFESSOR OF PHYSIC AND READER IN ANATOMY.
IN THE UNIVERSITY OF OXFORD,

THIS EDITION

IS RESPECTFULLY INSCRIBED,

As a Mark of Gratitude for the many Favours received

by

His sincere Friend,

THE AUTHOR.
INTRODUCTION

Sir Christopher Brogel, K. B. E.

I have been looking at the text and it seems to be a page from a book discussing the introduction of a writer to a subject. The text appears to be from a historical or biographical work, detailing the life and work of Sir Christopher Brogel. The text mentions his contributions and the importance of his work. However, the text is not entirely clear and some parts are difficult to decipher due to the quality of the image. Overall, it seems to be a continuation of a discussion on historical figures and their impact on society.}

The natural text is as follows:

INTRODUCTION

Sir Christopher Brogel, K. B. E.

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INTRODUCTION.

It is the intention of the writer, in the following Compendium, to present to the student a useful anatomical conspectus, or pocket manual of anatomy and physiology; giving a short but accurate description of the different parts of the human body, and their functions; the method of preparing the various parts of the body, in order to exhibit their structure, in a healthy and diseased state, as far as our present knowledge will enable us; and a glossary, or explanation of the principal terms used in that science.

The utility of such a performance, it is presumed, will be generally acknowledged, especially when it is considered that there is no such work written upon a similar plan.

The principal motive that induced the author to form and collect together, into one small pocket volume, this elementary production, was his having himself experienced the want of such an assistant when applying
to that branch of philosophy. He, therefore, solicits permission to recommend it to students, not as a work wherein any thing new is to be met with, but merely as their occasional companion in the prosecution of their studies.
From the works of Hippocrates, the father of medicine, who flourished about four hundred years before the birth of Christ, is to be collected all the information of antiquity on the subject of anatomy. This great physician, whose principal attention was directed to the symptoms and cure of diseases, was, nevertheless, well aware of the importance of anatomical knowledge to perfection in the healing art; hence we find, that his works abound with anatomical facts and observations, interspersed with the prevailing doctrines of the day. When it is considered, how many obstacles were thrown in the way of this science, from climate, prejudice, and superstition, the perseverance and acquirements of this great man, the ornament of the medical profession, cannot be sufficiently admired. He describes some parts peculiar to the human body which could only be ascertained by actual dissection. The body he made to consist of solids, fluids, and spirits; of containing and contained parts. The elementary humours he divided into four kinds: blood, phlegm, choler or bile,
bile, and melancholy or occult bile. This was agreeable to the philosophy of the age in which he lived; as likewise the notions of all bodies being composed of earth, air, fire, and water. He never distinguished between nerves, arteries, veins, or tendons; but calls the heart and its pericardium a powerful muscle; he knew the aorta, vena cava, pulmonary arteries and veins, and entertained obscure notions of the uses of the valves; but considered the auricles as a fan. He mentions the distributions of the arteries and veins by trunks and ramifications from the heart; and asserts, that all the arteries originate from the heart. The liver was thought to be the root of the veins, the fountain of the blood; and he supposed it to separate bile. He thought the arteries carried the spirits; but was entirely ignorant of the circulation of the blood, and of the use of the diaphragm; and his seating the soul in the left ventricle of the heart is a memorable example of human vanity, and of that inherent inclination in man, boldly to account for what is inexplicable. The heart and lungs, he imagined, received part of our drink. Of the organ of hearing, it is concluded, he knew little, for he only mentions the tympanum. As to the brain, which he thought a gland (an idea which has since been erroneously supposed to belong to Malpighi), the nerves and their uses, vision and the senses, he was totally ignorant as to the causes; yet he makes the brain the seat of wisdom. The glands he imperfectly understood. The Pythagorean doctrines of conception, generation, and pregnancy, are, in general, absurd and superstitious; as likewise
likewise his notions of the Pythagorean numbers, which seem to have been the prevailing, philosophical follies of the day. On moles, false conceptions, and the nourishment of the fetus, a rational judgment is formed; he comprehended the communication from the mother to the fetus by means of the umbilical cord; though, in another place, he supposes that it absorbs nutriment by the mouth, and from the surrounding fluid in the ovmum.

After Hippocrates, anatomy continued to be improved; but, as opportunities were extremely limited, from the prejudices of mankind, its progress was but slow, and chiefly confined to the two schools of Athens and Alexandria. In the former, the names of Socrates, Plato, Xenophon, Aristotle, and Theophrastus, are still preserved along with many of their works; and, although we observe that their general attention was directed to philosophy, yet natural history and anatomy were far from being overlooked: their opportunities, however, of examining bodies were confined; and after their time, the study of natural knowledge at Athens sank for ever. But while it decayed in Greece and Asia, it rose with increased energy, under the protection of the Ptolemies, at Alexandria. In this school, which was so long pre-eminent, Erasistratus and Herophilus were highly distinguished for anatomical knowledge. By the liberal patronage of the Ptolemies, they enjoyed ample opportunities of dissecting human bodies; and the consequent improvements which anatomy received were very great. They not only corrected many former errors, but wrote with great judgment upon neurology. They
observed a variety of structure in nerves supplying different parts, and hence distinguished them into those which were necessary to sense, and those which were subservient to motion.

Between the times of Herophilus and Erasistratus to Galen, a period of five hundred years, Asclepiades, Rufus Ephesius, and the sensible and elegant writer Celsus, flourished. The two latter have given the appellations and situations of all the parts of the human body, in compendio, in which many discoveries appear to have been made from the time of Hippocrates. Neither one nor the other dwelt much on the uses of the parts. Rufus writes Greek in the concise Attic style, and Celsus is the most classical writer that ever appeared in the art of medicine.

Claudius Galenus, or Galen, was physician to four emperors, and was, without exception, the most distinguished practitioner of the age in which he lived. He has arranged all the prior anatomical science that Herophilus and Erasistratus had obtained from the actual dissection of human subjects, and incorporated it into his voluminous treatises on all the branches of medicine. The medical principles of this great man, formed on the Peripatetic philosophy of Aristotle, are not to the present purpose; except that they reigned triumphantly in the schools and universities, disdaining and crushing all innovators or improvers, for a period of nearly fifteen hundred years. The celebrated Galen, however, was a man of uncommon erudition, and he brought into one point of view, with much labour, learning, and industry,
try; all the medical and philosophical science of his pre-
deceivers. The anatomical part was iniquitably ex-
tracted from the great Herophilus and Erasistratus, and,
consequently, in general contains what those first dissectors
of human bodies had observed or written. In the works
of this eminent physician, anatomy appears very con-
spicuous and methodical. He gives the situation and
uses of all the parts of the human body, whether ani-
mal, vital, or natural. What discoveries he made, can-
not be ascertained; but Galen was the first author who
seems to have digested, in regular order, the human
functions, the brain and its membranes, the senses, the
contents of the thorax and abdomen, osteology, a com-
plete myology and neurology, in which are the origin
and insertion of the muscles, their action, &c.; and the
distribution of the whole nervous system. The lacteal
vessels, likewise, were well known; though the extent of
their effects, their passing through the thoracic duct and
subclavian vein, to the blood, were not comprehended.
The exhalent arteries and inhalents were mentioned,
both by Hippocrates and Galen; but the principles of
action were unknown. The circulation of the blood,
the real uses of the liver, glands, heart, diaphragm, pan-
creas, kidney, ureters, bladder, universal cellular struc-
ture, the power of the nervous system over the arteries
and veins, the lymphatic absorbent system, were to him
unknown.

From the time of Galen to the fifteenth century, anat-
omy was rather on the decline, anatomists being con-
dered learned or ignorant in proportion to their know-
ledge.
ledge of his works. The destruction of Alexandria intro-
duced learning among the Arabs; but they made
but little progress in the knowledge of the human body.
Abdallahr, however, towards the close of the twelfth
century, exposed many of Galen's errors in osteology,
by frequenting burial grounds.

Among the early cultivators of the science of anatomy
in the sixteenth century, the great Vesalius nour-
ished, who may with propriety be styled the Restorer
of Anatomy; being the first who dared expose the er-
rors of Galen, in medicine and anatomy, by referring
to the human body. This wonderful man, whose per-
fection and genius cannot be sufficiently admired, was
born at Brussels, in 1514. After having gone through
the usual studies of the age, he went to Montpellier, to
study medicine. The principal professors in the univer-
sity of Paris requested him to come there, where he at-
tended their lectures. Vesalius's zeal for medicine, par-
ticularly anatomy, induced him to brave every danger
to which he was exposed, by clandestinely procuring
bodies for dissection. He did not, however, confine his
attention to the human subject only, but opened a
great number of animals. In the pursuit of his favourite
science, his veneration for Galen diminished in propor-
tion as he detected his inaccuracies; for at length he
threw off all control of this great standard of ancient
medicine and anatomy, and became the advocate for ac-
tual dissection of the human body, to which he constantly
referred in all his disputations.

The war, which commenced at that time in France,
obliging Vesalius to leave Paris, he returned to his own country, Louvain. The knowledge he had acquired in anatomy induced him to profess it publicly in that city; but, in order to extend his anatomical researches, in 1535, he followed the army of the Emperor Charles the Fifth, against France. His reputation increased. He was chosen professor of anatomy in the university of Padua, by the republic of Venice, and there gave lectures on medicine, particularly anatomy, for seven years.

In 1539, Vesalius published his anatomical plates, which attracted the admiration of the learned. In this, and in his other works, all the errors of Galen are exposed. A multitude of enemies sprung up against this bold innovator of old established authority. All Europe resounded with invectives against him: Eustachius at Rome, Driander at Marburg, and Sylvius at Paris, became his public enemies, particularly the latter, who employed every species of calumny to lessen him in the esteem of his patrons; instead of Vesalius, he called him Vesanus, or a madman; and accused him of ignorance, arrogance, and impiety. Fallopius was the only one among his opponents who preferred any moderation. Having been a pupil of Vesalius, he never forgot how much he was indebted to his preceptor; and, although he was far more able than Sylvius to criticize, from having powerful objections to bring forward against the work, he proceeded in the most delicate and respectful manner, influenced by the greatest esteem and gratitude for the affiurance he had received from his venerable master. Vesalius, on the other hand, acted towards his pupil in the most gentle and
and honourable manner. As soon as the remarks of Fallopius on his work, had reached Spain, Vesalius prepared to answer them, and replied to him as a father would to his son. Fallopius, who has rendered his name dear to posterity by his extensive knowledge in anatomy, possessed sentiments very different from Sylvius; he was not ashamed of acknowledging his obligations to Vesalius, for the greater part of his information on anatomy he admits that Vesalius has not shown sufficient respect to Galen, but confesses that his objections are generally correct. Notwithstanding all opposition, the reputation of Vesalius daily increased, and he established anatomy on solid and permanent principles, when the Emperor Charles the Fifth, by whom he had been already honoured, nominated him his first physician, and kept him constantly at court. He now gained the confidence of the nobility, and frequently gave unequivocal marks of his profound knowledge in the practice of physic. But an unexpected event soon reduced this great man to distress. Upon the death of a Spanish gentleman, whom he had attended during life, Vesalius requested permission of the relatives of the deceased to open the body. The moment he exposed the cavity of the thorax, he saw the heart palpitating. This unfortunate affair came to the ears of the gentleman's relations, who prosecuted Vesalius not only as a murderer, but accused him of impiety before the Inquisition, which severe tribunal was about to punish him for the crime. When Philip the Second, of Spain, suggested the means of removing him from the decision of his judges, and caused him to make a pilgrimage to the Holy Land;
in consequence of which Vesalius resolved to make the

tour of Palestine. He passed over to Cyprus with James
Malatesta, a Venetian general, and thence to Jerusalem.

Soon after the death of the celebrated Fallopiaus, which
happened in the year 1564, the Senate of Venice recalled

Vesalius to fill the chair; but on his voyage to Padua,

he was shipwrecked on the island of Zante, where this
great man, reduced to the utmost extremity, perished

with hunger, on the 13th of October 1564, at the age

of fifty years. It is said, that a goldsmith, who landed

on that part of the island soon after the accident, caused

him to be interred, and that the following epitaph is

engraven on his tomb in the church of the Virgin Mary,
in that island:

Tumulus

ANDREW VESALII BRUXELLIENSI

 Qui abit ibidus Obiitris

Anno M.D.LXIV.

Etatis vero sae L.

Cum Hierofolymis rediijit:

Vesalius had scarcely attained his twenty-fifth year
when he published his work, De Structura Corporis Humani

—on the Structure of the Human Body. This extraordinary production would appear incredible in so young a

man, were it not attested by the best authority, in

"Vesalius, in my opinion," says Monti Portal, "is one of the greatest men that ever existed." Let astronomers

"muse boast of Copernicus; natural philosophers, of

Galileo.
Galileo, Torricelli, &c.; mathematicians, of Parachil;
and the geographers, of Christopher Columbus; I
shall always rank Vefalius above them all." The
house of Vefalius was lately the convent of Capuchins,
at Bruxels. These pious men considered it an honour to
state their letters Ex Edibus Vefalianis. It appears, that
in the year 1546, Vefalius was at Baille, to correct the
press for a new edition of his works. He occupied his
leisure hours, whilst he resided there, in preparing a
human skeleton, which he presented to the body of
physicians in that city. It was received with the greatest
pleasure; and, as a proof of their gratitude, the fol-
lowing inscription was put under it, which remains to
this day:

Andreas Vefalius. Bruxell.


Laudatis, Anatomicorum

Administris. Comm.

It hac Urbis Region.
Publicaturus

Vitro quod cremis Seelturn.

Artis et Industriae sue

Specimen.

Anna Christiano

MDXLVI.

Exhibuit erexitique,

From the time of Vefalius, the value of human dis-
section was fully appreciated, though opposed by the
prejudices of the vulgar. The beginning of the seven-
teenth's
The sixteenth century is remarkable for the discovery of the circulation of the blood, by the immortal Harvey, in which he was much assisted by the previous discoveries of Fabricius on the valves in the veins, and by Servetus, Columbus, and Casalpinus, who nearly fifty years before demonstrated the circulation of the blood through the lungs. This has been the most important discovery ever made in anatomy, and upon it depends the whole of our present physiology. Soon afterwards, Aselius, an Italian, discovered the lacteals, which Pecquet, in 1651, traced to the thoracic duct, and thence to the left subclavian vein. In 1653, Rudbeck and Bartholin discovered the lymphatics; it does not appear that there was any communication between them; both, therefore, are entitled to equal praise. The latter has, however, additional credit from his having entertained very accurate ideas of the physiology of the lymphatic system, which was afterwards more fully explained by Glisson.

The two last centuries have nearly perfected our knowledge of the human body. Every nation in Europe has produced anatomists of the greatest reputation. The names of Albinus, Cooper, Diemerbrock, Highmore, Cheselden, Lewenhoek, Malpighi, Mayow, Ruysch, Willis, and Winslow, form but a small number of those who have enlightened the science of anatomy in the seventeenth century. In the eighteenth, the following are particularly distinguished: Haller, Morgagni, Zinn, Walter, Scarpa,
Scarpa, Soemmering, the Monros, the Hunters, Cruickshank, and Bailey.

Fortunately for mankind, anatomy is now become an indispensable branch of medical science; and throughout Europe we have everywhere distinguished teachers, who are daily adding to the stock of useful information.
ANATOMY is a science which explains the structure and use of every part of the human body, both solids and fluids.

The examination of brute animals, fishes, reptiles, polypi, &c. in order to illustrate more clearly, or to demonstrate by analogy, the structure and functions of man, is called Zootomy, or Comparative Anatomy.

THE PRINCIPLES OF THE HUMAN BODY.

The human body consists of solids and fluids. The solids are divided into hard and soft: the former comprehending bones and cartilages; the latter, muscles, nerves, the visceræ, and all the other soft parts of the body.

The Solids of the Human Body.

Analysis of the solid parts demonstrates their constituent principles to be earthy particles connected together by an intermediate gluten.

When these principles are joined one to another in a regular series, they form a simple or elementary fibre.

If a number of fibres be joined together, by their breadth, they constitute a layer or lamina.

The union of many of these laminaæ without any order forms cellular structure, more commonly termed cellular membrane.

A membrane is nothing more than a compact or condensed cellular structure.

Thick, strong, and elastic membranes are termed ligaments.

When cellular structure is distended with a coagulated elastic jelly, it forms a cartilage.
Phosphate of lime deposited in the cellular structure constitutes either bony fibres, or laminae, which form bone.

A nerve is a soft bundle of fibres of a pulpy substance, sui generis, called nervous and cellular structure.

The brain is composed of this nervous substance.

Muscles consist of fibres formed of a peculiar substance, nerves, and vessels. Tendons are the beginnings or ends of muscles, of a silver glintening colour.

Blood vessels and absorbents are hollow canals formed of membranes, nervous and muscular fibres, and cellular structure.

Glands are composed simply of vessels, nerves, and cellular structure; or a peculiar substance.

A viscus, that is, an organ or organical part, is a term given to any part which performs a determinate office, as the lungs, the liver, intestines, the skin, glands, &c. &c. The viscera are composed of vessels, nerves, and cellular texture.

The Fluids of the Human Body.

These consist of the chyle, blood, and various humours separated from the blood. See Hygrology.

The science of Anatomy comprehends, and is divided into,

Osteology,
Syndesmology,
Myology,
Bursalogy,
Angiology,
Neurology,
Adenology,
Splanchnology,
Hygrology,

or doctrine of the

Bones.
Ligaments.
Muscles.
Burseæ Mucosæ.
Vessels.
Nerves.
Glands.
Viscera.
Fluids.
OSTEOLOGY;

OR,

DOCTRINE OF THE BONES.

Bones are hard, compact, inflexible, and insensible substances composed of animal earth and gluten, which support and form the structure of the body, defend its viscera, and give adhesion to its muscles.

The substance of bones is of three kinds:—Compact, as in the bodies of the long bones; spongy, as in the extremities of the long bones; and reticular, called also the cancelli of bones, as in the cavities of bones which have marrow.

COLOUR. Whitish.—FIGURE. Various.

Long and irregular shaped bones are divided into a body and extremities; and flat bones into body and margins.

Bones are variously named; some from their situation, as the frontal, parietal, occipital, nasal, malar, &c.; others from their figure, as the ethmoid bone, clavicle, os cuboides, navicular, tibia, &c.; and some from their use, as the sphenoid bone, the maxillary bone, the femur, &c. The processae and cavities of bones are named after their figure, as the acetabulum of the os innominatum, the odontoid process of the second cervical vertebra, the coracoid process of the scapula, &c.; or from their use, as the trochanters of the thigh bone; or from their situation, as the nasal, palatine, orbital processae, &c. &c.

There is a kind of eminence peculiar to bones, called an epiphyse, which should be distinguished from an apophyse. The latter is nothing more than a process; but an epiphyse is a part of a bone connected to that bone by an intervening cartilage; thus the condyles of the thigh bone of a child are separable from the femur. Epiphyses at length become apophyses in the adult.

When
When the bones are deprived of their soft parts, and hung together, in their natural situation, by means of wire, the whole is termed an artificial skeleton: but when they are kept together by means of their ligaments, it is called a natural skeleton.

### A Table of the Bones

#### The bones of the cranium, or skull
- Os frontis
- Os parietalum
- Os occipitum
- Os temporalium
- Os ethmoides
- Sphenoides
- Os maxillarium sup.
- Jugalia
- Nafalia
- Lacrymalia
- Palatina
- Spongiosa infer.
- Os vomer
- Maxillare infer.

#### The bones of the face
- Incisores
- Cuspidati
- Bicuspidae
- Molares
- Sapienitae

#### The spine
- Vertebræ
- Sacrum
- Os coccygis

#### The thorax
- Sternum
- Ribs

#### The pelvis
- Os innominata

#### Bones of the Head

<table>
<thead>
<tr>
<th>Bone</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Os frontis</td>
<td>1</td>
</tr>
<tr>
<td>Os parietalum</td>
<td>2</td>
</tr>
<tr>
<td>Os occipitum</td>
<td>1</td>
</tr>
<tr>
<td>Os temporalium</td>
<td>2</td>
</tr>
<tr>
<td>Os ethmoides</td>
<td>2</td>
</tr>
<tr>
<td>Sphenoides</td>
<td>2</td>
</tr>
<tr>
<td>Os maxillarium sup.</td>
<td>2</td>
</tr>
<tr>
<td>Jugalia</td>
<td>2</td>
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<tr>
<td>Nafalia</td>
<td>2</td>
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<tr>
<td>Lacrymalia</td>
<td>2</td>
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<tr>
<td>Palatina</td>
<td>2</td>
</tr>
<tr>
<td>Spongiosa infer.</td>
<td>2</td>
</tr>
<tr>
<td>Os vomer</td>
<td>1</td>
</tr>
<tr>
<td>Maxillare infer.</td>
<td>8</td>
</tr>
<tr>
<td>Incisores</td>
<td>2</td>
</tr>
<tr>
<td>Cuspidati</td>
<td>4</td>
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<td>Bicuspidae</td>
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</tr>
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<td>Molares</td>
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<tr>
<td>Sapienitae</td>
<td>4</td>
</tr>
<tr>
<td>Os hyoides</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Incus</td>
<td>2</td>
</tr>
<tr>
<td>Stapes</td>
<td>2</td>
</tr>
<tr>
<td>Os orbiculare</td>
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</tr>
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</table>

#### Bones of the Trunk

<table>
<thead>
<tr>
<th>Bone</th>
<th>Cervical</th>
<th>Dorso</th>
<th>Lumbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertebræ</td>
<td>7</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Sacrum</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Os coccygis</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sternum</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ribs</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Os innominata</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The skeleton is divided into head, trunk, and extremities.

OF THE HEAD.

There is a great variety in the shape of the heads of individuals. That of females is more delicate; the insertions of the various muscles of the face are not so strongly marked. The heads of the different nations also vary; that of the African is flattened on the forehead, and the teeth and chin are extended forward.
The shape of the head of the Asiatic and American negro also varies from the European. The head is divided into the cranium, or skull, and face.

**OF THE ADULT CRANIUM, OR SKULL.**

**Shape.** Various, according to the customs of different nations, the bones of the child being so tender as to be moulded into almost any form. Composed of eight bones—viz. one os frontis, which forms the forehead; two osa parietalia, situated at the upper part and sides of the head; two osa temporum, placed below the parietal bones; one occipital, forming the back part of the head; one sphenoideal, placed in the middle of the basis of the cranium; and one ethmoid bone, situated behind the root of the nose.

Upon viewing the superior part of a skull externally, several zigzag lines are observable:—that which extends from one temple across over the head to the other temple is termed the coronal future; it unites the frontal bone to the two parietal:—that which proceeds from behind one ear upwards across to the other is the occipital or lambdoidal future; it unites the occipital bone to the two parietal:—and the future which extends upon the crown of the head, from the lambdoidal to the coronal, uniting the two parietal bones, is called the sagittal. They are sometimes termed the true futures, to distinguish them from two spurious or squamous, which are found, one on each side of the cranium, extending from the temple backwards, in the form of an arch, and uniting part of the temporal bone to the parietal. Besides these futures two other portions are to be noticed; the one belonging to the lambdoidal, the other to the squamous future, being, in fact, continuations of them: they are called additamentum future squamose, and additamentum future lambdoidalis. There are, sometimes, one or more
more triangular-shaped bones observed in the course of some of the futures; these are called *otica trigaea,* triangularia, or *Wormiana.* Besides these futures, there are several prominences upon the upper part of the cranium; two in the frontal bone, one immediately over each eye between it and the future; one in the middle of each parietal bone; and one in the middle of the occipital; these point out the centre of ossification of those bones.

Upon the internal surface of the upper part of the cranium there are a number of grooves, in an arborecent form; these are made by the spinous artery of the dura mater. The futures are here seen in the form of a line, not dove-tailed, and the whole surface appears more polished than the external.

The bones forming the upper part of the skull, or, as it is sometimes called, the *calvaria,* are composed of an external and an internal table, which are of a compact structure, and of a spongy intervening substance, called the *medullarium,* or *diploe.*

The internal surface of the batin of the cranium is divided naturally into eight considerable depressions, adapted to the lobes of the brain and cerebellum. The two *anterior* are immediately over the orbits, and are separated from each other by an obvious eminence, above the root of the nose, called *crista galli.* Immediately before this eminence is a small hole, called the *foramen caecum*; and on each side of it are a number of perforations, which transmit the olfactory nerves into the nose; they are called the *foramina cribrosa.* Passing backwards, there are two round holes, near each other, one going to the bottom of each orbit; these are for the passage of the optic nerves, and are called *foramina optica.* Beyond these holes there is a small cavity, which will admit the end of one's little finger, surrounded by four processes, two of which are anterior, and two posterior; these are termed *clinoïd processes,* and the cavity...
In their middle, which contains the pituitary gland, the *sella turcica*. Under each anterior clinoid process is a considerable fissure, the *foramen lacerum orbitale superius*, which communicates with the orbit, and transmits the third, fourth, the first branch of the fifth, and the sixth pair of nerves, and the ophthalmic artery. Beyond this fissure, proceeding backwards, there is a round and then an oval hole; the first is the *foramen rotundum*, through which the second branch of the fifth pair of nerves passes; the other, the *foramen ovale*, for the passage of the third branch of the fifth pair of nerves. Contiguous to the foramen ovale is a small hole, the *foramen spinosum*, through which the spinous artery of the dura mater enters. Between the foramen ovale and the posterior clinoid process, on each side of the *sella turcica*, there is a considerable ragged aperture, the *carotid canal*, which is partly filled up with cartilage in the fresh subject, and is for the entrance of the carotid artery and the exit of the great intercostal nerve. A projecting portion of bone next presents itself, called the *petrous portion* of the temporal bone; it has upon its posterior surface an oval opening, the *meatus auditorius internus*, through which the nerve for the organ of hearing, and the facial nerve, enter. Immediately below this is an irregular oval opening, formed by the junction of the occipital with the temporal bone; this is the *foramen lacerum in basi cranii*: through the anterior part of this opening passes the eighth pair of nerves, and the posterior part transmits the blood from the lateral sinus of the dura mater, whose course is marked by a *deep groove* leading to the foramen lacerum, into the jugular vein. The portion of bone which proceeds backwards from the posterior clinoid processes, between the petrous portions of the temporal bone, is the *cuneiform* or *basilar process* of the occipital bone; it is somewhat hollowed for the reception of the *medulla oblongata*, which lies upon it.
At the bottom of this process of bone is a considerable opening, called the foramen magnum occipitale; it transmits the spinal marrow, the vertebral arteries, and the accessary nerves of Willis; and a process of the second vertebra of the neck lies in its anterior part. Between this opening and the foramen lacerum in basi cranii is the foramen condyloideum anterius, which gives passage to the ninth or lingual pair of nerves. Beyond the great occipital foramen is a crucial eminence, to which processes of the dura mater are attached; the horizontal eminence separates the two superior occipital cavities from the two inferior.

The skull is divided into calvaria and basi. The calvaria comprehends all that portion situated anteriorly, about an inch above the nose, and half an inch above the orbits; laterally above the semicircular ridge of the parietal bones; and posteriorly about an inch above the occipital tubercle. The calvaria is the part which is fawed off to examine the brain after death. The operation of trepanning may be performed on any part of the calvaria.

The calvaria is more subject to venereal caries than any other of the bones; and one kind is peculiar to it, viz. the honeycomb caries: it consists in the total destruction, here and there, of one or both tables, so as to convey, though very imperfectly, the resemblance of the cells of a honeycomb. It is also subject to the spongy venereal exostoses.

Monsters are occasionally born without any calvaria; and when this happens, the greater part or the whole of the brain is wanting.

The calvaria is sometimes remarkably thick. It is not clear, whether this be the effect of disease or not. It is, however, very probable, that in some instances it is the consequence of rheumatic inflammation.

The dia phasis, or separation, and often the absorption, of the bones of the calvaria are frequently the consequences of an accumulation of water within the skull.
OF THE FœTAL CRANIUM.

The bones of the skull of a foetus at birth are far more numerous than those of an adult; for many of the processes of the latter are epiphyses in the former; thus the occipital bone consists of four portions; the sphænoidal of three, &c. There are no futures in the cranium of the foetus. The parietal bones and the frontal bones do not coalesce until the third year, so that before that period there is an obvious interstice, commonly called mould, and scientifically, the fontanel, or fons pulsatilis. There is also a lesser space, occasionally, between the occipital and parietal bones, termed the posterior fontanel. These spaces between the bones are filled up by the dura mater and the external integuments, so that, during birth, the size of the head may be lessened; for at that time the bones of the head, upon the superior part, are not only pressed nearer to each other, but they frequently lap one over another, in order to diminish the size during the passage of the head through the pelvis.

OS FRONTIS.

The frontal bone is situated in the anterior part of the skull, forming the forehead and upper part of the orbits, and is shaped somewhat like a cockle-shell. It sometimes consists of two portions, in consequence of the sagittal future being continued down through its middle to the nose. This is more frequent in females than males.

Processes. Two frontal eminences, which mark the centres of ossification; two frontal tuberosities, which are situated over the frontal sinus; two superciliary ridges or arches, which give origin to the frontal muscles, and whose extremities are called the angular or orbitar processes; an external frontal spine, upon which the offa nasi rest; an internal frontal spine, to which the
the dura mater adheres; and two orbitar plates, which separate the orbits from the cavity of the cranium.

Cavities. The cerebral cavity, which contains the anterior portions of the hemispheres of the brain; a large notch between the orbitar plates for the situation of the cribiform plate of the ethmoid bone; two frontal or pituitary sinuses within the bone, above the root of the nose; two orbital cavities, in which are two depressions for the situation of the lachrymal gland; a notch in each superciliary ridge for the trochlea of the superior oblique muscle; a superciliary foramen, through which passes the frontal artery and nerve; the foramen cecum, situated below the beginning of the internal frontal spine.

Connexion. The frontal bone is connected with the two parietal by means of the coronal future; with the two offa nasi, the two superior maxillary bones, and the two lachrymal bones, by means of what is called the transverse future; with the sphanooid bone by means of harmony, called harmonia sphanooidalis; with the ethmoid bone by harmonia ethmoidalis; and with the os jugale by means of future.

The use of the frontal bone is to constitute the forehead, pituitary sinuses, part of the orbit, and to contain and defend the anterior lobes of the brain.

The frontal bone at birth consists always of two portions. The superciliary arches and orbitar plates are distinctly formed, and sometimes the frontal sinuses.

When performing the operation of trepanning, the situation of the frontal sinuses, and the longitudinal sinus of the dura mater, should be remembered.

Ossa Parietalia.


The parietal bones are situated one on each side of the superior part of the cranium, and are considerably convex and somewhat
somewhat quadrangular. Each bone is distinguished into an external and an internal surface, and four angles, viz. the frontal, sphenoidal, called also the spinous process, the occipital, and mastoid.

**Eminences and Cavities.** A semicircular ridge, from which the temporal muscle originates; and the foramen parietale, which is near the sagittal future, and transmits an artery and a vein of the dura mater. Upon its internal surface are the grooves of the spinous artery; and when the two bones are united, there is a deep cavity extending along the sagittal future, for the longitudinal sinus of the dura mater.

Each parietal bone is connected with its fellow by means of the sagittal future; with the frontal bone by the coronal future; with the occipital by the lambdoidal future; and with the temporal by the squamous future. The use of these bones is, to form the superior part of the cranium.

The parietal bone, at birth, consists of one portion, and partakes of the shape of the adult bone. It shows, very beautifully, the radiated bony fibres, and the centre of ossification.

A considerable fossa is sometimes found in the internal surface of these bones, near the longitudinal sinus; it is in consequence of the pressure of a protruding portion of the sinus, or of the Pacchionian glands, by which absorption of the bone takes place.

**O* O*occipitis.**

Os basilare, Os memoriae, Os nervosum.

The occipital bone is situated in the posterior part of the head, is very convex, and somewhat of a quadrate oblong shape.

**Processes.** Upon the external surface, the occipital tubercle, in the middle of the bone to which the ligamentum nuchae adheres;
adheres; a transverse spine, proceeding from each side of the tubercle, to which the trapezius and complexus muscles are attached; a lesser transverse spine, below the former, for the insertion of the recti muscles; a prominent ridge running downwards from the occipital tubercle, and forming, with the above-mentioned ridges, a crucial spine; the cuneiform or basilar process, situated before the great foramen; two condyloid processes or condyles, which are united to the first vertebra of the neck.—Upon the internal surface. An internal crucial spine: the superior branch gives adhesion to the longitudinal sinus of the dura mater, the two lateral to the lateral sinuses, and the inferior to the septum cerebelli.

Cavities. The foramen magnum occipitale, through which the spinal marrow proceeds into the spine, and the vertebral arteries and accessory spinal nerves into the cranium; two anterior condyloid foramina, for the passage of the lingual pair of nerves; two posterior condyloid foramina (which are sometimes wanting), for the passage of the occipital vein into the lateral sinus; two notches, which, with two corresponding notches of the temporal bones, form the foramina lacera in basi crani, for the passage of the blood from the lateral sinuses into the jugular vein, and the exit of the par vagum; a considerable groove leading to the above notches, in which the lateral sinuses are situated. The internal surface has also four considerable depressions formed by the crucial spine; the two superior contain the posterior lobes of the brain, and the two inferior, the two lobes of the cerebellum.

Connexion. The occipital bone is connected by the cuneiform process to the sphenoid bone, in the adult by synostosis; hence Professor Stelemering describes them as one bone, the occipito-sphenoidale; but in youth by synchondrosis; with the two parietal and two temporal bones by the lambdoidal suture;
with the first vertebra of the neck by ginglymus, and with the second by syndesmosis.

The use of the occipital bone is to constitute the posterior and inferior part of the cranium; to contain the posterior lobes of the brain, the cerebellum and medulla oblongata, and to serve for the articulation of the head with the spine.

The occipital bone, at birth, is formed of four portions joined together by cartilages:—one large portion which forms the hinder part of the head; no trace of tubercle nor crucial spine is seen:—the cuneiform process; —and two portions between these forming the sides of the foramen magnum and the attachment with the atlas.

**OS SPHÆNOIDEUM.**

*Os sphœnoidal*. *Os multiforme*. *Os cuneiforme*. *Os pterygoideum*.

*Os vespertiliforme*.

The sphœnoidal bone is situated in the middle of the basis of the cranium, extending underneath, from one temple across to the other. Its figure is very irregular; and is compared, by some, to a bat with its wings extended.

**Processes.** Two *alae majores*, whose anterior part forms a portion of the orbit; the inner surface has lying upon it a portion of the middle lobe of the brain, and the whole external surface is covered by the temporal muscle.—*Upon the external surface.* Two *spinosus processes*, a narrow point projecting behind each foramen spinoform. The *sphœnoidal spine*, or *azygous process*, upon which the basis of the vomer lies; two *pterygoid processes*, each of which is distinguished into a root and two extended plates, or wings; one external, which gives origin on its external surface to the pterygoideus externus muscle, and on its internal surface to the pterygoideus internus muscle; and the other internal; two *hamular* or *hook-like processes*, one on the end
end of the internal wing of each pterygoid process, over which
the tendon of the circumflexus or tenor palati muscle turns
—Upon the internal surface. Two alae minores, which form the
upper part of the superior orbital fissures; four clinoid processes,
two anterior and two posterior.

Cavitites. The sphænoidal pituitary sinus, which is in the
middle of the bone, has a communication with the nostrils,
and is divided by an intermediate septum; two pterygoid depressions, one between each greater and lesser wing, for the reception of a part of the palate bone; two foramina, each leading to a canal, called the pterygoid or Viduan canal, in the root of the pterygoid process, through which the recurrent or Viduan branch of the fifth pair of nerves passes into the cranium.
—Internally. The sella turcica, or ephippium, which is surrounded by the four clinoid processes, and contains the pituitary gland; two foramina optica, one before each anterior clinoid process, which transmit the optic nerves; two grooves, one on each side of the sella turcica, between the anterior and posterior clinoid processes, formed by the pulsation of the carotid arteries; two foramina lacera orbitalia superiors, between each greater and lesser wing, through which the third, fourth, first branch of the fifth, and the sixth pair of nerves, and the ophthalmic artery pass out of the cranium; two foramina rotunda, for the passage of the second branch of the fifth pair of nerves; two foramina ovalia, for the third branch of the fifth pair; two foramina spinosa, through which the spinous artery of the dura mater enters the cranium. The sphænoid bone is connected with all the bones of the cranium; with the frontal, the ethmoid, the two parietal, and the two temporal by harmony, and with the occipital by synostosis; it is also united to the two cheek bones, the two superior maxillary bones, and the two palate bones by harmony, and to the vomer.
vomer by gomphosis. Its use is to form the basis of the cranium, to concur in forming the orbits, the pituitary sinuses of the nose, the temples, &c. and to contain the middle lobes of the brain.

The sphænoid bone, at birth, consists of five portions (one in the middle surrounding the pituitary gland, the two alæ majores, and the two pterygoid processes), joined together by strong cartilages. There is no sphænoidal sinus formed. The clinoid processes and alæ minores are cartilaginous.

Ossae temporalia.

Osæ temporalis.

The temporal bones are of an irregular figure, and are situated at the sides and inferior part of the cranium, containing within them the organ of hearing. Each bone is divided into a squamous portion, which is flat, and forms the squamous future; and a petrous portion, which is very irregular, and is situated in the basis of the skull.

Processes. The zygomatic process, which, with a process of the os jugale, forms the zygoma, yoke, or arch of the temples, underneath which the temporal muscle moves, and from whose lower edge several muscles of the face arise, particularly the masseter and zygomatic. The mastoid or mammary process, which projects from under the ear, and has inserted into its anterior part the sterno-cleido-mastoideus muscle, and into its posterior part the complexus, the obliquus, and tracheo-mastoideus. The styloid process, which is long and pointed, and gives origin to a ligament of the os hyoides, also to the stylo-hyoides, stylo-pharyngeus, and stylo-glossus muscles. The vaginal process, which surrounds the root of the styloid. The auditory process, or outer bony circle of the auditory passage, to which the membrana tympani and cartilage of the ear are fixed.

Cavities.
CAVITIES. The meatus auditorius externus, which leads to the cavity of the organ of hearing. The meatus auditorius internus, which begins on the internal and posterior surface of the petrous portion, and transmits the seventh pair of nerves; it has immediately within it the internal opening of the aqueduct of Fallopius.

Each temporal bone is connected with the parietal by the squamous future; with the occipital by the lambdoidal future; with the sphenoid and jugal bones by harmony, and with the lower jaw by arthrodia.

SUBSTANCE. The squamous portion consists of two tables and a diploe; the mammary processes of cells which communicate with the cavity of the organ of hearing; and the petrous portion is very hard and compact.

USE. To contain the middle lobes of the brain, and the organ of hearing; and to concur in forming the temples and the basis of the cranium.

The temporal bone, at birth, consists of three portions: the squamous, the petrous, and a ring-like bone, which surrounds the opening of the tympanum. The last bone is seen completely ossified at the fourth month after impregnation: it is not a ring, though termed annulus ossesus, for its ends do not meet. After birth this portion is gradually elongated to form the meatus auditorius externus. It is within the petrous portion that the organ of hearing is situated, which is perfectly formed at birth. See Cavity of Hearing.

The whole of this bone has been destroyed by venereal caries. The bony parietes of the tympanum are often carious from common abscesses.

An operation is sometimes performed on the mastoid processes of this bone, to remedy deafness: it consists in removing a portion of the bone by an instrument of the trephine kind, and forming a communication of the external
external air through the mastoid cells with the cavity of the tympanum. A much more simple, and perhaps more certain, operation for this purpose, is perforating the membrana tympani.

**OS ETHMOIDEUM.**

*Os ethmoidale.* *Os cribiforme.* *Os cribrosum.*

The ethmoid bone is a four-side bone situated in the anterior part of the basis of the skull, behind the root of the nose, and between the orbits.

**Processes.** A cerebral or cribriform plate, which lies horizontally above the root of the nose, within the cavity of the cranium: it is everywhere perforated by a number of small foramina, through which the olfactory nerves pass into the cavity of the nostrils. The *cribri galli*, a process somewhat like a cock's comb, which proceeds upwards from the middle of the cribiform plate, and has attached to it the falciform process of the dura mater. Two *orbitar plates*, called also *offa plana*, and *plana papyracea*, which are very smooth externally, and form the inner side of the orbits. The *septum ethmoidale*, nasal plate, azygous process, or perpendicular lamina, a considerable process, descending directly under the cribri galli into the cavity of the nose, and forming with the vomer the septum narium. Two *cavernous substances*, which are curled, like a piece of parchment, one on each side of the septum, called improperly the superior turbinated or spongy bones.

**Cavities.** A number of *cribriform foraminula*, situated on each side of the cribri galli. Two *foramina orbitalia nasi*, one situated in the line of union between the frontal bone and orbitar plate of the ethmoid, for the passage of the nasal branch of the orbital nerve. A number of *cells*, which compose the internal part of the bone, and form the pituitary sinuses of the ethmoid bone.
The ethmoid bone is connected with the os frontis, the two nasal bones, the two superior maxillary, the two palatine, the sphenoid bone, and the vomer by harmony.

Use. To form an extensive surface for the organ of smell, and to constitute part of the nose, orbits, and cranium.

The ethmoid bone, at birth, is mostly cartilaginous; part of the septum ethmoidale, however, consists of bony matter, and the superior turbinated bones are occasionally found ossified.

Caries and a complete destruction of this bone have arisen from tumours of the dura mater and nasal polypi.

OF THE FACE.

The bones of the face are fourteen in number, and consist of those of the upper and under jaw. The upper jaw is formed of thirteen bones, viz. two superior maxillary, two nasal, two palatine, two jugal, or malar, two inferior spongy, two lachrymal, and the vomer, which are united to the cranium, and with one another, by harmony. The under jaw consists of one bone.

There is an obvious line, beginning at the external angle of the orbit, where the frontal bone is united to the cheek bone, which leads to the inferior opening in the orbit, proceeds upwards to the nose, whose root it crosses, and then traverses the other orbit to the external angle: this is called the transverse future. The other harmonies of the face are named after the bones which they unite, as the zygomatic, nasal, palatine harmonies, &c.

OSSA MAXILLARIA SUPERIORA.

The superior maxillary bones are two hollow bones situated in the anterior and middle part of the face, and assist in forming the nose, orbit, and palate; so that their shape is very irregular.
Processes. The nasal process, which forms the side of the nose. The orbitai process, or plate, which forms part of the orbit. The malar process, by which it is united to the cheek bone. The alveolar process, in which the teeth are situated. The palate process, which forms the palate. A spine, formed by the union of each palate portion, upon which the vomer rests. The orbital margin.

Cavities. The antrum maxillare, called also antrum High-mori, and sinus maxillaris pituitarius, in the body of the bone, between the orbital and palate processes; it has an opening into the nostrils. The infra-orbital canal, which opens under the margin of the orbit, and transmits the infra-orbital nerve. The lachrymal depression, situated in the superior and internal part of the nasal process, for the situation of the lachrymal fac; it leads to the canalis nasalis, which conveys the tears into the nostrils. The posterior palatine foramen, near the last tooth on the inside, for the passage of the alveolar nerve. A notch on the anterior part of the palatine processes, which with the corresponding notch of the other superior maxillary bone, forms the foramen palatinum anticum, or foramen incisivum, which transmits the anterior palatine nerve and artery.

connexion. Each superior maxillary bone is connected with its fellow, with the os frontis, one os nasi, one lachrymal bone, the ethmoid, sphenoid, one os jugale, one palatine bone, and one inferior spongy bone, by harmony; and with the vomer and teeth by gomphosis.

Use. The use of these bones is to form part of the face, palate, nose, nostrils, and orbits, and to afford a convenient situation for the organ of mastication.

The superior maxillary bone, at birth, consists of one portion, so that every process and cavity can be seen, but not so perfect as in the adult. The alveoli are fewer in number.
These bones are subject to caries from disease in the antrum of Highmore; abscess and polypus. Nearly the whole bone has come away from the venereal disease, and also from a long-continued salivation.

**Ossa Maxilarum.**

*Ossa jugalia. Ossa zygomatica.*

The cheek bones are situated at the sides of the face, and are nearly of a quadrangular shape.

**Processes.** The *upper orbital process,* which forms part of the orbit and the sharp edge of the temple. The *inferior orbital process,* opposite to the former, and constituting in part the bottom of the orbit and the edge of the cheek. The *internal orbital process,* which also forms a part of the orbit. The *maxillary process,* by which it is joined to the superior maxillary bone. The *zygomatic process,* which is joined to the temporal bone, to form the zygoma.

**Connexion.** The *os jugale* is united to the frontal, superior maxillary, sphenoid, and temporal bone, by future.

The use of these bones is to assist in forming the face and orbits.

Every part of the jugal bone is formed at birth, but the shape is rather more triangular.

**Ossa Nasi.**

*Ossa nasalia.*

The bones of the nose are of an oblong and quadrangular shape, are formed of a very compact substance, and are placed close to each other in the superior and middle part of the nose, in such a way as to form a strong arch, called the bridge of the nose.

In each bone may be noticed an *external* and an *internal surface,* and four margins. There is always a small foramen in each bone for the passage of blood-vessels and nerves.
Use. To form the bridge and external part of the nose. Each bone is connected with its fellow, and the superior maxillary bone by harmony, and with the frontal and ethmoid by the transverse suture.

The osa nae are perfectly formed at birth.

Ossa Lachrymalia.

Os a unguis.

The lachrymal are two flat quadrangular bones, resembling somewhat the nail of the finger, situated one in each orbit at the internal angle, and separating the orbit from the nostrils. The surface towards the eye is concave, and has a fossa, or groove, in which the lachrymal sac is situated. The internal surface is convex, and covers some of the ethmoid cells, and part of the nostril.

Connexion. Each bone is connected with the frontal, ethmoid, superior maxillary, and inferior spongy bone, by harmony.

The use of these bones is to assist in covering the labyrinth of the nose, in forming the orbit, and to afford a situation to the lachrymal sac.

They are completely formed at birth.

These bones are subject to caries from fistula lachrymalis.

The lachrymal bone is perforated obliquely downwards in the operation for fistula lachrymalis, in order that the tears may be conveyed into the nostrils.

Ossa Spongiosa Inferiora.

Os a turbinata inferiora. Conchae inferiores.

The inferior spongy bones are situated in the side and lower part of the nostrils, and are of a spiral and convoluted figure.

Use.
USE. To augment the surface of the organ of smelling.

CONNEXION. Each bone is united with the superior maxillary, the palate, lachrymal, and ethmoid bone, by harmony.

They are subject to caries and total destruction, from the venereal disease, and nasal polypi.

OSSA PALATINA.

Ossa palatii.

The palatine bones are extremely irregular in their shape, and are situated in the posterior part of the nose, from which they ascend laterally to the orbits. This irregularity of their figure and their situation being so varied, gives rise to their division into palatine, pterygoid, nasal, and orbital portions.

Processes. The palatal plate, which forms the posterior part of the roof of the mouth. The pterygoid process, which is situated behind the last grinder. The nasal process, which arises perpendicularly from the palate, and covers a part of the antrum of Highmore. The orbital process, which is situated in the orbit.

Cavities. The palatine cells, which communicate with, and form part of the sphænoid cells.

USE. To form the posterior part of the palate, and part of the nose and orbit. Each bone is connected with its fellow, with the superior maxillary bone, the sphænoid, ethmoid, inferior spongy bone, and vomer, by harmony.

The ossa palatina are very perfectly formed at birth, but cannot, without great difficulty, be separated from the surrounding membranes.

The palatine portions of these bones are extremely subject to caries from the venereal disease.
VOMER.

The vomer is a bone situated perpendicularly between the roof of the mouth and the septum ethmoidale, in the cavity of the nostrils, which it divides into two parts. It bears some resemblance to the ploughshare used in former times.

Use. To sustain and divide the cavity of the nostrils.

Connexion. Superiorly it is united with the sphenoid bone by gomphosis, and with the ethmoid by harmony; inferiorly with the superior maxillary and palatine bones by harmony; anteriorly it is united to the cartilaginous septum of the nose.

The vomer, at birth, consists of two distinct lamellae, with an intervening cartilage.

It is not unfrequently destroyed by venereal caries.

OS MAXILLARE INFERIUS.

Mandible.

The lower jaw is shaped somewhat like a horseshoe, and occupies the inferior and anterior part of the face.

Processes. Two condyloid or articulatory processes, which are received into the articulatory cavities of the temporal bones. Two coronoid processes, which are sharp pointed, and give adhesion to the temporal muscles. The alveolar process, in which the teeth are fixed. The symphysis of the jaw, in the middle of the chin. The inferior margin, whose ends form the angles of the jaw.

Cavities. A semilunar notch, between each coronoid and condyloid process. Two posterior maxillary foramina, one above each angle, on the inner surface of the jaw, which transmit the lower maxillary nerve and artery into a canal in the middle of the bone, called canalis mentalis, which conduits the same artery
The artery and nerve to the anterior maxillary foramina, upon the external surface of the bone, one on each side of the chin, from whence the artery and nerve again emerge upon the chin.

Use. To retain the roots of the teeth in the alveolar margin; to constitute the inferior segment of the cavity of the mouth, and to afford a point of adhesion to the muscles of the face, neck, larynx, and tongue.

The lower jaw is connected with the temporal bones by ginglymus, with the teeth by gomphosis, and with the os hyoides and other parts by sypharososis.

The lower jaw, at birth, consists of two pieces, which meet at the symphysis.

Besides the usual diseases of bones, the author has seen one case in which the whole of the lower jaw came away at four different times; and another, where one half came away at one time. The former was under a long-continued salivation; the latter from an abscess destroying the nutritious artery. Their loss was supplied by a very firm body of bone.

OF THE CAVITIES FORMED BY THE BONES OF THE FACE.

ORBITS.

The orbits are two conoidal cavities, situated under the forehead, and on each side of the root of the nose. The angles of the orbits are called canthi.

Cavities. A depression for the lachrymal gland; a notch of the orbital trochlea; a depression for the lachrymal sac; the canalis nasalis for the passage of the tears; a superior and inferior, or sphen-maxillary orbital fissure. The suprerior foramen; the infra-orbital canal; the foramen nasi, and the optic foramen.

Seven bones enter into the formation of each of these cavities, viz. the frontal, maxillary, jugal, lachrymal, ethmoid, palatine, and sphenoid.
The use of the orbits is to contain and defend the organ of sight and its adjacent parts.

CAVITY OF THE NOSTRILS.

The nostrils are two pyramidal cavities situated under the anterior part of the cranium, in the middle of the face, and covered anteriorly by the nose.

Prominences. The septum narium; the cavernous substance of the ethmoid bone, improperly called the superior spongy bones; and the inferior spongy bones.

Cavities. Three pair of pituitary sinuses, namely, the frontal, sphenoid, and maxillary; the caverns of the ethmoid labyrinth, the anterior foramina of the nostrils, the ductus nasalis, the sphenopalatine foramina, and the anterior palatine foramina.

The nostrils are composed of fourteen bones, viz. the frontal, two maxillary, two nasal, two lachrymal, two inferior spongy, the sphenoid, vomer, ethmoid, and two palatine bones.

The use of these cavities is to form a situation for the organ of smelling, and the pituitary sinuses of the nostrils, and to serve also for speech and respiration.

CAVITY OF THE MOUTH.

The cavity of the mouth is situated between the upper and under jaw, and is covered laterally and anteriorly in the fresh subject by the cheeks and lips: posteriorly it is continued into the fauces. The two superior maxillary bones and the palatine portions of the palate bones form the superior part of the mouth, and anteriorly it is closed by the teeth.

The teeth are hard bones, partly covered with a peculiar substance, called enamel, and fixed one after another in the upper
upper and under jaw, in such a manner, that in the adult there are sixteen belonging to each.

Every tooth is divided into a crown, which is covered by the enamel; a neck, or that part embraced by the gum; and a root, also called the fang, which is hidden within the socket.

There are four kinds of teeth: incisores, cuspidati, bicuspides, and molares.

The incisors are eight in number, four in each jaw; they are situated in the front of the mouth, and are flat and sharp-edged, so as to cut the food; the roots or fangs are simple; those of the upper jaw are fixed obliquely backwards, so that they generally cover a small part of the incisors of the under jaw.

The tooth on each side of the incisors is called cuspidatus, or canine; they consequently are four in number. The fang of these teeth is single, and goes a considerable way in the jaw, especially the two of the upper jaw, which were supposed to go to the eye, and are therefore called the eye-teeth. The oral part of the cuspidati is rounded, and their end pointed, as their name implies.

The bicuspides are eight in number, two being situated next to each cuspidatus; they appear at both extremities as if they were formed by the junction of two incisors.

The molares are twelve in number, and situated three at the extremity of each jaw. The fangs of these are varied; those of the under jaw have two, and those of the upper three. Their oral extremities are full of irregularities, so that they are able to grind the food between them. The two last molares are distinguished by the name of dentes sapientiae; they are always the last that appear, and not unfrequently the first which decay: their fangs are all squeezed, as it were, into one.

The teeth are fixed in the alveoli of the jaws by gomphosis; so that each tooth fills up its appropriate socket, which
is separated from the next by an intermediate, thin, spongy partition.

In children, soon after birth, a double order of teeth is hidden in their sockets by the gums. The superior protrudes through the gums about the seventh month, which is called the cutting of the teeth; first the incisors, then the molares, and, last of all, the cuspidati. These teeth are termed milk, shedding, or primary: they gradually fall out about the seventh year, and are succeeded by the other order, which till now had been concealed in the bottom of the alveoli.

The teeth are very subject to caries, which may arise from an internal, though it mostly does from an external cause.

There are a variety of operations performed on the teeth; extraction and scaling are the chief.

**CAVITY OF THE FAUCES.**

This cavity is situated under the basis of the cranium, within the superior bodies of the vertebrae and posterior part of the nostrils. It is composed of ten bones, viz. the occipital, two palatine, the vomer, the bodies of the three first vertebrae, the os hyoides, and the two temporal bones.

**USE.** For the situation of the fauces, larynx, pharynx, and os hyoides:

**OS HYOIDES.**

The os hyoides is a bone of a semilunar shape, situated in the fauces between the basis of the tongue and the larynx.

**PROMINENCES.** Two cornua majora, and two cornua minora.

**USE.** To serve for the adhesion of the tongue, for deglutition, and for a point of adhesion to many muscles.

It is connected with the styloid process of the temporal bone,
bone, the scapula, lower jaw, and sternum by various muscles, and with the larynx by ligament.

**CAVITY OF HEARING.**

This cavity is situated within the petrous portion of the temporal bones, and consists of the meatus auditorius externus, the cavity of the tympanum, and the labyrinth.

The meatus auditorius externus is somewhat funnel-shaped; it is, in fact, a foramen terminating in a larger cavity.

The tympanum is an irregular cavity, covered, in the fresh subject, by a membrane, and in which there are four bones, called osseula auditus; one is hammer-shaped, and called the malleus, and has a round head, a narrow neck, the manubrium or handle; the other, formed of two legs or crura, and a body, is the incus; the one which resembles a stirrup in miniature is called stapes; and the very small round particle of bone, not larger than the third part of a pin's head, generally found adhering to the long crus of the incus, is termed as orbiculare.

There are also many inequalities of this cavity, and the five following foramina:

1. The opening of the Eustachian tube, situated anteriorly;
2. A canal in which the tensor tympani muscle is fixed, which extends from the former opening to the fenestra ovalis; 3. An oval opening, called fenestra ovalis—the stapes is attached to this opening; 4. The fenestra rotunda, which is less than the former; 5. An opening leading to the mastoid cells.

The labyrinth is composed of three parts: the vestibulum, cochlea, and semicircular canals. They are placed behind the cavity of the tympanum.

The vestibulum is an equally rounded cavity situated between the cochlea and semicircular canals. It has seven openings into it: five of the semicircular canals, the fenestra ovalis, and an opening
opening into the cochlea, called *scala vestibuli*. There is also to be noticed in the vestibulum, a small spinous process, to which the barbula adheres; and several depressions corresponding with the alveus communis and the ampullae of the membranaceous semicircular canals described in *Splanchnology*.

The *cochlea* has obtained its name from its figure: it has a bony nucleus in the middle, called *modiolus*, and two spiral windings like those of a snail's shell, the opening into the tympanum called *scala tympani*; the other communicating with the vestibule, termed *scala vestibuli*. These *scala* communicate with one another at the top of the *modiolus*. The partition between the wings is called the *spiral lamina*; it is partly bone and partly membranous.

The *semicircular canals* are three in number: one inferior and posterior, one superior and middlemost, and one exterior and foremost. They open into the vestibule, and contain the membranaceous semicircular canals.

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**OF THE TRUNK.**

The trunk of the skeleton is divided into the spine, chest, joints, and pelvis.

**SPINE.**

*Columna spinalis. Columna vertebralis. Theca vertebralis. Spina dorsi.*

The spine is a long, bony, and cartilaginous hollow column, extending from the condyles of the occipital bone of the head down to the *os sacrum*, in the posterior part of the trunk.

The bones which compose this column are termed *vertebrae*. Each
Each vertebra is divided into surfaces, margins, a body, processes, and cavities.

The body is the thickest and foremost part, anteriorly convex, and posteriorly concave; its upper and under surfaces are somewhat hollowed, and covered with cartilage of a particular nature, called *intervertebral substance*.

The *processes* of a vertebra are seven: *two superior obliquely ascending*, one of which is situated superiorly on each side; *two inferior obliquely descending*, of which one is placed inferiorly on each side—these four processes are also called *articular processes*, for they form the union of one process with another; *two transverse processes*, one on each side; and the *spinous process*, extending posteriorly outwards, and forming the *spine*, strictly so called.

Each vertebra has a *great foramen*, which concurs to form the great canal continued through the whole spine for the passage of the spinal marrow.

There are also four notches in each vertebra; two on each side, one superior, the other inferior. When two vertebrae are put together, the corresponding notches form *foramina*; and it is through these foramina that the spinal nerves pass out.

**Connexion.** The first bone of the spine is connected with the occipital bone by *ginglymus*; the second vertebra is united with the first by *trochoides*, and with the occipital bone by *lydesmosis*. The bodies of the vertebrae are connected with one another by the intervertebral substance; and posteriorly by a yellow elastic ligament, and by their oblique processes.

The *use* of the spine is to support the head and trunk, and to contain and defend the spinal marrow.

The spine is subject to caries, distortion, and *spina bifida*, called also *hydrorachitis*. The latter consists of a tumour filled with water, which makes its way between the processes of a vertebra, and divides it into two.
CERVICAL VERTEBRÆ.

These are seven in number: the first is called *atlas*; it has no body, nor spinous processes, but forms an *arch*, which anteriorly surrounds the dentiform process of the second vertebra. Instead of upper oblique processes, there are two *articular sinuses*. The second vertebra is termed *epistrophæus*, or *dentatus*. An *odontoid* or *dentiform process* at the upper part of the body is peculiar to it. All the transverse processes of the remaining cervical vertebrae have a peculiar *foramen* for the passage of the vertebral arteries.

DORSAL VERTEBRÆ.

These are twelve in number. They are distinguished by a *depression* at the sides of their bodies, and a superficial one in the points of the transverse processes, for the attachment of the great and little heads of the ribs.

LUMBAR VERTEBRÆ.

The lumbar vertebrae are five in number; they are much larger than the dorsal, and the transverse processes have no depressions.

The vertebrae, at birth, consist of three parts, connected together by cartilage; one of these is the body, and the other two the transverse processes. The anterior part of the first vertebra is entirely cartilage. The second vertebra often consists of five and six portions. The spinous processes are all cartilage.

When aneurism of the aorta is very large, the bodies of the vertebrae are occasionally absorbed, but the intervertebral substance remains entire. This is a singular fact; that bone should be sooner absorbed than cartilage. The same phenomenon takes place in caries from other causes. The spinal marrow is always defended in these cases by a deposit of coagulable lymph.
OF THE THORAX.

The thorax or chest forms the upper part of the trunk. It resembles an arched bony cavity, narrow above, broad below, flat anteriorly, hollow posteriorly, and convex laterally. The bones which compose the thorax are the twelve dorso-vertebrae already described, the sternum, and twenty-four ribs.

COSTÆ.

The ribs are twenty-four semicircular bones, situated twelve on each side of the chest, and extending from the dorso-vertebrae round to the sternum. They are distinguished into seven true ribs on each side, or those whose extremities are affixed to the sternum; and five spurious or false on each side, whose extremities do not reach the breast bone. Each rib may be divided into a body, or middle part, two extremities, two margins, and two surfaces.

EMINENCES. The great head, which is connected to the bodies of the dorso-vertebrae; the neck; the lesser head, which is joined to the transverse processes of the dorso-vertebrae; and the angle of the rib.

CAVITIES. A longitudinal groove, for the intercostal artery.

SUBSTANCE. The anterior part of each rib is cartilaginous, and the other part is formed of a compact bony texture.

CONNEXION. Anteriorly with the sternum, and posteriorly with the bodies and transverse processes of the dorso-vertebrae.

USE. To form the thorax, to serve for respiration, to defend the vital viscera, and to give adhesion to muscles.

The ribs, at birth, differ very little in substance and form from those of adults.

Great portions of the ribs are occasionally absorbed from the pressure of aneurysms.

STERNUM.
STERNUM.

The breast bone is shaped somewhat like a dagger, and is situated in the anterior part of the thorax, between the true ribs. It is of a very spongy texture, and mostly consists of two, and sometimes of three portions. A sharply pointed cartilage is attached to the inferior extremity of the sternum, which is named, from its supposed resemblance, the xyphoid or ensiform cartilage. It is situated at the pit of the stomach.

CAVITIES. The jugular sinuses, at the superior and inner part. Two clavicular sinuses, for the attachment of the clavicles. Seven costal depressions, to which the ribs adhere.

CONNECTION. The sternum is connected by arthrodia with the clavicle, and with the seven true ribs by snychondrodis.

USE. To form the thorax, and give adhesion to the mediastinum.

The sternum, at birth, consists of cartilage shaped like the adult sternum, with two, three, or four round ossifications in its centre.

When caries attacks the sternum, the disease is seldom removed, and the bone crumbles away insensibly.

When an abscess forms in the anterior space of the mediastinum, a portion of bone is removed, by a trephine, from the sternum, to give an exit to the collected fluid.

The xypoid cartilage occasionally takes on a disposition to curl outwards, and produces considerable pain and uneasiness.

When the cartilages of the ribs are divided, and the sternum elevated and bent back, to examine the viscer of the thorax after death, a quantity of bloody, somewhat gelatinous fluid, escapes from the divided ends of the sternum; this appears to be no more than the osseous fluid, and not a diseased fluid.
OF THE LOINS.

The bones of the loins are five lumbar vertebrae, which have already been described.

OF THE PELVIS.

The pelvis, so named from its resemblance to a barber's basin without a bottom, consists of four bones: two *ossa innominata*, the *os sacrum*, and the *os coccygis*, which are situated at the bottom of the trunk, and upon the lower extremities. It is within the cavity formed by these bones that the internal organs of generation are situated; the urinary bladder, the rectum, and occasionally part of the small intestines. The pelvis also serves as a firm support to the upper part of the body.

The pelvis is a part very liable to become distorted, especially the female pelvis. The different kinds of distortion are fully treated by writers on midwifery.

**OSSA INNOMINATA.**

*Os ilii. Os ischii. Os pubis. Os coxae. Os coxendicis.*

These two bones constitute the sides and anterior part of the pelvis, and are extremely irregular in their shape.

Each bone is divided into three portions, viz. *ilium*, the uppermost; *ischium*, the lowest; and *pubis*, the anterior.

**EMINENCES.** The *crista of the ilium*, from which the oblique and transverse muscles of the abdomen arise—at its posterior part are two *spinous processes*, which give adhesion to ligaments—at its anterior part are also two *spinous processes*; the *superior* gives adhesion to the *sartorius*, *tensor vaginae femoris*, and the *ligament of the thigh*; the *inferior anterior spinous process*, about
an inch from the former, has arising from it the rectus femoris. The external surface of the iliac portion is covered by the glutæi muscles; the internal by the internal iliac. Upon the internal surface there is a line even with the pubis; this is called linea innominata, or rim of the pelvis; it divides the cavity of the abdomen from the pelvis. Upon the ischiatic portion, or ischium, are, the tuberosity of the ischium, upon which we fit; the spinous process of the ischium, which projects backwards, and gives adhesion to the uppermost facro-sciatic ligament; the ramus ischii, which joins the pubis. Upon the pubic portion, or pubis, are, the body, near the socket; the angles and arches of the pubis.

Cavities. A notch between the anterior spines of the ilium; an anterior and posterior ischiatic notch; the acetabulum, which receives the head of the os femoris, and the foramen thyroideum, or ovale.

Each os innominatum is connected with its fellow anteriorly by symphysis, with the facrum posteriorly by strong cartilages and ligaments, and with the head of the thigh bone by enarthrosis.

Use. To form the pelvis, to retain the gravid uterus in its situation, and to constitute the acetabulum for the thighs.

The os innominatum, at birth, and for a long time after, consists of three distinct bones, united together by cartilage; this probably gave rise to these portions receiving distinct names, as os ilii, os ischii, and os pubis, which in the adult form one bone, without a name, and hence the term os innominatum. The form of the adult pelvis is, nevertheless, perfect in the foetus.

**Os Sacrum.**

The os sacrum is a bone of a triangular shape, bent forwards, and situated at the bottom of the spine, and the posterior
rior part of the pelvis. It is by many described as a bone of
the spine; and from the irregularities resembling spinoous and
transverse processes, and its foramina, it seems to have some
just claim to be considered as such.

EMINENCES. Two superior oblique processes, the appearances of
the spinoous processes, the appearances of the oblique and trans-
verse processes, and the appearances of the vertebral bodies.

CAVITIES. Four pair of external, and four pair of internal
foramina, and five longitudinal middle canals.

CONNEXION. Superiorly with the last lumbar vertebrae,
laterally with the osa innominata, and inferiorly with the os
coccygis.

USE. To constitute the pelvis, and sustain the spine.

At birth, this bone is shaped like that of an adult, but
this shape is given it by cartilage. A vast number of
offixed portions are embedded in the cartilage, and the
similarity to vertebrae is very conspicuous.

os coccygis.

This bone, which is so called from its resemblance to a
cuckoo's bill, consists very frequently of two, three, or four
portions, which are triangular or irregularly shaped; they are
placed at the extremity of the sacrum.

USE. To sustain the rectum, and prevent the rupture of
the perineum, in parturition.

The os coccygis, at birth, consists of several portions of
cartilage, and a round ossification is occasionally found
in the uppermost.

It sometimes happens, that in labour this bone is separated
from the sacrum.
OF THE SUPERIOR EXTREMITIES.

The upper extremities hang from the superior part of the sides of the thorax, and are composed of the bones of the shoulder, arm, forearm, and hand.

OF THE SHOULDER.

The shoulder consists of two bones, the clavicle and scapula, which are united together immediately over the top of the os brachii, and form what is properly termed the shoulder, *summitas humeri*.

CLAVICULA.

The clavicle or collar bone is a roundish bone, shaped like the letter J, and situated obliquely in the upper and lateral part of the chest.

Cavities. A furrow, or groove, of the subclavian vessels, on the inferior surface.

Use. To connect the scapula and humerus to the thorax, and to defend the subclavian vessels.

Connexion. Anteriorly it is articulated to the sternum, and posteriorly to the scapula, by arthrodia.

The clavicle is perfectly formed at birth; indeed it is completely so at the third month after conception.

SCAPULA.

Omo Plata.

The scapular, or blade bone, is of a triangular figure, and is situated in the upper and lateral part of the back.

Eminences. The spine, which is in the middle of the external surface: its anterior termination is called the acromion. The coracoid process, which stands out opposite to the acromion.
The borders of the bone are called caftae, and the corners angles. The circle below the articular cavity is called the neck.

Cavities. The articular or glenoid cavity, which receives the head of the humerus.

The scapula is united with the clavicle by arthrodia, with the ribs and os hyoides by muscle, and with the humerus by arthrodia.

Use. To defend the back, and give articulation to the humerus.

The scapula, with respect to shape, is perfect at birth. The acromion and coracoid processes are cartilage.

Of the arm.

The brachium, or arm, consists of one long bone.

Os brachii.

Os brachiale. Os humeri.

The bone of the arm occupies the space between the junction of the clavicle with the scapula and the fore-arm. It is a long cylindrical bone, thickest at its extremities.

Eminences. The head, which is rounded on its superior part. The neck, which is immediately below the head. The greater tubercle, near the neck, which receives the supra-spinatus muscles. And, the lesser tubercle, which is near the former, and has fixed to it the subscapularis. On the inferior extremity are three condyles, namely, an external and an internal condyle, which give origin to the flexor and extensor muscles of the arm; and the trochlea of the humerus.

Cavities. A furrow between the tubercles, for the long tendon of the biceps. In the inferior extremity, a posterior fossa, for the anconoid process of the ulna; and an anterior depression, for the coronoid process.
CONNEXION. The humerus is connected with three bones; with the scapula by arthrodia, and the cubit and radius by ginglymus.

USE. To constitute the arm.

This bone is perfect in its shape at birth, but its extremities are cartilage.

OF THE FORE-ARM.

The fore-arm is composed of two bones; the ulna and radius.

ULNA.

Cubitus.

This bone is long, and thicker above than below. It is placed in the inside of the fore-arm, towards the little finger.

EMINENCES. The olecranon, or anconoid process, upon which we lean; and the coronoid process, which is opposite to it. In the lower extremity are, the lower head, the neck, and the styloid process, which gives a strong adhesion to the ligament that secures the wrist.

CAVITIES. The sigmoid cavity, at the upper end.

USE. To constitute the chief support of the fore-arm.

CONNEXION. Superiorly with the trochlea of the humerus by arthrodia, inferiorly with the carpus by arthrodia, and with the radius by trochoides, as in pronation and supination.

The ends of the ulna, at birth, are cartilaginous; the body of the bone is very round.

RADIUS.

The radius, the lesser bone of the two, is long and cylindrical, and situated in the external side of the fore-arm towards the thumb.
EMINENCES. An upper head, which is excavated; the little head, and the styloid process at the inferior extremity.

CAVITY. The glenoid cavity, at its inferior extremity.

USE. To assist in forming the fore-arm, and to serve for flexion, supination, and pronation.

The radius is connected to the humerus by ginglymus, to the cubit by an interosseous ligament and trochoides, and to the carpus by arthrodia.

Both extremities of this bone are epiphyses at birth.

OF THE HAND.

The bones of the hand consist of those of the carpus, metacarpus, and fingers.

CARPUS.

The carpus, or wrist, is situated between the fore-arm and metacarpus. It is composed of eight bones, which lie close to one another in a double row, one of which is superior, the other inferior. In the superior row, are (from the thumb to the little finger), os scaphoides, or naviculare; os lunare; os cuneiforme; and os orbiculare, or sub-rotundum. In the lower row are, os trapezium, os trapezoides, os magnum, and os unciforme.

The bones of the carpus, at birth, are for the most part cartilage, but a small round ossification is frequently found in many of them.

Spina ventosa, or suppuration of the internal structure of bones, is a disease which very frequently attacks the bones of the carpus and tarus.

METACARPUS.

The metacarpus is placed between the carpus and fingers. It consists of five long rounded bones; one of the thumb, and four metacarpal bones of the fingers.
Use. To form the middle part of the hand.

The extremities of the metacarpal bones, at birth, are epiphyses.

**DIGITI MANUS.**

The fingers are situated at the inferior extremity of the metacarpus, and consist of a thumb and four fingers. The thumb has two bones, and each finger three, which are called phalanges.

Use. To form the fingers, which are the instruments of touch, defence, and labour.

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**OF THE INFERIOR EXTREMITIES.**

The bones of the lower extremities consist of those of the thigh, leg, and foot.

**OF THE THIGH:**

The thigh has but one bone, which is by far the largest in the body, the *os femoris* or *femur*.

**OS FEMORIS.**

The *os femoris*, so called because it bears the body, is a long cylindrical bone, thickest at its extremities, and situated between the *pelvis* and leg.

**EMINENCES.** The head, which is received into the acetabulum of the os innominatum, and has a small *dimple* in its middle, for the attachment of the round or restraining ligament. The neck, upon which the head stands; it is rough, and gives attachment to the capsular ligament. The *great trochanter*, which is a large eminence below the neck, for the insertion of the glutaee muscles; the *little trochanter*, which

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*receives*
receives the psoas and iliacus internus; and a rough line on the body of the bone, called linea aspera. On the inferior extremity are the external and the internal condyle, and between them posteriorly a deep notch, for the passage of the great artery, vein, and nerve of the leg.

Use. To form part of the lower extremity.

The femur is connected to the acetabulum of the os innominatum by enarthrosis, and to the tibia and patella by ligamentum.

Substance. Compact on the outside, spongy in the extremities, and cancellated internally.

The thigh bone, at birth, is of the same shape as the adult femur. Its head is cartilage, its inferior extremity an epiphysis. The ossification of this bone, as well as of the os brachii, begins a month after conception, and has the same shape at four months as at nine.

A longitudinal section of the adult femur beautifully exhibits the three substances of bones, viz. the reticulated, which occupies the medullary cavity; the spongy, which forms the extremities; and the compact, of which the sides of the body of the bone are formed.

OF THE LEG.

The leg is that part of the lower extremity between the femur and foot. It consists of three bones; the tibia, fibula, and patella.

TIBIA.

The tibia is a long, triangular, and cylindrical bone, much the thickest at its upper extremity, placed between the femur and tarus in the anterior and inside of the leg.

Eminences. The upper head of the tibia. The spine of the tibia, to which the great ligament of the patella is fixed. And the lower head of the tibia, which forms the outer ankle.

Cavities:
CAVITIES. Two articular sinuses, in the upper head, for the reception of the condyles of the femur; and the articular cavity, at the side of the head, for the reception of the fibula.

Use. To support the leg, and serve for the flexion of the lower extremity.

The tibia is connected to the femur and patella by ginglymus, to the fibula by synarthrosis, and to the astragalus by arthrodia.

Both extremities of the tibia, in foetuses, are cartilage; but perfectly shaped like those of the adult. The body of the bone is more rounded.

This bone is more frequently attacked with venereal nodes than any other, and particularly the anterior part.

FIBULA.

The fibula is a longitudinal bone, situated in the outer part of the leg, by the side of the tibia.

EMINENCES. The head of the fibula, at the upper part; and the malleolus externus, or outer ankle, at the lower end.

Connexion. It is connected to the tibia by an interosseous ligament, and to the astragalus by arthrodia.

Use. To form a fulcrum for the tibia, and assist in forming the leg.

The fibula, at birth, is perfectly formed, as to shape; its extremities are cartilaginous.

PATELLA.

The patella, rotula, or knee-pan, is a small, triangular, or heart-shaped spongy bone, situated between the inferior extremity of the thigh bone, and the upper part of the tibia.

It is connected to the condyles of the femur by ginglymus, and with the tibia by synarthrosis.

Use.
USE. To strengthen the knee-joint, and to serve as a common pulley for the extensor muscles of the tibia.

The knee-pan is always cartilaginous at birth. Ossification begins at different periods after birth, which depends upon the activity of the system. At first the artery is seen to deposit a few specks of bony matter. It next appears as if the vessel were itself converted into bone; a complete ring of bone is then observed; and at length the middle of this annulus is filled with bone, which goes on increasing until the whole is become bone. This process in the patella forms a most beautiful series of preparations, especially if injected. For this purpose, the knee-pans should be collected at all periods before they are completely ossified, and dried, and put into spirit of turpentine.

The patella is very frequently fractured. It is never united by callus, which would subject it to be more frequently broken; but an union is effected between the divided portions by means of ligament.

OF THE TARSUS.

The tarus, like the carpus, consists of a number of small bones. They are seven in number, and are placed between the leg and metatarsus. Viewed all together, the superior part of the tarus appears headed, and this to be supported by a broad and somewhat arched basis. The seven bones are disposed into two rows. In the first row are, the astragalus and os calcis; in the second row, the os naviculare, os cubiforme, and three cuneiform bones, which are placed close to each other.

EMINENCES. The head of the astragalus, and the tuberosity of the heel.

USE. To form the basis of the foot, and to serve for its motion.

The connexion of the bones of the tarus is with the tibia and fibula by arthrodia, and with the metatarsal bones, and also with one another, by amphiarthrosis.
The os calcis and the astragalus are become bone at birth; but the other bones are cartilaginous.

**METATARSUS.**

The metatarsus is situated between the tarfus and toes, and is composed of five longitudinal bones, which form the back and sole of the foot.

**DIGITI PEDIS.**

The great toe is composed of two, and the other toes of three small bones, called phalanges.

**OSSA SESAMOIDEA.**

The sesamoid bones are of the size of a small pea, and situated occasionally about the joints of the thumb and great toe.

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**DISEASED APPEARANCES OF BONES.**

The bones, like other parts of the body, are subject to diseases in which no alteration of structure is perceived. Those which the anatomist occasionally observes, are, inflammation, suppuration, necrosis, morbid thickness, morbid thinness, mollities, hyperostosis, rachitis, exostosis, absorption, praeternatural joints, diastasis, anchylosis, fracture, fissure, tophus, sarcoftosis, caries, spina-ventosa, and fragility.

**Inflammation.** Bones are supplied with arteries, veins, absorbents, and nerves; and when inflammation takes place, there is perceived a greater number of vessels carrying red blood than in a healthy state;—this diseased appearance is common in the bone lying immediately under old ulcers.

When
When inflammation attacks the internal structure of bones, it forms the spina ventosa.

Suppuration. Abscesses in bones are not very frequent. They are often attacked with caries, and form the spina ventosa; but it sometimes happens that the absorbents remove a considerable portion of bone while pus is deposited; and in these cases the abscess is lined by a thick coat of coagulable lymph:—this occurs most frequently in icterophalous caries of the vertebrae.

Necrosis. This disease consists in a considerable portion of bone losing its vitality, and the neighbouring vessels taking on the officinal action, and depositing a considerable quantity of new bone to supply its place. It is a singular fact, that in most of these cases the dead bone is not protruded until a new one is formed. Necrosis happens most frequently in the cylindrical bones, as the humerus, tibia, femur, &c.

Morbid thickness of bones. Bones are often observed remarkably thick, especially those of the calvaria; it sometimes is the effect of rheumatic inflammation. The body of one thigh bone has likewise been considerably thickened from a deposition of bony laminae over the original bone; in these cases the bone is considerably heavier than in a healthy state.

Morbid thinness. This affection of the bones is mostly observed in those of the head, from rickets and hydrocephalus.

Mollities. Mucrofoscon. In mollities ossium there is a want of the due proportion of bony particles, and the bone which is formed is of a morbid nature, so that the whole may be bent in any direction. This disease often exists to so great a degree, that the bone may be cut with a knife.

Hyperostosis. When the whole of a bone is swollen, or the extremity of a bone, the disease is so called. Anatomists frequently have occasion to examine this disease in the extremity of a bone; as in white swellings. A considerable deposition of
of a morbid fluid is observed in the cells of the bone, which is remarkably spongy.

Rachitis. This is merely a degree of mollities in which the bones swell at their extremities, and, unable to support the weight of the body, too often become deformed.

Exostosis. This disease consists in a bony excrescence arising from a bone. The fangs of the teeth are very subject to exostoses. When a bone has been fractured and there is a luxuriance of callus, it forms an exostosis. The structure of these unnatural formations of bone is similar to that of compact healthy bone. Exostoses occasionally form to a considerable size, from the action of venereal and syphilitic virus, and then the diseased bone is very spongy.

Absorption of Bone. In the honeycomb caries of the cranium, which is the effect of the venereal disease, portions of bone are removed here and there, so as to give somewhat the appearance of a honeycomb. During life small ulcers occupy these cavities. Bone is likewise absorbed from pressure; so that some of the ribs and two or three of the dorsal vertebrae are occasionally removed, from aneurism.

Preternatural Joints. When the patella and the collar bone of old people, and occasionally the long cylindrical bones, are broken, the broken ends are united by ligament, and a new joint is sometimes formed, surrounded by a capsular ligament.

Diastasis. Bones which in a healthy state are united by a firm and immovable connexion, occasionally are separated by disease to a considerable distance from each other: thus diastasis of the bones of the calvaria from hydrocephalus, and diastasis of the bones of the pelvis from enlarged viscera.

Anchylosis. Bones, which in a natural state are united with each other in such a way as to admit of considerable motion,
motion, are often found united to each other by a mass of bone interposing. Sections of such ankylosed joints exhibit the ends of the bones sometimes in a healthy state, and a considerable quantity of spongy bone going across from each extremity. There is not unfrequently a morbid enlargement of the extremities of such bones.

Fracture. The ends of fractured bones have been examined by anatomists at various periods after the accident, from almost the moment after to the time of the complete formation of callus. A coagulum of blood is first deposited; in a short time after, vessels are seen shooting into this coagulum, from whose extremities bone is secreted, and the coagulum is then absorbed. Callus becomes bone of a more or less compact structure. When a cylindrical bone is fractured, the callus between the broken ends of the bone is a solid mass, and has no medullary canal. A fractured tooth never unites again.

Fissure. The bones of the skull are often found cracked, or not completely divided. A fissure is observed in one table whilst the other remains whole.

Tophus. A portion of a bone is occasionally observed elevated above the natural surface. When examined, it is found to arise from a diseased fluid deposited between the external lamellæ of the bone, raising these lamellæ so as to form a knot, or tumour. Such diseased appearances are common to the tibia, and mostly arise from the action of the venereal virus.

Sarcostosis. This disease consists in a loss of a portion of a bone, and in its place a spongy, fleshy excrescence. It most frequently is observed in the cranium and tibia, and generally becomes cancerous, producing death.

Caries. When a portion of a bone is deprived of its periosteum from disease, so that a gritty sensation may be felt by touching it with a probe, it is said to be carious. The whole carious
carious portion is often separated altogether, when the bone is said to exfoliate; but it frequently happens, that in caries of the spongy bones the bone crumbles insensibly away until the whole is lost: this happens to the sternum, carpal, tarfal bones, and vertebrae; whilst the long cylindrical bones, the calvaria, ribs, &c. mostly, when carious, exfoliate.

Spina ventosa. Caries of the internal structure of bones often comes under the examination of the anatomist. A spina ventosa, or suppuration in the medullary canal of the femur, has given rise to a tumour the size of a human head. When the carpal and tarfal bones are examined with this disease, their internal structure is found carious and crumbling away.

Fragility. When there are more earthy particles deposited than in a healthy state, the bones are extremely brittle. This is observed in the bones of very old people; such bones being commonly fractured by a force which, if applied to a young and healthy bone, would scarcely affect it.

Bone converted into chalk. The extremities of the metatarfal bones, and of the phalanges of some gouty people, are occasionally found converted into an earthy mass of a chalky whiteness. This substance often fills the joint, so as to ankyloose it.

COLOUR OF BONES.

The natural colour of recent bones is various: in the foetus they are red; blueish in youth; and white in old age.

By feeding animals, as pigs, pigeons, rabbits, &c. with madder, the bones become of a beautiful red colour.
VESSELS AND NERVES OF BONES.

Bones have always their arteries arising from contiguous trunks, and their veins return the blood into those in the neighbourhood. In the larger and cylindrical bones there is a canal for these vessels. The nerves pass in, along with the arteries, from contiguous branches. The absorbents come out with the veins.

PERIOSTEUM.

DEFINITION. A membrane which invests the external surface of all the bones except the crowns of the teeth.

NAMES. Pericranium, on the cranium; periorbita, on the orbits; perichondrium, when it covers cartilages; and peridesmium, when it covers ligaments.

SUBSTANCE. Fibrous, furnished with arteries, veins, nerves, and absorbent vessels.

CONNEXION. The periosteum coheres very firmly by means of vessels with the substance of bones, and its external surface is connected with cellular membrane, muscles, and ligaments.

USE. To distribute the vessels on the external and internal surfaces of bones.

DISEASED APPEARANCES. Inflammation, in which there is a greater quantity of red vessels than in health, and a general thickening. Gummi, or an elevation of the periosteum, from a spongy thickening.

Many have contended for the insensibility of the periosteum; in a diseased state, however, it is highly sensible, and often gives excruciating pain.

In some birds the periosteum is black, and green in some fish.
CARTILAGES.

Definition. White, elastic, glistening substances, growing to the bones.

Division. Into obducent, which cover the articulatory surfaces of bones; inter-articular, which are not accreted to the bones, but adhere to the capsular ligament, and lie between the articulating extremities, as in the knee-joint, &c.; and uniting cartilages, which unite bones firmly together, as the symphysis pubis, bodies of the vertebrae, &c.

Use. To lubricate the articulation of the cartilages; to connect some bones by an immovable connexion; and to facilitate the motion of some articulations.

The diseases of cartilages are little, if at all, understood.

OSTEOGENY;

or,

DOCTRINE OF THE FORMATION AND GROWTH OF BONES.

In what manner bones are first formed has long been a matter of dispute. Duhamel was of opinion that they were formed from layers of the periosteum, which gradually ossified. This plausible doctrine, taught for many years, was at length opposed by Detleff, who, under the direction of Haller, made many experiments to prove its fallacy. He was of opinion, from repeated observations, that the first rudiments of bone are a glutinous substance, which quickly assumes the consistence of cartilage, and then proceeds more slowly to the firmness of bone. This hypothesis is now abandoned. Modern physiologists
Physiologists are of opinion, that offication is a specific action of small arteries, by which officating matter is separated from the blood, and deposited where it is required.

The first thing observable in the embryo, where bone is to be formed, is a transparent jelly, which becomes gradually firmer, and is formed into cartilage. The cartilage gradually increases to a certain size, and, when the process of offication commences, vanishes as it advances. Cartilages, previous to the offication, are solid, and without any cavity; but when the officating action of the arteries is about to commence, the absorbents become very active, and form a small cavity, in which the bony matter is deposited; bone continues to be separated, and the absorbents model the mass into its required shape.

The process of offication is extremely rapid in utero; it advances slowly after birth, and is not completed in the human body till about the twentieth year.

Offication in the flat bones, as those of the skull, always begins from central points, and the radiated fibres meet the radii of other offifying points, or edges of the adjoining bone.

In long bones, as those of the arm and leg, the clavicle, metacarpal and metatarsal bones, a central ring is formed in the body of the bone, the head and extremities being cartilage, in the centre of which offication afterwards begins. The central ring of the body shoots its bony fibres towards the head and extremities, which extend towards the body of the bone. The head and extremities at length come so close to the body as to be merely separated by a cartilage, which becomes gradually thinner until the twentieth year.

Thick and round bones, as those of the tarus, carpus, sternum, and patella, are at first all cartilage; offication begins in the centre of each.
At birth the bones of the foetus are very imperfect. The extremities and processes of almost all the long bones are connected to the body of the bone by cartilage. These portions of bone are called epiphyses. The cranium has no future; its bones are connected together by a firm and almost cartilaginous membrane. On the anterior part of the cranium, between the parietal bones and the frontal, is a considerable membranous space, called the anterior fontanel, and a similar but smaller one between the parietal bones and the occipital, termed the posterior fontanel. The frontal bone consists of two bones, and the occipital of four. The teeth are partly formed, especially the enamel, and are placed in a double series. The external auditory foramen is surrounded by a bony circle, in which there is a groove for the attachment of the membrana tympani:—this circle gradually elongates into the meatus auditorius. The articular cavities of all the bones are much more shallow than in the adult. The os innominatum consists of three bones, the ilium, ischium, and pubis, which are connected together by very firm cartilage. The bodies of the vertebrae and its processes are united by cartilages.

OF THE CONNEXION OF BONES.

Bones are connected with one another, so as to admit of motion, and this kind of union is termed diarthrosis; or so as to admit of no motion, which is termed scharthrosis; and when connected with one another by an intervening substance, the union is termed symphysis. Diarthrosis, scharthrosis, and symphysis, are to be considered as the genera only of articulations, each genus comprehending several species, which are arranged as follows.

Diar-
Genera.

Species.

Enarthroses, when the round head of one bone is received into the deep cavity of another, so as to admit of motion in every direction; as the head of the os femoris with the acetabulum of the os innominatum.

Arthrodia, when the round head of a bone is received into a superficial cavity of another, so as to admit of motion in every direction; as the head of the humerus with the glenoid cavity of the scapula.

Ginglymus, when the motion is only flexion and extension; thus the tibia is articulated with the os femoris; and the cubit and radius with the os humeri.

Trochoides, when one bone rotates upon another; as the first cervical vertebra upon the odontoid process of the second, and the radius upon the ulna, or cubit.

Amphiarthroses, when there is motion, but that very obscure; as the motion of the metacarpal and metatarsal bones.

Suture, when the union is by means of dentiform margins; as in the bones of the cranium; hence the sagittal, lambdoidal or occipital, and coronal sutures.

Harmony, when the connexion is by means of rough margins, not dentiform; as in the bones of the face.

Gomphosis, when one bone is fixed within another, like a nail in a board; as the teeth in the alveoli of the jaws.
SYNDESMOLOGY;

OR,

DOCTRINE OF THE LIGAMENTS.

Ligaments are elastic and strong membranes connecting the extremities of the moveable bones.

Division. Into capsular, which surround joints like a bag, and connecting ligaments.

Use. The capsular ligaments connect the extremities of the moveable bones, and prevent the efflux of synovia; the external and internal connecting ligaments strengthen the extremities of the moveable bones.
Ligaments of the lower jaw.—The condyles of the lower jaw are connected with the articular sinuses of the temporal bone by two ligaments, the capsular and lateral ligament.

Of the occipital bone, and vertebrae of the neck.—The condyles of the occipital bone are united with the articular depressions of the first vertebra by the capsular, broad, anterior, and posterior ligaments, the ligaments of the odontoid process, and ligamentum nuchae.

Of the vertebrae.—The vertebrae are connected together by means of their bodies and oblique processes. The bodies, by a soft cartilaginous substance, and the processes by ligaments, viz. the transverse ligament of the first vertebra; the anterior and posterior common; the interspinous; the intertransverse; the intervertebral ligaments; the capsular ligaments of the oblique processes; and the ligaments of the last vertebra of the loins with the os sacrum.

Of the ribs.—The posterior extremity of the ribs is united with the vertebrae; the anterior with the sternum. The ligaments of the posterior extremity are, the capsular ligaments of the greater and lesser heads; the internal and external ligaments of the neck of the ribs; and a ligament peculiar to the last rib. The ligaments of the anterior extremity are, the capsular ligaments of the cartilages of the true ribs, and the ligaments of the ribs inter se.

Of the sternum.—The ligaments connecting the three portions of the sternum to the ribs are, the membrana propria of the sternum; and the ligaments of the ensiform cartilage.

Of the pelvis.—The ligaments which connect the osa innominata with the os sacrum are, three ligamenta ilio-sacra, two sacro-ischiatric ligaments, two transverse ligaments of the pelvis, the ligamentum obturans of the foramen ovale, and the ligamentum Poupartii, or inguinale.
Of the os coccygis.—The basis of the os coccygis is connected to the apex of the os sacrum by the capsular and longitudinal ligaments.

Of the clavicle.—The anterior extremity is connected with the sternum and first rib; and the posterior extremity with the acromion of the scapula, by the interclavicular, the capsular ligament, the ligamentum rhomboideum; and in the posterior extremity, the capsular ligament.

Of the scapula.—The proper ligaments which connect the scapula with the posterior extremity of the clavicle are, the eonoid and trapezoid ligaments.

Of the humerus.—The head of the humerus is connected with the glenoid cavity of the scapula by the capsular ligament.

Of the articulation of the cubit.—The elbow joint is formed by the inferior extremity of the humerus, and superior extremities of the ulna and radius. The ligaments connecting these bones are, the capsular, the brachio-cubital, and the brachio-radial ligaments.

Of the radius.—The radius is affixed to the humerus, cubit, and carpus, by peculiar ligaments, namely, the superior, inferior, oblique, and interosseous ligaments.

Of the carpus.—The ligaments which connect the eight bones of the wrist together, and with the fore-arm and metacarpus, are, the capsular ligament of the carpus, the first and second transverse ligament, the oblique ligament, and the capsular ligament proper to the bones of the carpus.

Of the metacarpus.—The bones of the metacarpus are in part connected with the second row of bones of the carpus, and in part together, by the articular and interosseous ligaments.

Of the fingers.—The fingers and phalanges are connected together, and with the metacarpus; and the thumb with the carpus by the lateral ligaments of the fingers, and ligament of the thumb with the os trapezium of the carpus.
Of the hand.—The ligaments which keep the tendons of the muscles of the hand in their place, are situated partly in the palm and partly on the back of the hand. In the back of the hand are, the *external transverse* ligament of the carpus, the *vaginal* and the *transverse* ligaments of the extensor tendons. In the palm of the hand are, the *internal transverse* ligament of the carpus, the *vaginal* or *crucial* ligaments of the flexor tendons of the phalanges, and the *accessory* ligaments of the flexor tendons.

Of the articulation of the femur.—The head of the os femoris is strongly annexed to the acetabulum of the os innominatum, by two very strong ligaments—the *capsular* ligament, and *lamentum teres*, or restraining ligament.

Of the articulation of the knee.—The knee joint is formed by the condyles of the os femoris, head of the tibia, and patella. The ligaments are, the *capsular*, the *posterior*, the external and the internal *lateral* ligaments, the *crucial* and the *alar* ligaments, the ligaments of the semilunar cartilages, and ligaments of the patella.

Of the fibula.—The fibula is connected with the tibia by means of the *capsular* ligament of the superior extremity, the *interosseous* ligament, and the ligaments of the inferior extremity.

Of the articulation of the tarsus.—The inferior extremity of the tibia and fibula forms the cavity into which the astragalus of the tarsus is received. This articulation is effected by the *anterior*, *middle*, and *posterior* ligaments of the fibula, the *lamentum tibiae deltoides*, the *capsular* ligament, and the ligaments proper to the bones of the tarsus.

Of the metatarso.—The bones of the metatarso are connected in part together, and in part with the tarsus, by means of the *capsular* ligament, the *articular* ligaments, the *transverse* ligaments.
ligaments in the back and sole of the foot, and the *interosseous*
ligaments of the metatarsus.

*Of the toes.*—The phalanges of the toes are united partly
together, and partly with the metatarsus, by the *capsular* and
*lateral* ligaments.

The ligaments which restrain the muscles of the foot in
their proper places are found partly in the back and partly
in the sole of the foot. They are the *vaginal* ligament of the
tibia, the *transverse* or *crucial* ligaments of the tarus, the lig-
ments of the tendons of the peronei muscles, the *lacinated*
ligament, the *vaginal* ligament of the extensor muscle and
*flexor* pollicis, the *vaginal* ligaments of the *flexor* tendons, the
*accessory* ligaments of the *flexor* tendons, and the *transverse*
ligaments of the extensor tendons.

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**MYOLOGY;**

**OR,**

**DOCTRINE OF THE MUSCLES.**

*A muscle* is a fibrous body, divided into *head, belly,* and
*tail.*

*Adhesion.* The *head* and *tail* are firmly attached to the
bones; the place of attachment of the former is called its
*origin*; it is usually that part nearest the trunk of the body.
The latter is termed the *insertion,* which is more remote from
the trunk of the body, and is implanted into the part to be
moved. The body adheres laxly to other parts, by means of
the cellular membrane, in order that it may swell when the
muscle acts.
SUBSTANCE. Fleshy in the belly, tendinous in the extremities. The former is composed of fleshy fibres, which are irritable and sensible; the latter of white fibres, which are neither sensible nor irritable. When the tendinous extremity of a muscle is rounded, it is called a tendon; when broad and expanded, aponeurosis, and sometimes fascia.

Muscles are variously named, according to the arrangement of their fibres, or from their action, or from their origin and insertion, or from their figure or situation; thus, when the fibres go in the same direction, it is said to be a simple muscle; when they are in rays, a radiated muscle; when arranged like the plume of a feather, a penniform muscle; and, when two penniform muscles are contiguous, a compound penniform. Muscles sometimes surround certain cavities of the body, forming a thin lamina, as in the intestinal canal, bladder, &c. When they are situated around any opening, so as to shut or open it, they are termed sphincters. There are many muscles named from their action, as the flexors, extensors, depressors, levators, corrugatores supercili, &c. The muscles which receive names from their origin and insertion are very numerous; as the sterno-clidomastoideus, stylo-hyoidus, stylo-glossus, &c. The deltoïd, pectineus, pyramidalis, &c. are named from their figure; and the pectoralis, lingualis, temporalis, pterygoideus, &c. from their situation. Muscles that concur in producing the same action, are called congeneres; and those that act contrary to each other, antagonistes.

VESSELS. Arteries, veins, and absorbents abound in the fleshy part; but very few indeed in the tendinous.

NERVES of muscles are also numerous in the fleshy parts, and wanting in the tendinous.

USE. Muscles are the organs of motion.
MUSCLES OF THE INTEGUMENTS OF THE CRANIUM.

Occipito-frontalis*. — Epicranius, Occipitalis et frontalis. Digastricus capitis. — A broad, thin, muscular expansion, which arises from the upper ridge of the occipital bone, covers the back part of the head, from the mastoid process of one side around to that of the other side, becomes a flat aponeurosis on the top of the head, and is inserted into the skin and eyebrows, and the bone in that neighbourhood. The use of this muscle is to pull the skin of the head backwards, to raise the eyebrows, and corrugate the skin of the forehead.

Corrugator supercilii. — This muscle appears like a flip of the former; it arises above the root of the nose, and is inserted amongst the fibres of the occipito-frontalis. Its use is to wrinkle the eyebrows, by drawing them together.

MUSCLES OF THE EYELIDS.

Orbicularis palpebrarum. — This muscle arises and is inserted by the same small tendon at the inner angle of the orbit. It is a neat, regular, flat muscle, surrounding the eye, which it squeezes with violence when injured, as by dust.

Levator palpebræ superioris. — A small muscle, arising by a flat tendon, deep within the orbit, near the optic foramen; it becomes fleshy as it passes the eyeballs, and ends in the eyelid by a broad expansion of muscular fibres, which finally terminate in a short flat tendon. It opens the eye by raising the upper eyelid.

** The reader will be pleased to observe, that though all the muscles (a few only excepted, which are marked thus *) are in pairs, mention is made here only of the muscles of one side.
MUSCLES OF THE EYEBALL.

The eyeball is completely surrounded by muscles, which move it in every direction. They arise from the very bottom of the orbit, around the optic foramen, and are implanted into the upper, under, and lateral surfaces of the sclerotic coat of the eye; and the expansions of their colourless tendons, form the tunica adnata, or white of the eye; these are termed recti. Besides these, there are two whose action turns the eye obliquely.

—This muscle lifts the eye directly upwards, and is expressive of pride and haughtiness.

Rectus inferior.—Deprimes oculi. Humilis.—This is directly opposite to the former muscle, and is expressive of modesty and submission.

Rectus internus.—Adducens oculi. Bibitorius.—This moves the eye towards the nose.

Rectus externus.—Abduetor oculi. Indignabundus.—This muscle turns the eye outwards. When the recti muscles all act in succession, they roll the eye; but if they act all at once, the eye is immovable.

Obliquus inferior.—Longissimus oculi. Trochlearis.—This arises with the former, from the bottom of the orbit, by a slender tendon, passes the upper part of the eyeball fleshy, then forms a smooth round tendon, which passes through a cartilaginous pulley in the margin of the orbit, and returns down to be inserted in the middle of the eyeball.

Obliquus inferior.—Brevissimus oculi.—This muscle is opposed to the former in form, place, and office. It arises from the nasal process of the superior maxillary bone, in the edge of the orbit, and passes obliquely backwards and outwards under
under the ball of the eye, to be inserted opposite to the obliquus superior.

MUSCLES OF THE NOSE AND MOUTH.

**Levator labii superioris alaeque nasi.**—Pyramidalis. Dilator alae nasi.—A neat, delicate, pyramidal muscle, arising by a small double tendon from the nasal process of the superior maxillary bone, and spreading as it passes down the nose to be implanted by two fasciculi, one into the cartilage of the nose, and the other into the upper lip. Its office is to raise the upper lip, and dilate the nostrils.

**Levator labii superioris profundi.**—Musculus incisivus. Arises immediately under the edge of the orbit, and above the incisors, by a broad flat origin, and runs downwards and obliquely inwards to the middle of the lip, where it meets its fellow. It pulls the upper lip directly upwards.

**Levator anguli oris.**—Levator labiorum communis. Caninus. The origin of this muscle is between the infra-orbital foramen of the superior maxillary bone and the first molaris, immediately above the canine tooth. It is inserted into the fibres of the orbicularis oris, at the corner of the mouth, so that it raises the angle of the mouth upwards.

**Zygomaticus major.**—Distor tor oris. Arises from the cheek bone, near the zygomatic future; runs downwards and inwards to the corner of the mouth, and is lost in the fibres of the orbicularis oris, and depressor of the lip. Its action is that of distorting the mouth in laughter, rage, grinning, &c.

**Zygomaticus minor.**—Arises higher than the former from the cheek bone. It is a much more slender muscle than the major, and is often wanting.

**Buccinator.**—A large flat muscle which forms the sides of the cheek. It arises chiefly from the coronoid process of the
lower jaw, and from the superior maxillary bone, close by
the pterygoid process of the sphenoid bone, and proceeds
directly forwards to be implanted into the corner of the
mouth. In its middle it is perforated by the duct of the
parotid gland. Its use is to flatten the cheek, assist in swal-
lowing liquids, turning the morsel in the mouth while chew-
ing: in blowing wind instruments, it both receives and expels
the wind;—hence its name.

**Depressor anguli oris.**—*Triangularis labiorum.*—A trian-
gular muscle arising fleshly from the edge of the lower jaw. It
gradually grows smaller as it runs upwards to be implanted in
the angle of the mouth, which it draws downwards.

**Depressor labii inferioris.**—*Quadratus genae.*—A small
square muscle which arises under the depressor anguli oris, and
goes obliquely upwards and inwards, until it meets its fellow
in the middle of the lip, where it mixes with the fibres of the
orbicularis. It pulls the lip downwards.

**Orbicularis oris.**—*Contractor oris. Sphincter oris. Oc-
—A regularly round muscle, an inch in breadth, surrounding
the mouth alter the manner of the orbicularis oculi, and con-
stituting the thickness of the lips. There is a crossing of the
fibres at the angles of the mouth, which has induced some to
consider it as two semicircular muscles. Often there is a small
flip going from the middle of the upper lip to the nose, called
nasalis labii superioris. The orbicularis contracts the mouth,
and antagonizes with the muscles inserted into it.

**Depressor labii superioris alae nasi.**—*Incisivus me-
dius. Contractor, vel compressor alae nasi.*—A very small muscle
concealed under the former. It arises from the socket of the
fore teeth, and goes into the root of the cartilage of the nose
and upper lip, which it pulls down.
Consitiator Nasi. — Compressor nasi. — A small scattered bundle of muscular fibres, which crosses the cartilage of the nose, and goes to the very point of the nose, meeting on the top with its fellow.

Leverator Menti. — Levator labii inferioris. Incisivo inferior.
— Arises from the lower jaw, at the root of the incisors, and is inserted into the skin on the very centre of the chin. By its contraction it draws the centre of the chin into a dimple, and moves the lip at the same time.

Muscles of the External Ear.

Superior Auris. — Attollens. — A very thin flat expansion of muscular fibres, scarcely distinguishable from the fascia of the temporal muscle, upon which it lies. It arises broad and circular from the expanded tendon of the occipito-frontalis, and is inserted narrow into the root of the cartilaginous tube of the ear. It appears to have been intended to lift the ear upwards.

Anterior Auris. — A delicate, thin, narrow expansion, arising from near the back part of the zygoma, and inserted into the eminence behind the helix. This muscle is frequently not to be distinguished from the former. Its use is to raise the eminence forwards.

Posterior Auris. — Retractens auris. Triceps auris. — A very small, delicate, thin muscle, arising by three narrow distinct slips from about the mastoid process of the temporal bone, and going directly forwards to be inserted into the concha. Its use is to draw the ear back, and stretch the concha.

Helicis Major. — Arises from the anterior and acute part of the helix; is inserted into the cartilage of the helix, a little above the tragus. It depresses the upper part of the helix.

Helicis Minor. — Arises lower than the former, and is inserted
inverted into the crus of the helix. Its use is to contract the
base of the conchæ when the ear is compressed.

TRAGICUS.—This muscle lies upon the concha, and stretches
to the tragus. It depresses the concha, and pulls the tragus
a little outwards.

ANTITRAGICUS.—A very small muscle lying in the anti-
tragus. It dilates the mouth of the concha.

TRANSVERSUS AURIS.—Arises from the upper part of the
concha, and is inverted into the inner part of the helix. It
draws these parts together.

MUSCLES OF THE INTERNAL EAR.

LAXATOR TYMPANI.—This muscle arises from the spinous
process of the sphenoid bone, proceeds into the cavity of the
tympanum to be inverted into the long process of the malleus.
Its use is to draw the malleus obliquely forwards towards its
origin.

TENSOR TYMPANI.—Arises from the cartilaginous extremity
of the Eustachian tube, within the tympanum, and is inverted
into the manubrium of the malleus. By contracting, this muscle
pulls the malleus and membrana tympani inwards.

STAPEDIIUS.—This delicate muscle arises from a little cavern
in the tympanum, near the cells of the mastoid process, and
passes in a bony furrow to be inverted into the posterior part
of the head of the stapes, which, by contracting, it draws
upwards.

MUSCLES OF THE LOWER JAW.

TEMPORALIS.—This great muscle of the lower jaw arises
from a fennecircular ridge in the lower part of the parietal
bone, and from the sphenoid, temporal, and frontal bones in
the hollow behind the eye, where they meet to form the
squamous
famous future, and from the aponeurosis which covers it. Its fibres are bundled together, and pass in a narrow compartment under the zygoma to be inserted all around the coronoid process of the lower jaw. Its use is to pull the lower jaw upwards, which it does very powerfully.

Spasm of this muscle constitutes trismus, or locked-jaw.

Masseter.—A short, thick, flesh muscle, which gives roundness to the back part of the cheek. It arises from the superior maxillary bone, near its junction with the cheek bone, and also from the lower edge of the zygoma, and passes over the coronoid process of the lower jaw, and covers that part of the jaw quite down to its angle, where it is inserted. The parotid gland lies on the upper part of the masseter, and its duct passes over it as it crosses the cheek. The office of this muscle is the same as the temporalis.

Pterygoideus internus.—Pterygoideus minor.—Arises from the internal or flat pterygoid process of the sphenoid bone, and passes downwards and outwards to be inserted into the angle of the jaw on its inside. When this muscle contracts, it raises the jaw, and draws it a little to one side.

Pterygoideus externus.—Pterygoideus major.—This arises from the external pterygoid process, and passes directly outwards, not downwards, to be implanted into the lower jaw, just below the capular ligament, to a part of which it is connected. The use of this muscle is to move the jaw, and prevent the capular ligament from being pinched.

MUSCLES WHICH APPEAR ABOUT THE ANTERIOR PART OF THE NECK.

Platysma myoides.—Musculus cutaneus. Latissimus colli. Quadratus genæ.—This delicate, flat, and expanded muscle arises
arises from the cellular membrane covering the pectoral and deltoid muscles. Its fibres pass upwards to be inserted into the side of the chin and integuments of the cheek. When this muscle contracts, it pulls the skin of the cheeks and face downwards.

**Sterno-cleido-mastoideus.**—Sterno-mastoideus, and cleinomastoideus. Mastoideus.—This arises from the upper part of the sternum, and by another head from the fore part of the clavicle. These two portions pass upwards and outwards, unite and form a big, strong, round muscle, which is inserted into the mastoid process. When one of these muscles acts, the head is pulled to one side; but, when both contract together, the head is bent forward.

Spasm of this muscle causes the wry neck, or *caput obliquum.*

**MUSCLES SITUATED BETWEEN THE LOWER JAW AND OS HYOIDES.**

**Digastricus.**—Biventer maxillae inferioris.—This muscle arises fleshly from the notch along the root of the mastoid process of the temporal bone, goes obliquely forwards and downwards, and becomes a long, thick, and round tendon, which perforates the stylo-hyoideus muscle, and is affixed by a tendinous bridle to the os hyoides; then turning upwards towards the chin becomes again fleshy, and is inserted into the lower and anterior part of the chin. When the jaw is fixed, as in swallowing, this muscle raises the os hyoides; but when the os hyoides is fixed, it pulls down the jaw.

**Mylo-hyoides.**—A flat and broad muscle arising from the whole semicircle of the lower jaw internally, and proceeding with very regular straight fibres to the basis of the os hyoides. It is divided from its fellow by a white tendinous line, which extends
extends from the symphysis of the jaw to the os hyoïdes. When these muscles contract, the os hyoïdes is moved upwards.

**Genio-hyoïdeus.** — *Musculus polychrestus.* A small near muscle, which arises from the rough point of the chin, and proceeds downwards, becoming flat and broad, to be implanted into the basin of the os hyoïdes. When the jaw is fixed, these muscles move the os hyoïdes forwards and upwards, and when the os hyoïdes is fixed, they pull the jaw down.

**Genio-glosseus.** — Arises by a narrow-pointed origin from the rough tubercle behind the symphysis of the chin; spreads out like a fan as it proceeds towards the tongue, whose substance it chiefly forms. It moves the tongue in various directions.

**Hyo-glossus.** — *Baso-glossus. Chondro-glossus. Cerato-glossus.* *Baso-chondro-cerato-glossus.* — This muscle arises by three fasciculi (one from the basis, one from the horn, and the other from the cartilage of the os hyoïdes), which proceed upwards with very slight marks of any division, to be inserted into the side of the tongue, which they pull downwards; and when both act, the tongue is made somewhat round.

**Lingualis.** — This muscle arises from and is inserted into the tongue. It is an irregular bundle of fibres, which runs along the side between the stylo-glossus and the genio-glossus, unconnected with any bone. The tongue is shortened and drawn backwards by these muscles.

**MUSCLES SITUATED BETWEEN THE OS HYOÏDES AND TRUNK.**

**Sterno-hyoïdeus.** — A flat, broad, riband-like muscle, which arises from the upper part of the sternum, rather within the breast, and partly also from the clavicle and cartilage of the
the first rib, and goes straight up to be implanted into the base of the os hyoides, which it draws downwards.

_Omo-hyoiideus._ *Coraco-hyoiideus._ This is a very long thin muscle, arising from the scapula near the coracoid process, and passing around the throat to be inserted into the side of the os hyoides. When one of these muscles acts, the os hyoides is pulled to one side, and when both act it is pulled downwards.

_Sterno-thyroideus._ This muscle lies under the sterno-hyoiideus, which it very much resembles, except that it is much shorter. It arises immediately under it, from the sternum and cartilage of the first rib, and goes upwards to be inserted into a rough ridge in the thyroid cartilage, which it pulls downwards.

_Hyo-thyroideus._ *Thyreo-hyoides._ Arises from the base and horn of the os hyoides, and goes down to be implanted into the lower border of the thyroid cartilage. It raises the thyroid cartilage, and depresses the os hyoides.

_Crico-thyroideus._ A very short muscle passing from the upper edge of the cricoid to the lower margin of the thyroid cartilage. It pulls the thyroid towards the cricoid cartilage.

**MUSCLES SITUATED BETWEEN THE LOWER JAW AND OS HYOIDES LATERALLY.**

_Stylo-glossus._ Arises from the styloid process of the temporal bone, goes obliquely downwards and forwards to be inserted into the side of the tongue in a radiated form, so as to make part of the flesh of the tongue. Its office is to pull the tongue backwards into the mouth.

_Stylo-hyoiideus._ *Stylo-hyoides alter._ Arises, like the former, from the styloid process, and goes obliquely downwards and forwards to be inserted into the side of the os hyoides. Just above its insertion, its fibres are slit so as form a small...
loop for the tendon of the digastricus: to pass through. The stylo-hyoides is sometimes accompanied by a small, flabby muscle, called stylo-hyoides externus. These muscles draw the os hyoides upwards.

Stylo-pharyngeus.—This arises from the root of the styloid process. It is a long, slender muscle, expanding its fibres upon the side of the pharynx. It lifts the pharynx up to receive the food, and then straitens and compresses it to push the morsel down the oesophagus.

Circumflexus palati.—Tensor palati: Palato-salpingus. Staphilinus externus. Spheno-salpingo-staphilinus. Musculus tube. Pterygo-staphilinus.—This muscle arises from the spinous process of the sphenoid bone, and from the beginning of the Eustachian tube, along with which it runs down betwixt the pterygoid processes; it then becomes tendons, and turns around the hamulus of the pterygoid processes to ascend again to the side of the velum; hence, when in action, the soft palate is made tense, by being drawn downwards.

Levator palati mollis.—Salpingo-staphilinus. Spheno-staphilinus. Pterygo-staphilinus. Petro-salpingo-staphilinus.—This arises from the point of the petrous portion of the temporal bone, from the Eustachian tube, and also from the sphenoid bone, from which it descends to the velum pendulum palati, and spreads out in it. When these muscles contract, the soft palate is raised against the posterior opening of the nostrils, and the opening of the Eustachian tube, whilst any thing is passing into the pharynx.

Muscles situated about the entry of the fauces.

Constrictor isthmi faucium.—Glosso-staphilinus.—This muscle arises from the very root of the tongue on each side.
goes round the middle of the velum, and ends in the uvula. This semicircle forms the first arch which presents itself when looking into the mouth. Its office is to pull down the soft palate, and raise the root of the tongue at the same time.

**Palato-pharyngeus.** — *Salpingo-pharyngeus.* — Arises in the middle of the soft palate, goes round the entry of the fauces, forming the second arch in the mouth, and ends in the edge of the thyroid cartilage. It assists in contracting the arch of the fauces.

**Azygos uvula.** — A slip of straight fibres which goes directly down from the peak of the palate bones to the uvula, which its pulls directly upwards.

**Muscles Situated on the Superior Part of the Pharynx.**

**Constrictor pharyngis inferior.** — Arises partly from the thyroid, and partly from the cricoid cartilage, and meets its fellow in a tendinous middle line. It assists in pushing down the morsel through the pharynx.

**Constrictor pharyngis medius.** — Arises from the round point of the os hyoides and its cartilage, and is inserted into the ambit of the pharynx, its uppermost part touching the occipital bone. It compresses the pharynx, and at the same time draws the hyoid bone upwards.

**Constrictor pharyngis superior.** — Arises from the basis of the cranium, from the jaws, palate, and root of the tongue, and surrounds, with its fellow, the upper part of the pharynx, which it moves upwards and forwards, and also compresses.

**Muscles Situated about the Glottis.**

**Crico-arytenoideus posticus.** — A small pyramidal muscle, which arises broad from the back part of the cricoid cartilage,
cilage, and goes directly upwards to be inserted by a narrow point into the back of the arytenoid cartilage. This pair of muscles pulls the arytenoid cartilage directly backwards, and lengthens the *rima glottidis*.

**Crico-arytenoideus obliquus.**—*Crico-arytenoideus lateralis.*—Arises from the side of the cricoid cartilage, and goes obliquely to be inserted into the side of the arytenoid. It opens the glottis.

**Thyro-arytenoideus.**—Arises from the back of the wing of the thyroid cartilage, from the hollow, and is inserted into the fore part of the arytenoid cartilage. It widens the glottis by pulling the arytenoid cartilage forward.

** Arytenoideus obliquus.**—These delicate muscles arise from the root of each arytenoid cartilage, and go obliquely upwards to the points of the opposite one. They draw the cartilages together, and close the glottis.

**Arytenoideus transversus.**—A delicate muscle which arises from the whole length of one arytenoid cartilage, and goes across to be implanted into the whole length of the opposite one. By drawing these cartilages together the glottis is contracted.

**Thyro-epiglottideus.**—Arises from the thyroid cartilage, and is inserted into the side of the epiglottis. It pulls the epiglottis obliquely downwards.

**Aryteno-epiglottideus.**—This muscle arises from the upper part of the arytenoid cartilage laterally, and is inserted into the side of the epiglottis, which it moves outwards.

**MUSCLES SITUATED ON THE ANTERIOR PART OF THE ABDOMEN.**

**Obliquus externus.**—*Obliquus externus descendens. Obli-
quus major descendens. Declinis.*—This muscle, which is the outermost
outermost of all the abdominal muscles, arises by distinct fleshy tongues, from the eight lower ribs. Its fibres pass down all in one parallel direction with each other, but oblique with respect to the abdomen. Its fleshy belly ceases about the middle of the side, and becomes a flat tendon, which goes over the fore part of the belly, until it meets its fellow in the middle. This meeting of the tendons, along with that of the other muscles to be described, forms a white line extending from the pubis to the sternum, called linea alba. Before the tendon of this muscle reaches the middle of the belly it unites with the flat tendon of the inner oblique muscle, about four inches on either side of the linea alba, and forms a semilunar white line, called linea semilunaris. Besides the insertion of this muscle into the linea alba, it is implanted into the spine of the ilium, and the ligament, which extends from the spine of the ilium to the crest of the pubis, called Poupard's ligament. It compresses the abdomen; hence its utility is very considerable in expiration, evacuation of the feces, urine, foetus, &c.

The operation for removing the water in abdominal ascites is now performed in the linea alba, in the middle between the pubis and umbilicus, care being taken to cause the urine to be evacuated previous to it.

Obliquus internus.—Obliquus internus ascendens. Obliquus minor.—This muscle arises fleshy from all the circle of the spine of the ilium, and by a thin tendon, common with the serratus and latissimus dorsi, from the three lower spinous processes of the loins. From the spine of the ilium it ascends upwards in a radiated direction, and crosses the abdomen to the linea alba; its higher fibres reaching the sternum, and the lower ones the pubis. Its flat tendon is inserted into the cartilages of all the false ribs, into the sternum, and into the linea alba.
alba, throughout its whole length. It acts in conjunction with the former.

Transversalis Abdominis.—This muscle arises fleshly from the inner surface of the six lower ribs; from the transverse processes of the four last lumbar vertebrae; from the whole spine of the ilium, and from part of Poupart's ligament. Its fibres run directly across the abdomen, and are inserted tendinous into the whole length of the linea alba. This muscle also acts in conjunction with the two former in compressing the abdomen.

Rectus Abdominis.—These two muscles cover the fore part of the abdomen, in a line between the sternum and pubis, one on each side the linea alba, and are enclosed all this way by a sheath of tendon, formed by a separation of those of the oblique, which are uppermost, from that of the transversalis, which lies underneath. The origin is fleshly from the outside of the sternum; it proceeds about four inches in breadth all down the abdomen, and is inserted by a short flat-pointed tendon on the side of the symphysis of the pubis. It is crossed at intervals by four tendinous intersections. The recti muscles not only compress the abdomen, but bring the trunk forwards towards the pubis.

Pyramidalis.—A small triangular muscle immediately above the symphysis pubis, from the side of which it arises broad, and is inserted a little above into the linea alba. Its use is to assist the rectus in drawing down the sternum, and also to tighten the linea alba.

The umbilicus, or navel, was originally an opening in the foetus, through which the umbilical vein and two umbilical arteries passed. After birth the vessels degenerate into ligaments within the abdomen, and the opening is closed, like a ring, in the middle of the linea alba. The tendinous fibres are very firmly connected together in this place; yet they occasionally give way, and furnish
an outlet to the abdominal viscera: this constitutes an umbilical hernia.

The abdominal ring, or, as it is also termed, the inguinal ring, is an opening in the lower part of the abdomen, just above the pubis, through which the spermatic cord of men passes, and the round ligament of women. It is an opening in the external oblique muscle only, the other muscles having nothing to do with it; formed by the splitting, as it were, of its tendinous fibres at that part. It begins about an inch and a half above the pubis, is oblique, looking towards the pubis. The tendinous fibres forming the upper part of the opening go directly towards the highest point of the pubis, and the slip of fibres which form the lower edge of the slit turn in behind the upper one, and are implanted into the pubis, within and behind the upper edge of fibres. It is this crossing of the fibres which secures the opening; for the more the muscle pulls in pressing the abdomen, the tighter the ring is drawn. Protrusions of the viscera of the abdomen at this place form bubonocele.

Umbilical and inguinal hernie do not consist in the rupture of any part to allow the viscera to protrude. The tendinous fibres lose their strength, and constant pressure upon them causes them to be elongated, or to separate from one another: when this separation is effected, the peritoneum lining the abdomen, an elastic membrane, always goes before the protruding viscus, and constitutes the sac of the hernia. Original malformation of the inguinal ring is the most frequent cause of hernia in that part: this runs through families.

The operation to relieve strangulated hernie in these parts consists in cutting down upon the strangulated viscus to examine it, and then enlarging the opening which strangulated it, so as to allow of its being returned.

Hydrocele of the hernial sac is a very common disease. It frequently accompanies an afoil, when there is an inguinal hernia, and consists merely of a collection of water in the peritoneum forming the sac. It is removed on returning the fluid, by pressure, into the cavity of the abdomen.
MUSCLES ABOUT THE MALE ORGANS OF GENERATION.

Dartos *.—The membrane So termed is laid by many to be muscular; it appears, however, to be no more than a condensation of cellular membrane lining the scrotum, which admits of being corrugated and relaxed. It is placed immediately under the skin of the scrotum.

Cremaster.—A number of fleety fibres which arise about the ring and Poupart's ligament, and run downwards to be inserted into the tunica vaginalis testis. When this flat sheet of fibres contracts, the testicle is drawn upwards.

Erector penis.—Collateralis penis. Ischio-cavernosus.—A small muscle which lies along the crus penis on each side. It arises by a slender tendon from the tuberosity of the ischium, and goes fleshly, thin, and flat over the crus penis to be inserted about two inches up into the crus of the penis. These muscles are supposed, by pressing the penis against this pubis, to compress the vena magna ipsius penis, and so cause an erection.

Accelerator urine.—Ejaculator feminis.—Arises from the sphincter of the anus, and a little above the bulb of the urethra, and meets its fellow in a white tendinous line along the lower part of the bulb of the urethra; so that these two muscles surround the whole of the bulb. Their use is to compress the urethra in emptying it of the last drops of urine, and to expel forcibly the semen, which they do with a kind of involuntary or convulsive action.

Transversalis perinæi.—Transversalis penis. Transversalis perinæi alter.—Arises by a delicate tendon from the tuberosity of the ischium, and crosses the perineum to be inserted into the very back part of the bulb of the urethra. There is occasionally another muscle accompanying it, called transversalis perinæi alter.
MUSCLES OF THE ANUS.

Sphincter ani*.—A broad circular band of muscular fibres surrounding the anus. It arises from a point of the os coccygis behind ; tends a neat flit forwards, by which it is attached to the back part of the accelerator urina. When it contracts, the anus is shut.

In performing the operation for fistula in ano, this muscle, or some part of it, is mostly divided.

levator ani*.—Muscules ani latus.—One broad thin muscle arising from the internal surface of the fore part of the pelvis; so that its origin is continued from the internal pubis all the way round to the sacrum. It grows gradually smaller as it goes downwards to surround the anus, and is inserted into the circle of the anus, the point of the os coccygis, and is mixed with the sphincter ani. This muscle raises the anus, and dilates it, and supports it during the evacuation of the faeces.

MUSCLES OF THE FEMALE ORGANS OF GENERATION.

Erector clitoridis.—A small delicate muscle arising from the internal part of the crus of the ischium, and inserted into the upper part of the crus, and into the body of the clitoris. Its use is to draw the clitoris downwards, and make it tense.

Sphincter vaginae*.—A circular bundle of fibres arising from the sphincter ani and sides of the vagina, which it surrounds,
founds, and inserted into the union of the crura clitoridis. It contracts the entrance of the vagina.

MUSCLES SITUATED WITHIN THE PELVIS.

Obturator internus.—Marsupialis. Burfsalis.—This muscle arises from all the internal surface of the obturator ligament, from the edges of the foramen thyroideum within the pelvis, and comes out by turning round the ischium in the notch between the tuberosity and the spine of the ilium; it proceeds between the crura of the gemini and its tendon, is united to theirs, and inserted with them by one common tendon into the root of the great trochanter. It rolls the thigh obliquely outwards.

Coccygeus.—A thin flat muscle which arises by a narrow point from the inside of the spinous process of the ilium, and is inserted, after being expanded, fleshy into the whole length of the os coccygis. It pulls the point of the os coccygis upwards.

MUSCLES SITUATED WITHIN THE CAVITY OF THE ABDOMEN.

Diaphragma*.—Septum transversum.—The diaphragm is called, in English, midriff. It is a transverse vaulted muscle, dividing the cavity of the thorax from that of the abdomen. It is fleshy towards its borders, and tendinous in the centre, convex towards the thorax, concave towards the abdomen. It arises by one broad fleshy attachment from all the lower borders of the chest; and this fleshy origin constitutes what is considered by some as the upper or greater muscle of the diaphragm. It arises also by many small tendinous feet from the fore part of the loins, which sec un ite in two
two fleshy bellies, termed the *crura diaphragmatis*, which, meeting, form what is termed the *lesser muscles* of the diaphragm. The middle of the diaphragm is a strong aponeurosis, and is distinguished by the epithet of *centrum tendinosum*. The shape of this tendinous centre is determined by the fleshy bellies; the large one above almost surrounds it, and the lesser one below meeting the larger, the two divisions give it a pointed form behind, not unlike a trefoil leaf, or the ace of hearts. The tendinous centre is fixed to the spine, so that the two sides form two convexities in the cavity of the chest.

*Apertures.* This great muscle is perforated by several vessels passing reciprocally betwixt the thorax and abdomen; and the apertures through which they pass have received appropriate names:—1. *Foramen dextrum*. The vena cava passes through this foramen to the heart. The opening is of a triangular shape, tendinous, and larger than the vein requires, so that there is no danger of strangulation.—2. The *foramen sinister*, which is in the lower fleshy belly; it transmits the oesophagus and par vagum into the cavity of the abdomen, and the muscular fibres are so disposed as to make some anatomists believe they acted as a sphincter to the cardia.—3. The *foramen posterius*, which is formed by the crura of the diaphragm bestriding it like an arch, to defend it from pressure. The aorta passes through this opening into the abdomen, and the thoracic duct and *vena azygos* from the cavity of the abdomen into the thorax.

*Coverings.* The upper surface of the diaphragm is covered by the pleura, and its under surface by the peritoneum.

*Arteries.* The diaphragmatic arteries arise from the descending aorta.

*Veins.* The veins follow the arboreal course of the arteries, and empty their blood into the *vena azygos*.
Nerves. The nerves of the diaphragm are called phrenic, it being formerly the supposed seat of the mind: they arise from the spinal nerves of the neck.

Use. Next to the heart, this muscle is the most useful; it is the principal muscle in respiration, and is so perfect in this office, that though there be a complete ankylosis of the ribs, the person lives and breathes by the diaphragm, without feeling the loss. Its actions, in assisting those of the abdominal muscles in agitating, the bowels, expelling the feces, urine, and fetus during labour, are of the utmost assistance.

Inflammation of the diaphragm constitutes the disease called paraphrenitis, or diaphragmitis. It is sometimes an idiopathic affection, but more frequently a symptomatic one.

The appearances, after death, of the true paraphrenitis are, a high state of inflammation of the muscular substance of the diaphragm, which is of a very black colour and soft, as if gangrene had taken place. The spurious diaphragmitis arises from inflammation of the pleura or peritoneum; and is therefore treated of under the diseases of the pleura and peritoneum.

A portion of the diaphragm has been converted into cartilage, which had become completely ossified in its centre; but whether this was originally a disease of the pleura, or peritoneum, or diaphragm, is not easily determined.

Quadratus Lumborum.—A flat, oblong, though somewhat square, muscle, arising fleshly from the back part of the os ilium and ligaments of the pelvis, which tie the back part of the ilium to the side of the sacrum and transverse processes of the lumbar vertebrae. It goes upwards to be inserted into the points of the transverse processes and the lower edge of the last rib. It supports the loins, and draws the spine to one side.
PSOAS PARVUS.—A muscle of the loins which arises from the last dorsal and first lumbar vertebra, and passes down by the side of the psoas magnus to be inserted into the brim of the pelvis, near the acetabulum. It is often wanting. It bends the loins forwards.

PSOAS MAGNUS.—A very long and fleshy muscle filling the space upon the sides of the spine. It arises by an upper head from the last vertebra of the back, then successively from each lumbar vertebra, not only from the sides of their bodies, but likewise from their transverse processes. The muscle then descends thick, round, and fleshy, to be united with the internal iliac muscle, under Poupart’s ligament, and the common tendon then bends obliquely round to be inserted into the lesser trochanter. The psoas muscles are in constant use in moving the thigh forwards, and supporting the pelvis upon the thigh bone.

Inflammation of the cellular membrane near this muscle very frequently terminates in abscesses, called psoas abscesses. Dissections prove that it more commonly happens in the cellular structure around the muscle than in the muscle. After a short time, the pus descends under Poupart’s ligament, following the course of this muscle in the cellular substance surrounding the tendon and femoral vessels. At other times it insinuates itself under the fascia of the thigh, and opens in various places very remote from the psoas muscle. Nor is its appearance upon the loins and about the hip joint unfrequent. It mostly proves fatal.

ILIACUS INTERNUS.—A thick, fleshy, fan-like muscle, occupying the internal surface of the iliac portion of the os innominatum. It arises from the inner edge of the crista of the ilium, and adheres to the concavity of that bone down to the brim of the pelvis, to the fore part of the bone under the spinous processes. All its radiated fibres are gathered together into a tendon under Poupart’s ligament, where it unites with the
the ploas, and the common tendon turns obliquely round to
be inferted into the lesser trochanter. It acts in conjunction
with the ploas in moving the thigh forwards.

MUSCLES SITUATED ON THE ANTERIOR PART OF
THE THORAX.

PECTORALIS MAJOR. — A large, thick, and fleshy muscle
which covers all the breast. It arises from the clavicle next
the sterno, from the edge of the sternum and the cartilaginous endings of the fifth and sixth ribs. All its fibres con-
verge to form a flat twisted tendon, which goes before the arm-
pit to be inferted into the edge of the groove in the humerus
for the tendon of the biceps. When this muscle contracts,
the arm is brought forwards obliquely.

Cancer of the breast is situated over this muscle; and is
occasionally very firmly attached to it.

SUBCLAVIUS. — Subclavianus. — A small muscle concealed
under the clavicle. It arises by a flat tendon from the carti-
lage of the first rib, and is inferted fleshy into a great part
of the clavicle. Its use is to fix the clavicle more firmly.

PECTORALIS MINOR. — Serratus minor anticus. — This muscle
lies underneath the pectoralis major, close upon the ribs. It
arises thick and fleshy from the third, fourth, and fifth ribs,
and its fibres all converge to form a thick fleshy point, to be
inferted into the very apex of the coracoid process of the sca-
pula. It pulls the scapula directly forwards.

SERRATUS MAJOR ANTIUS. — This muscle covers the side
of the chest. It arises by sharp-pointed slips or digitations
from all the true ribs, except the first, and from three of
the false ribs. It proceeds upwards and backwards to form
a fleshy cushion, as it were, for the scapula; and its fibres
all converge to be inserted into the basis of the scapula. It pulls the scapula downwards and forwards.

MUSCLES SITUATED BETWEEN THE RIBS, AND WITHIN THE THORAX.

INTERCOSTALES EXTERNI.—The external layer of muscular fibres between the ribs is so termed. They run from the spine towards the sternum, having their fibres directed from behind forwards, and stopping at the cartilages of the ribs. They assist in inspiration, by raising the ribs.

INTERCOSTALES INTERNI.—These muscles run from before backwards, underneath the former, and crossing them. They raise the ribs.

STERNOCOSTALIS.—Triangularis sterni.—This is very generally considered as a triangular muscle lying on each side, chiefly on the inner face of the sternum, and on the cartilages of the ribs; whilst some think it is three or four muscles:—they are, in fact, three or four slips, arising from the ensiform cartilage, and going over the middle of the sternum to be inserted into the second, third, and fourth rib. Their office is to depress the rib.

MUSCLES SITUATED ON THE ANTERIOR PART OF THE NECK CLOSE TO THE VERTEBRÆ.

LONGUS COLLI.—This is the chief of the muscles which lie on the fore part of the neck. It arises, within the thorax, from the flat part of the bodies of the three uppermost dorsal vertebrae, and from the transverse processes of the four last vertebrae of the neck; and is inserted into the fore part of the second cervical vertebra, where the opposite large muscles meet. It pulls the neck to one side, and, with its fellow, the head and neck directly forwards.
RECTUS INTERNUS CAPITIS MAJOR.—Arises from the transverse processes of the five lower cervical vertebrae, and proceeds obliquely to be inserted into the cuneiform process of the occipital bone, just before the foramen magnum occipitale. It pulls the head and neck directly forwards.

RECTUS INTERNUS CAPITIS MINOR.—A very small muscle immediately underneath the former. It arises from the forer part of the atlas, and goes obliquely inwards to be inserted into the occipital bone, near the condyle. It assists the former.

RECTUS CAPITIS LATERALIS.—A very small muscle like the former. It arises from the transverse processes of the atlas, and is inserted into the side of the cuneiform processes of the os occipitis. It lies immediately under the exit of the internal jugular vein. It moves the head to one side; and, when both act, they assist the former muscles in pulling the head forwards.

MUSCLES SITUATED ON THE POSTERIOR PART OF THE TRUNK.

TRAPEZIUS.—Cucullaris.—These two muscles cover the back part of the neck and shoulders, extending from the tip of one shoulder to the tip of the other, and from the nape of the neck quite down to the loins; hence it has been compared to a monk's cowl hanging back upon the neck. It arises by a strong tendon from the most pointed part of the os occipitis, and along the transverse spine to the mastoid processes; from this point, all down the neck, it has no hold of the vertebrae, but arises from the ligamentum nuchae; it then arises from the spines of the two last cervical vertebrae, and those of the back. From this long origin its fibres converge into one point, the tip of the shoulder, to be inserted into the scapular end of the clavicle, the acromion of the scapula, and the whole length of its
its spine. The trapezius is chiefly a muscle of the scapula; it also bends the neck and head backwards.

**Latissimus dorsi.**—The broadest muscle of the whole body. It covers all the lower part of the back and loins. It arises by a broad flat tendon in the middle of the back, loins, and sacrum, and fleshly from the circle of the ilium. The tendon gradually becomes a flat regular muscle, which proceeds upwards, passes over the corner of the scapula, from which it receives a small fleshly bundle, and several smaller ones as it passes over the ribs; it then becomes a twisted tendon, which, passing into the axilla, turns under the os humeri to be inserted into the inner edge of the groove of the tendon of the biceps. Thus it appears that the anterior part of the axilla is formed by the *pectoralis major*, and the posterior by the *latissimus dorsi*: hence they support the whole body when on crutches. The latter muscle brings the arm down, when raised, as in striking with the hammer; and downwards and backwards, as in knocking with the elbow; it also turns the palm of the hand behind the back.

**Serratus posticus inferior.**—A very broad thin muscle, situated in the lower part of the back, under the former, with which it arises from the three lower dorsal and four uppermost lumbar vertebrae. It soon becomes fleshly, and divides into three or four slips, each of which is inserted separately into the ninth, tenth, eleventh, and twelfth lower ribs, near their cartilage. It pulls the ribs downwards and backwards.

**Rhomboides.**—*Rhomboides major et minor.*—A neat, flat, square muscle, situated between the spine and the whole length of the basis of the scapula. One part arises from the three lower spinous processes of the cervical vertebrae, and goes across to be inserted into the uppermost part of the basis of the scapula. The other portion arises from the spinous processes.
of the four first dorsal vertebrae, and goes directly across under the former piece to be implanted into the lowermost part of the basis of the scapula. These are generally considered as two distinct muscles, though it often happens that there is no division, and most frequently only a partial one. The use of the rhomboideus is to move the scapula upwards and backwards.

**Splenius.** — *Splenius capitis. Splenius colli.* — This muscle lies immediately under the *trapezius* and above the *complexus*, and is named *spleinus*, from its lying like a surgical splint along the side of the neck. It is a flat and broad muscle arising from the four uppermost spinous processes of the back and five lowest of the neck, and proceeds upwards and outwards to be implanted into the whole length of the occipital ridge and mastoid process of the temporal bone. Immediately under this portion is another arising with it, but terminating by four or five distinct tendons in the transverse processes of the upper cervical vertebrae. This portion is considered by some as a distinct muscle, and called *spleinus colli*, and the former *spleinus capitis.* When the muscle of one side acts, the head is pulled backwards to one side; when both act, it is drawn directly backwards; and when the muscle of one side with the *sterno-cleido-mastoideus* of the same side act together, the ear is brought down upon the shoulder.

**Serratus superior posticus.** — This is a flat muscle lying on the posterior part of the chest, over the *spleinus*. It arises by a flat and shining tendon from the spinous processes of the lower cervical and two uppermost dorsal vertebrae, and goes obliquely downwards under the upper corner of the scapula to be inserted into the second, third, and fourth ribs, by three fleshy digitations. They elevate the ribs.

**Spinalis dorsi.** — There is one long mass of muscular and tendinous fibres going from spine to spine along the whole length
length of the back and neck; and which is divided into *spinalis dorfi* and *cervicis*. The former arises from the two upper spinous processes of the loins and three lower of the back, and passing two spines untouched, is inserted into all the spinous processes of the back, except the uppermost. It raises the spine.

**levatoris costarum.** — *Supra-costales. Levatores costarum longiores.* — There are twelve muscles on each side, for the direct purpose of raising the ribs. They arise from the transverse processes of the last cervical and eleven uppermost dorsal vertebrae, and go down to the angle of each rib. The three last are twice as long as the others.

**Sacro-lumbalis.** — *Additamentum ad sacro-lumbalem. Musculi accessorii.* — This muscle arises by a tendon common to it and the *longissimus dorfi*, from all the spinous processes of the lumbar vertebrae, from the spines of the sacrum, and back part of the *os ilium*. Just opposite the lowest rib the tendons separate, and the sacro-lumbalis goes away, to be inserted by a flat tendon into each rib. From the surface of the six or seven lowest ribs there arises a small slip, which mixes with the substance of this muscle, and are termed *additamentum ad sacro-lumbalem*, and sometimes *musculi accessorii*. There is also a fleshy slip connected with the sacro-lumbalis, sometimes described as a distinct muscle, when it is termed cervicalis descendens.

**Cervicalis descendens.** — This muscle is connected with the former; it arises from the transverse processes of the five lower cervical vertebrae, and passes downwards small and slender to be inserted into the six uppermost ribs. It turns the neck obliquely backwards, and to one side.

**Longissimus dorfi.** — A round, thick, firm muscle, filling up the hollow betwixt the spine and the angle of the ribs. It arises
arises by a tendon common to it and the former muscle, and is implanted by two distinct sets of insertions into the heads of the ribs and the transverse processes of the vertebrae. The chief use of this muscle is to assist in returning the spine to the erect posture, and to keep it erect.

TRANSVERSALIS COLLI.—Arises from the five upper transverse processes of the dorsal vertebrae, and passes upwards to be inserted into the transverse processes of the neck. It is sometimes considered as belonging to the longissimus dorsi.

COMPLEXUS.—Implicatus. Trigeminus. Biventer cervicis. Complexus major.—This is so called from the intricacy of its muscular and tendinous parts. It lies immediately under the splenius, and arises by ten or more tendinous feet from the transverse processes of the four lower cervical and seven uppermost dorsal vertebrae. It then becomes a large, thick, fleshy, and tendinous mass, filling up the hollow by the sides of the cervical spinous processes, and terminates by a broad fleshy head in the lower occipital ridge. It draws the head backwards.

TRACHEO-MASTOIDEUS.—Complexus minor. Mastoideus lateralis.—Arises from the transverse processes of the three first vertebrae of the back and the five lowest of the neck, and is inserted into the mastoid process. When one muscle contracts, the head is drawn obliquely backwards; and when both act together, it is pulled directly backwards.

LEVATOR SCAPULARIS.—Levator proprius angularis. Musculus patientiae.—A small thin muscle which arises from the transverse processes of the four or five uppermost vertebrae of the neck, by as many distinct heads, which soon unite, and the muscle goes downwards to be inserted into the upper part of the scapula by a thin tendon. It pulls the scapula up, as in shrugging the shoulders.
SEMI-SPINALIS DORSI.—Tranverso-spinalis dorsi.—Arises from the transverse processes of the seventh, eighth, ninth, and tenth dorsal, and is inserted into the spinous processes of the four uppermost and last cervical vertebrae. It extends the spine obliquely backwards.

MULTIFIDUS SPINE.—Semi-spinalis internus, five transverso-spinalis dorsi. Semi-spinalis, five transverso-spinalis colli, pars interna. Tranversalis lumborum, vulgo fucr. Tranversalis dors. Tranversalis colli.—The many irregular portions of muscle, which authors have variously described, running from the sacrum all along the spine to the vertebrae of the neck, are comprehended under the name of multifidus spine. It begins tendinous and fleshly from the upper part of the sacrum, from the oblique processes of the lumbar vertebrae, from the transverse processes, and from the oblique processes of the cervical vertebrae; and its many bundles are inserted into the spinous processes of the third or fourth, above that from which the bundle arose. These muscles prevent the spine from being too much bent forwards, and also move the spine backwards.

SPINALIS CERVICIS.—Semi-spinalis colli. Tranverso-spinalis colli.—Arises from the transverse processes of the six uppermost dorsal vertebrae, and is inserted into all the spinous processes of the cervical vertebrae, except the first and last. It stretches the neck obliquely backwards.

RECTUS CAPITIS POSTICUS MAJOR.—Arises tendinous from the transverse process of the second cervical vertebra, and mounts up fleshly to be inserted into the lower occipital ridge. It draws the head backwards.

RECTUS CAPITIS POSTICUS MINOR.—A shorter muscle than the former, arising tendinous from the middle of the first vertebra of the neck, and is inserted fleshly with the former into the lower occipital ridge. Its action assists that of the major.
OBliquus capitis superior.—The oblique muscles very much resemble the recti, except in their direction. This arises from the transverse process of the atlas, and goes obliquely to be inserted into the end of the lower occipital ridge. It assists in turning the head.

Obliquus capitis inferior.—Arises from the spinous process of the second cervical vertebra; and is inserted into the transverse process of the atlas. It assists in turning the head quickly.

Scalenus.—Scalenus, primus et secundus.—The ancients considered this as one triangular muscle. It has since been distinguished as two, three, four, and even five distinct muscles. It is, in fact, one great, flat, triangular muscle, stretching from the ribs to the neck, closing the thorax above, and giving passage to the nerves and vessels of the arm. It arises from the transverse processes of the six lower cervical vertebrae: one part of it is inserted into the flat part of the first rib close by its cartilage, another portion is inserted into the whole length of the outer edge of the first rib, and a third portion is inserted into the upper edge of the rib. It moves the head forwards, or pulls the neck to one side.

Interspinales.—Interspinales colli, dorfi, et lumborum.—Under this term are comprehended the muscular, tendinous, and ligamentous fibres passing from one spinous process to the next throughout the spine. In the neck they are muscular; in the back, ligamentous; and in the loins, tendinous, or ligamentous. They draw the spinous processes towards each other.

Inter-transversales.—These are small bundles, strongest where there is most motion, passing between the transverse processes of the spine. They draw these parts together.
MUSCLES OF THE SUPERIOR EXTREMITIES.

**Supra-spinatus.**—A muscle occupying the hollow of the scapula above its spine. It arises from the back, spine, and edge of the scapula, is very thick and fleshy, and is enclosed by an aponeurosis. It runs along the scapula under the acromion, and there becomes tendon, which passes over the head of the humerus, to be inserted into the great tuberosity of the head of the humerus. It raises the arm directly upwards.

**Infra-spinatus.**—This arises from the back, spine, and lower margin of the scapula, occupying the cavity below the spine of the scapula, and is covered with a strong aponeurosis like the former muscle. It becomes perfectly tendinous at the capular ligament of the shoulder joint, to which it is attached, and then passes over it to be inserted into the great tuberosity of the humerus. It assists the former.

**Teres Minor.**—A flat muscle, which appears somewhat round when superficially dissected. It is closely connected at its origin with the infra-spinatus; it is long, small, and fleshy, and arises from the angle and all the lower edge of the scapula, and accompanies the infra-spinatus to be attached to the capular ligament, and then inserted into the great tuberosity of the os brachii. It assists the former muscles in raising the arm.

**Teres Major.**—This is a thicker and longer muscle than the former, situated below it, and arising chiefly from the angle of the scapula, and is closely connected with the teres minor and infra-spinatus. Its tendon passes under the long head of the triceps, and is inserted into the ridge on the inner side of the groove along with the tendon of the latissimus dorsi. Its chief use is to draw the arm downwards and backwards.

**Deltoides.**—A thick fleshy muscle which covers the top of
of the shoulder. It arises from the outer end of the clavicle; from the point of the acromion of the scapula, and also from the spine of the scapula; the muscular fibres from these origins all converge over the shoulder, and form a flat strong tendon, which is inserted into the os brachii, one third down. Its use is to raise the arm.

**Coraco-brachialis.**—*M. perforatus Caff.ii.*—A long and rather slender muscle, so named from its origin and insertion. It arises fleshly from the coracoid process of the scapula, along with the short head of the biceps, which it accompanies, and is inserted by a short tendon into the middle of the os brachii. It raises the arm obliquely forwards and upwards.

**Subscapularis.**—This muscle lines all the convexity of the scapula, and is consequently of a triangular shape. It is very fleshly, thick, and strong, and its fibres all converging from their origin in the two edges and base of the scapula, to form a tendon, give it a radiated or fan-like appearance. The tendon accompanies that of the supraspinatus, and goes round the head of the humerus to be inserted into the lesser tuberosity of the os brachii. It rolls the arm inwards.

**MUSCLES SITUATED ON THE OS BRACHII.**

**Biceps flexor cubiti.**—*Biceps. Biceps flexor brachii.*—A very thick and strong muscle situated in the fore part of the arm. It arises by two distinct heads: one, the larger and thicker head, arises by a long tendon from the coracoid process of the scapula; the other, the shorter head, arises from the edge of the glenoid cavity of the scapula. About one third down the arm the two heads meet, and form a firm fleshly belly, which terminates in a tendon implanted into the tubercle on the fore part of the radius, a little below its neck.
An aponeurosis is sent off from this muscle just above the flexure of the arm. It bends the fore-arm with great strength.

The aponeurosis of the biceps is sometimes punctured in bleeding. When the puncture is in the direction of the fibres, and the arm kept still, it seldom produces any mischief; but when the fibres are divided transversely, and the muscle put into much action, inflammation and its consequences take place.

**Brachialis internus.**—This muscle lies immediately under the biceps, which it assists. It arises by a forked head from two thirds of the os brachii at its fore part, and continues its attachment all the way down to within an inch of the joint. It is inserted by a flat tendon into the coracoid process of the ulna.

**Triceps extensor cubiti.**—*Extensor longus. Extensor brevis. Brachialis internus.*—This muscle is situated on the back part of the arm, and was formerly described as three distinct muscles. It arises by a long tendon from the edge of the scapula; by an outer head from the os brachii, just under the greater tuberosity; and by an internal head, which is the shortest from the inside of the os brachii, just under the insertion of the teres major. All these heads unite and are continued downwards, adhering to the os brachii, to within an inch of the joint, where a strong thick tendon is formed, which is implanted into the olecranon. It extends the fore-arm with considerable force.

**Anconeus.**—A small triangular muscle placed on the back part of the elbow. It arises from the external condyle of the os brachii, and is inserted into the back part or ridge of the ulna. It assists in extending the fore-arm.
MUSCLES SITUATED ON THE FORE-ARM.

S U P I N A T O R  R A D I I  L O N G U S.—This muscle forms the very edge of the fore-arm, arising from the edge above the external condyle of the os brachii, becomes very fleshly as it passes the elbow joint, then tendinous and long, and is inserted into the radius near the styloid process. It assists in turning the palm of the hand upwards.

E X T E N S O R  C A R P I  R A D I A L I S  L O N G I O R.—Arises from the ridge of the os brachii just above the external condyle; having become a thick fleshly belly, it passes along the back of the radius, and then forms a thin tendon, which passes over the wrist under the annular ligament, and is inserted into the root of the metacarpal bone of the fore-finger. It extends the wrist.

E X T E N S O R  C A R P I  R A D I A L I S  B R E V I O R.—This muscle is almost the same in origin and use with the former. It is inserted into the fore part of the metacarpal bone of the middle finger.

E X T E N S O R  D I G I T O R U M  C O M M U N I S.—This muscle covers the middle of the back part of the fore-arm, and betwixt the extensor radialis secundus and the extensor minimi digiti. It arises from the outer condyle of the humerus; it grows very fleshly and thick as it descends, and about the middle of the fore-arm divides into three slips. The tendons pass under the annular ligament, along the metacarpal bones and first phalanx of the fingers, where they are joined by those of the interossei and lumbricales, and form a tendinous sheath, which surrounds the back of all the fingers. It extends the fingers.

E X T E N S O R  M I N I M I  D I G I T I.—Auricularis.—The little finger is raised by this muscle, as in picking the ear. It arises from the outer condyle of the humerus, and accompanies the extensor digitorum communis, passes under the annular ligament in
in a channel peculiar to it, and is inserted into the second joint of the little finger.

**Extensor carpi ulnaris.**—Arises from the external tubercle of the humerus, and proceeds along the ulnar edge of the arm to be affixed tendinous into the outside of the lower head of the metacarpal bone of the little finger. Its use is to extend the carpus.

**Flexor carpi ulnaris.**—This muscle arises tendinous from the inner condyle of the os humeri, and fleshy from the olecranon; it proceeds fleshy along the lower edge of the arm; about the middle it becomes tendon, which goes to be inserted into the os pisiforme. The flexor carpi radialis with this muscle bend the wrist with great force; alone, it pulls the hand sideways.

**Palmaris longus.**—A long thin muscle that arises from the internal condyle of the os humeri; its fleshy belly is but two or three inches long; it then forms a slender tendon, and passes along the middle of the fore-arm to be inserted into the annular ligament, just under the root of the thumb. It expands from thence into an aponeurosis, which covers and protects the muscles and blood-vessels of the hand. It bends the hand.

**Flexor carpi radialis.**—A long thin muscle arising, by a thick, short, and split tendon, from the internal condyle of the humerus, from which it proceeds fleshy along the middle of the fore-arm in the course of the radius. Its thin tendon passes under the annular ligament in a groove peculiar to itself, to be inserted into the metacarpal bone of the fore-finger. It bends the wrist.

**Pronator radii teres.**—A small round muscle which arises from the internal condyle of the humerus, and from the coronoid process of the ulna. It is chiefly fleshy, and of a conical
Conical shape, stretching obliquely across the arm to be inserted into the outer ridge of the radius, about the middle of its length. It turns the hand downwards.

_Supinator radii brevis._ A short, thick, and fleshy muscle: it arises from the external condyle of the os brachii, from the edge of the ulna, and from the interosseous ligament; and is turned over the radius to be inserted into its ridge. It rotates the radius outwards.

_Extensor ossis metacarpi pollicis manus._ _Extensor primus pollicis._ _Extensor primi internodi._ _Abductor longus pollicis manus._ This muscle crosses the fore edge of the radius; arising from the edge of the ulna, about the middle of the arm. Its fleshy belly divides into two, three, or four slips, with distinct tendons, which go under the ligament of the carpus to be inserted into the root of the first metacarpal bone of the thumb. Its use is to extend the thumb.

_Extensor primi internodi._ _Extensor minor pollicis manus._ _Extensor pollicis primus._ _Extensor secundi internodi._ _Extensor secundus pollicis._ This muscle lies close to theformer, arising just below it, and accompanying it under the ligament of the wrist; it passes on to be inserted into the first phalanx of the thumb, which it extends.

_Extensor secundi internodi._ _Extensor major pollicis manus._ _Extensor pollicis secundus._ _Extensor tertii internodi._ _Extensor tertius pollicis._ A thick fleshy muscle, arising higher than the former on the ulna, and passing straight down that bone. Its small tendon passes the ligament of the wrist in a peculiar ring, and goes on to be inserted into the last bone of the thumb, which it extends.

_Indicator._ _Extensor indicis proprius._ Arises from the ridge of the ulna, is attached to the interosseous ligament; its tendon passes under the annular ligament, and then joins with the indicator.
Flexor digitorum sublimis. — A large fleshy muscle which lies between the palmaris longus and flexor ulnaris; it arises from the internal condyle of the os brachii, from the ligament of the elbow joint, the coronoid process of the ulna, and from the upper part of the radius. Its fleshy and thick belly divides about the middle of the fore-arm into four fleshy slips, each of which gives off a fonder tendon, which passes under the annular ligament, to be inserted, after being perforated near the first phalanx of the fingers by the tendons of the flexor digitorum profundus, into the fore part of the second phalanx. The use of this strong muscle is to bend the first and second phalanges.

Flexor digitorum profundus. — This muscle lies deeper than the former, which it accompanies; it arises from the internal surface of the ulna, and the interosseous ligament; divides into four slips, whose tendons pass under the annular ligament, perforate those of the flexor sublimis, and are inserted into the fore part of the last phalanx of the fingers. It bends the last joint of the fingers.

Flexor longus pollicis. — This muscle runs by the inside of the radius, arising from it, and the interosseous ligament; it has often, also, another head from the condyle of the humerus and fore part of the ulna. It passes under the annular ligament, and is inserted into the last bone of the thumb. It bends the thumb.

Pronator radii quadratus. — This lies flat upon the interosseous ligament in the fore part of the arm, about two inches above the wrist. It is nearly square, its fibres going across between the radius and ulna. It turns the radius upon the ulna.
MUSCLES SITUATED CHIEFLY ON THE HAND.

Lumbricales.—Musculi fidi cinales.—Four small round muscles, resembling earth-worms. They arise in the palm of the hand, from the tendons of the profundus; their small tendons reach the middle of the second phalanx. They are chiefly useful in performing the quick short motions of the fingers on musical instruments, &c.

Flexor brevis pollicis manus.—A two-headed muscle situated on the inside of the thumb; one head arises from the os trapezium, the other from the os magnum. They are inserted into the scaphoid bones and edge of the first bone of the thumb. The use of this muscle is to bend the first joint of the thumb.

Opponens pollicis.—Lies under the abductor pollicis, arising from the os scaphoides and ligament of the wrist. It is inserted into the fore part of the metacarpal bone of the thumb. It bends the thumb, as in clenching the fist.

Abductor pollicis manus.—This muscle lies immediately under the common integuments; it arises from the annular ligament of the wrist, and from the os scaphoides, then bends gradually round the thumb to be inserted into the first bone of the thumb. A second muscle is described, by Albinus, by the same name. It pulls the thumb from the fingers.

Abductor pollicis manus.—The metacarpal bone of the middle finger gives origin to this triangular muscle; it goes directly across to meet the thumb, and is inserted into the root of the first phalanx. It draws the thumb towards the little-finger.

Abductor indicis manus.—A flat and broad muscle; it arises from the os trapezium and the first bone of the thumb,
and is inserted into the back part of the first bone of the finger, which it pulls forwards towards the thumb.

**Palmaris brevis.** — *Palmaris cutaneus.* — A thin, flat, cutaneous muscle: it arises from the palmar aponeurosis, and stretches across the hand to be inserted into the metacarpal bone of the little finger, and the superincumbent fat. It stretches the aponeurosis of the palm of the hand.

**Abductor minimi digiti manus.** — A thin fleshy muscle upon which the hand rests in writing: it arises from the os pisiforme, and the outer end of the annular ligament, and is inserted laterally into the first bone of the little finger. It draws the little finger away from the rest.

**Adductor minimi digiti.** — Arises from the ligament of the wrist and cuneiform bone, and turns round the metacarpal bone of the little-finger to be inserted into the outside of it. It pulls the metacarpal bone of the little finger towards the thumb.

**Flexor parvus minimi digiti.** — A small thin muscle which arise from the ligament of the wrist and cuneiform bone, and accompanies the abductor minimi digiti, and has nearly the same insertion. It bends the little finger.

**Interossei externi et interni.** — These are small muscles lying between the metacarpal bones, and assisting the lumbricales in bending the fingers.

**MUSCLES OF THE INFERIOR EXTREmitIES.**

**Pectinals.** — *Pectineus.* — A broad, flat, square muscle, lying under the skin, and arising from the os pubis, or pectinis, from that part of it which forms the brim of the pelvis, immediately above the foramen thyroideum; it then proceeds downwards to be inserted by a long flat tendon into the linea aspera of the thigh bone, just below the little trochanter. Its
Life is to bring the knees together; to raise the thigh upwards, and give it a degree of rotation outwards.

**Adductor femoris.**—A broad flat muscle, with three heads, which have so little connexion with one another that they are usually described as three muscles. 1. **Adductor longus femoris.** This is the uppermost head; it arises from the upper and fore part of the pubis, by a short roundish tendon, which becomes a thick fleshy belly, and is inserted by a flat tendon along the middle part of the linea aspera.

2. **Adductor brevis femoris.** This portion lies under the former; it arises from the symphysis of the pubis, by a thick flat tendon, which swells into a thick fleshy belly; it then becomes flat, and is inserted by a flat tendon into the upper part of the linea aspera.

3. **Adductor longus femoris.** The head of this muscle lies behind the former; it arises from the symphysis pubis, and all along the flat edge of the foramen thyroideum, from whence it goes to be inserted into the linea aspera throughout its whole length, its fibres having various degrees of obliquity.

The use of all these muscles is the same, to bring the thigh forwards and upwards.

**Obturator externus.**—This short muscle, so named from its origin, arises from the obturator ligament, and from the ramus ischiæ and pubis, forming the sides of the thyroid foramen. Its fleshy fibres are soon gathered into a round tendon, which swells under the os femoris to be inserted into the cavity at the root of the great trochanter. Its use is to roll the thigh obliquely outwards.

**Gluteus maximus.**—Gluteus magnus, Gluteus major. This muscle lies immediately under the skin, upon the posterior part of the thigh, upon which we sit; it arises fleshy
from the posterior half of the spine of the ilium, from the junction of the ilium and sacrum, from the whole external surface of the sacrum, and from the sacro-sciatic ligament. All the fibres from these origins run obliquely forwards and downwards to the thigh bone, where they are gathered into a broad tendon, which is implanted into the great trochanter, and about three inches along the linea aspera. It extends the thigh, by pulling it directly backwards and a little outwards.

**Gluteus Medius.**—This lies immediately under the former: it arises from the anterior half of the spine of the ilium, and from its anterior superior spinous process. Its fibres all converge towards the great trochanter, into which the muscle is inserted by a broad tendon. Its use is to draw the thigh outwards and a little backwards, and to roll the thigh outward, especially when it is bended.

**Gluteus Minimus.**—Gluteus minor.—A muscle radiated like the former, but much smaller: it arises from the middle of the external surface of the ilium, from a ridge which is continued from the superior anterior spinous process. Its short flat tendon is inserted into the lower and upper part of the great trochanter. The use of this is to assist the other gluteal muscles.

**Pyritiformis.**—M. externus. Pyramidalis. This muscle is so named from its shape: it arises by three fleshy and tendinous beginnings from the hollow of the sacrum and sacro-sciatic notch, and growing gradually narrower, it passes between the gluteus minor and gemini, and its round tendon is inserted into the upper part of the cavity, at the inner side of the root of the great trochanter. The use of the pyritiformis is to move the thigh upwards, and roll it outwards.

**Gemini.**—Gemelli. This is a biceps muscle, and its heads are so distinct, that they are often taken for two muscles. The
uppermost head is the larger and stronger one; it arises from the spinous process of the ischium, the smaller head begins from the outer end of the tuberosity of the ischium. Both heads are fleshy in their whole length, and, meeting, form a tendon to be inserted into the root of the great trochanter. This muscle rolls the thigh bone outwards.

**Quadratus femoris.**—A thin flat muscle which passes in a transverse direction between the tuberosity of the ischium and the thigh bone. It arises from the outside of the tuberosity of the ischium, and is inserted into the ridge between the large and little trochanters. It rolls the thigh outwards.

**MUSCLES SITUATED ON THE THIGH.**

**Tensor vaginae femoris.**—Fascialis. *Musculus aponeurosis, vel fasia lata.*—The anterior superior spinous process of the ilium gives rise to this muscle by a narrow tendinous and fleshy slip, from whence it proceeds to be inserted into the inside of the fascia of the thigh, which it stretches.

The fascia of the thigh is a strong, thick aponeurosis, sent off from the back, and from the tendons of the glutei and adjacent muscles, to surround the muscles of the thigh. It is strongest and thickest on the outside of the thigh, and towards the inside becomes gradually thinner until it appears more like cellular membrane than an aponeurosis. A little below the great trochanter it is firmly attached to the linea aspera, and further down to that part of the head of the tibia which is next to the fibula, where it is expanded along the outside of the leg. This fascia serves to strengthen the action of the muscles by keeping them in their places when in action.

**Sartorius.**—A long muscle that extends obliquely across the whole thigh. It arises tendinous from the anterior superior spinous
spinous process of the ilium; it then forms a thin flat belly, somewhat like a strap, which goes obliquely round the thigh to be inserted into the inner side of the head of the tibia by a broad aponeurosis. This muscle acts in bending the leg obliquely inwards, and bringing one leg across the other, an action common to tailors, whence it is termed the tailor's muscle.

**Gracilis.**—**Gracilis internus.** *Rectus internus femoris.*—A small, thin, and flat muscle; it arises tendineous from the pubis, near its symphysis, and passes directly under the integuments down to the knee, to be inserted under the sartorius into the side of the head of the tibia. It assists the sartorius in bending the leg.

**Rectus femoris.**—**Rectus cruris.** *Rectus five gracilis anterior.*—A thin flat biceps muscle in the anterior part of the thigh, called rectus, from its straight direction. It arises from the inferior anterior spinous process of the ilium by a short round tendon, and from the edge of the acetabulum and capsular ligament. A flat tendon is formed by the union of these heads, which soon becomes fleshy, and the muscle passes directly down towards the patella. This muscle is united at the sides to the vasti, at the back part to the cruræus; and its tendon, along with that of the cruræus, goes to be implanted into the patella. It assists in extending the leg, in a very powerful manner.

**Vastus externus.**—A large muscle situated on the fore part of the thigh. It arises by a thick and strong tendon from the root of the great trochanter and upper part of the linea aspera, and passes down the thigh, attached to the cruræus, and forms a flat tendon, which embraces the patella, and goes round the head of the tibia to be inserted into the inner side of the knee. It extends the leg.

**Vastus internus.**—This muscle resembles very much the former,
Crureus.—Cruralis.—The little trochanter, and nearly the whole of the fore part of the os femoris, give origin to this muscle. On its outer edge and fore part it is united to the vastus externus, and on its inner edge and fore part to the vastus internus. At its lower part the cruralis is joined to the tendon of the rectus, and forms one tendon, which is inserted into the patella.

Semitendinosus.—Seminervosus.—A muscle so called, because its lower half is composed of a small round tendon. It arises tendinous and fleshly from the posterior portion of the tuberosity of the ischium, and continues a little way connected with the biceps cruris; it then leaves it, and goes obliquely inwards to form a long tendon, which passes down behind the inner tubercle of the knee to be inserted into the inside of the tibia, a little below its tuberosity. Its use is to bend the leg backwards and a little inwards.

Semimembranosus.—This muscle begins and ends by a flat tendon, somewhat like a membrane; it arises by a broad, thin, and flat tendon, from the fore part of the tuberosity of the ischium, becomes thick and fleshly in its middle, and terminates in a short tendon, which is inserted behind the head

former, but is not so large. It arises tendinous and fleshly from the fore part of the little trochanter, and from the whole of the linea aspera: its fibres run obliquely forwards and downwards, accompanying the crureus, and the tendon surrounds the knee-pan to be inserted into the outer part of the head of the tibia. The vastus internus assists the externus in extending the leg.

Subcrurari.—Two little muscular slips sometimes found under the cruræus; they are inserted into the capsular ligamen, which they pull up. The cruræus assists in extending the leg.
of the tibia; and, with the tendon of the semitendinosus, forms the inner ham-string. Its use is to bend the leg, and bring it directly backwards.

**BICEPS FLEXOR CRURIS.**—*Biceps cruris.*—*Biceps.*—This muscle, so named from its having two heads, lies immediately under the skin in the back part of the leg. It arises tendinous from the outer part of the tuberosity of the ischium, with the semitendinosus. The other, which is the short head, begins from the linea aspera, all the way down to its bifurcation. A little above the condyle of the femur the two heads unite, and the muscle proceeds outwards to be inserted into the head of the fibula, forming the outer ham-string. Its use is to bend the leg.

**POPLITEUS.**—A small triangular muscle lying across the back part of the knee-joint. It arises from the outer condyle of the femur, and is inserted into a ridge on the back part of the tibia. It assists in bending the leg, and prevents the capsular ligament from being pinched.

**MUSCLES SITUATED ON THE LEG.**

**GASTROCNEMIUS EXTERNUS.**—*Gemellus.*—The large fleshy muscle which forms the calf of the leg. It arises by two heads from the external and internal condyles of the femur: the two heads meet and run down the calf with the appearance of a raphe between; they then form a flat tendon, very broad at its commencement, which passes down the leg, and unites with the tendon of the gastrocnemius internus a little above the ankle.

**GASTROCNEMIUS INTERNUS.**—*Soleus.*—*Extensor tarsi.*—Some have compared this muscle to a sole fish. It arises, like the former, by two heads: the one from the back part of the head of the fibula; the other from the posterior and upper part.
part of the tibia: these immediately unite, and form a large fleshy belly. About half way down the leg it becomes tendinous, and soon unites with the tendon of the gastrocnemius externus. From this union the great tendon, called *tendo Achillis*, is formed, which inserts both muscles into the extremity of the os calcis.

**Plantaris.**—*Tibialis gracilis*, vulgo *plantaris*. *Extensor tarsi minor*, vulgo *plantaris*.—This muscle appears to have been named *plantaris* from a mistaken notion that it formed the plantar aponeurosis, like the palmaris of the hand. It is a long and slender muscle, arising fleshy from the external condyle of the femur, and adhering firmly to the capsular ligament of the knee. It soon forms a small flat tendon, which runs between the inner head of the external gastrocnemius, and the soleus, to be attached to the *tendo Achillis*, with which it is inserted into the inner side of the os calcis. The use of this muscle is to prevent the capsular ligament of the knee-joint from being pinched, and to assist the gastrocnemii muscles.

**Tibialis Anticus.**—This muscle arises from the fore part and outside of the tibia, beginning just under the head of the tibia. About two thirds down the bone it becomes tendon, which passes obliquely over the leg, crosses the ankle, and goes under the annular ligament to be inserted into the upper and inner part of the os cuneiforme internum, and metatarsal bone of the great toe. It extends the foot, and turns the toes inwards.

**Tibialis Posticus.**—A penniform muscle, so named from its situation. It arises from the back part and ridge of the tibia, from the opposite part of the fibula, and from the interosseous ligament quite down to the ankle. About the middle of the tibia it becomes tendinous and fleshy, and the tendon passes in a groove at the inner ankle, and expands so
as to grasp the bones of the tarsus, and is inserted into the two first metatarsal bones, os calcis, and os cuboideis. Its contraction pulls the foot in so as to put the toes together.

Peroneus longus.—Peroneus maximus, vulgo peroneus posterior. Peroneus primus, seu posticus.—This muscle arises from the fore part of the head of the fibula, and from the upper part of that bone. It has also a small slip coming from the upper part of the tibia. About the middle of the leg its tendon emerges towards the integuments, and passing the outer ankle in a cartilaginous pulley, which also transmits the peroneus brevis, it is reflected to the sinuosity of the os calcis, and runs along a groove in the os cuboideis to be inserted tendinous into the outside of the root of the metatarsal bone of the great toe, and the os cuneiforme internum. It moves the foot outwards, and assists in extending it.

Peroneus brevis.—Peroneus medius, vulgo peroneus anticus. Peroneus secundus, seu anticus.—Arises fleshly from above the middle of the external part of the fibula, all the way down to the ankle; it also adheres to the tendinous partition between it and the common extensors. Its tendon passes under that of the peroneus longus, by the outer ankle, to be inserted into the metatarsal bone of the little toe. This muscle assists the former in pulling the foot outwards and extending it a little.

Extensor longus digitorum pedis.—Extensor longus. Peroneus tertius. Nonus Vesali.:—A common extensor muscle of the toes. It arises from the outer and fore part of the head of the tibia, just below the knee; also from the head of the fibula, the interosseous ligament, and the tendinous fascia of the leg. It soon becomes a thick fleshly muscle, and is divided into three distinct portions, which form three round tendons that pass obliquely inwards under the annular ligament of the tarsus, where the first portion divides its tendon into two.
These four tendons are inserted flat into the root of the first joint of each of the four small toes, expanding along the upper side as far as the root of the last joint. A portion of this muscle also arises from the middle of the fibula, and sends its fleshly fibres forwards to a tendon which goes under the annular ligament to be inserted into the root of the metatarsal bone of the little toe. This portion is termed, by Albinus, peroneus tertius.

**Extensor proprius pollicis pedis.**—Extensor longus.—
An extensor muscle of the great toe. It arises by an acute, tendinous, and fleshly beginning, from the head of the fibula: it continues a fleshy muscle down the fibula, and its tendon passes under the annular ligament to be inserted into the posterior part of the last and first joint of the great toe.

**Flexor longus digitorum pedis.**—Profundus. Perforans.—
This muscle arises from nearly the whole of the back part of the tibia. Near the ankle it becomes tendinous, crosses the tendon of the tibialis posticus behind the ankle joint, and goes forward in a groove of the os calcis, and about the middle of the sole of the foot divides into four tendons, which pass through the slips of the perforans to be inserted into the extremity of the last joint of the four lesser toes. Just before the division of the tendon, it receives a considerable tendon from that of the flexor pollicis longus. The use of the perforans is to bend the last joint of the toes.

**Flexor digitorum accessores.**—Majda earned Jacob Sylvii.—This is a small fleshly mass connected with the former muscle, whose office it assists. It arises from the lower part of the os calcis, and from its tuberosity, and is inserted into the flexor longus digitorum pedis at its division into four tendons.

**Flexor longus pollicis pedis.**—A flexor muscle of the great toe, arising fleshly from the upper part of the fibula, and being...
being continued down the same bone almost to the ankle by a double order of oblique fleshy fibres. Its tendon passes under the annular ligament to be inserted into the last joint of the great toe.

MUSCLES CHIEFLY SITUATED ON THE FOOT.

*Extensor brevis digitorum pedis.*—Extensor brevis.—A common extensor of the toes, very closely connected with the extensor longus digitorum pedis. It arises fleshy and tendinous from the fore part of the os calcis, and, passing forwards, soon divides into distinct muscular heads, from each of which a tendon is sent off to be inserted into the great toe, and the three next to it, with the extensor longus.

*Flexor brevis digitorum pedis.*—Perforatus. Sublimis.—This muscle is placed on the sole of the foot: it arises from the inferior and posterior part of the os calcis, soon becomes a fleshy belly, and divides into four tendons, which are split about the root of the first bone of the toes for the passage of the tendons of the flexor longus digitorum pedis. The tendons of the brevis then go on to be inserted into the second phalanx of the four lesser toes, which they bend.

*Lumbricales pedis.*—These four small muscles resemble somewhat the earth-worm, or *lumbricus*. They arise from the forks of the tendons of the flexor profundus, and pass on to be inserted by slender tendons into the inside of the first joint of the four lesser toes. Their use is to bend the first joint of the toes, and to draw them towards the great toe.

*Flexor brevis pollicis pedis.*—Arises by a long tendon from the under and fore part of the os calcis, and from the os cuneiforme externum; it soon divides into two heads, one of which goes to the abductor, and the other to the adductor pollicis,
pollicis, and is inserted with the tendons of those muscles into the external sesamoid bone and root of the first joint of the great toe, which it bends.

**Abductor pollicis pedis.**—*Thenar.*—Arises by short tendinous fibres from the inner and lower part of the os calcis, and is inserted tendinous into the internal sesamoid bone and root of the first joint of the great toe. Its use is to pull the great toe from the rest.

**Adductor pollicis pedis.**—*Antishenar.*—Arises by a long delicate tendon from the ligament extending from the os calcis to the os cuboides, soon divides into two fleshy heads, which again unite and go obliquely inwards to be inserted into the sesamoid bone, or first bone of the great toe. Its use is to bring this toe nearer to the rest.

**Abductor minimi digiti pedis.**—A slender muscle lying on the outside of the foot. It arises from the tuberosity of the os calcis; it forms two small tendons; the shorter one is inserted into the root of the metatarsal bone of the little toe, and the longer goes on to be fixed into the root of the first bone of that toe. Its use is to bend the little toe, and carry it a little outwards, and to support the tarfus in walking.

**Flexor brevis minimi digiti pedis.**—*Parathenar minor.*—A very small muscle arising from the metatarsal bone of the little toe, which it goes over to be inserted into the root of the first bone of the little toe. Its use is to bend this toe.

**Transversalis pedis.**—This muscle extends transversely across the sole of the foot, arising from the ligament which connects the bones of the tarfus going across to be inserted into the tendon of the adductor pollicis. It contracts the foot.

**Interossei externi et interni.**—Four small double-headed muscles situated externally, and four internally, all arising from the metatarsal bones they lie between. Their tendon
tendons meet those of the long and short extensors, the lumbricales forming altogether the sheath which covers the upper part of the toes.

The muscles situated on the sole of the foot are covered by a strong flat tendon, called the plantar aponeurosis, extended from the os calcis to the first joint of all the toes, protecting the muscles, blood-veins, and nerves running under it.

PHYSIOLOGY AND PHENOMENA OF MUSCULAR MOTION.

Muscular motions are of three kinds; namely, voluntary, involuntary, and mixed.

The voluntary motions of muscles are such as proceed from an immediate exertion of the active powers of the will: thus the mind directs the arm to be raised or depressed, the knee to be bent, the tongue to move, &c.

The involuntary motions of muscles are those which are performed by organs, seemingly of their own accord, without any attention of the mind or consciousness of its active power; as the contraction and dilatation of the heart, arteries, veins, absorbers, stomach, intestines, &c.

The mixed motions are those which are in part under the control of the will, but which ordinarily act without our being conscious of their acting; as is perceived in the muscles of respiration, the intercostals, the abdominal muscles, and the diaphragm.

When a muscle acts, it becomes shorter and thicker; both its origin and insertion are drawn towards its middle. The sphincter muscles are always in action; and so likewise are antagonist muscles, even when they seem at rest. When two
antagonist muscles move with equal force, the part which they are designed to move remains at rest; but if one of the antagonist muscles remain at rest, while the other acts, the part is moved towards the centre of motion.

All the muscles of living animals are constantly endeavouring to shorten themselves.

When a muscle is divided, it contracts. If a muscle be stretched to a certain extent, it contracts, and endeavours to acquire its former dimensions, as soon as the stretching cause is removed: this takes place in a dead body, in muscles cut out of the body, and also in parts not muscular, and is called by the immortal Haller *vis mortua*, and by some *vis elastica*. It is greater in living than in dead bodies, and is called the tone of the muscle.

When a muscle is wounded, touched, or otherwise irritated, it contracts, independent of the will; this power is called irritability, and by Haller *viis instis*; it is a property peculiar to, and adherent in, the muscles. The parts of our body which possess this property are called irritable, as the heart, arteries, muscles, &c. to distinguish them from those parts which have no muscular fibres. With regard to the degree of this property peculiar to various parts, the heart is the most irritable, then the stomach and intestines, the diaphragm, the arteries, veins, absorbents, and at length the various muscles follow; but the degree of irritability depends upon the age, sex, temperament, mode of living, climate, state of health, idiosyncrasy, and likewise upon the nature of the stimulus.

When a muscle is stimulated, either through the medium of the will or any foreign body, it contracts, and its contraction is greater or less in proportion as the stimulus applied is greater or less. The contraction of muscles is different according to the purpose to be served by their contraction; thus,
the heart contracts with a jerk; the urinary bladder, slowly and uniformly; puncture a muscle, and its fibres vibrate; and the abdominal muscles act slowly in expelling the contents of the rectum. Relaxation generally succeeds the contraction of muscles, and alternates with it.

The use of this property is very considerable; for upon it depend all muscular action, and the function of every viscus, except that of the nerves.

DISEASED APPEARANCES OF MUSCLES.

MUSCLE CONVERTED INTO BONE. A portion of a muscle is occasionally converted into bone: this is observed in the heart, in the muscular coat of arteries, and in the diaphragm. It consists in a diseased action of the nutritious arteries, by which they deposit bony or earthy particles, instead of muscular matter.

MUSCLES DIMINISHED IN SIZE. A general diminution of the bulk of muscles in the body, or emaciation, is a very common occurrence: but, besides this, the anatomist occasionally finds an obvious wasting of a single muscle; as the heart, the biceps, &c. This in most instances arises from a deficiency of nervous power in the muscle.

CHANGE OF COLOUR OF MUSCLES. The healthy colour of muscle is a florid or flesh colour. Muscles that have become paralytic, and muscles of dropical subjects, are mostly of a paler hue. Besides this, a muscle has been known to have changed its colour to a pale yellow, resembling fat, whilst the surrounding ones possessed their healthy appearance.

INFLAMMATION OF MUSCLES. This affection occurs very frequently. It consists in an increase of vascularity; the mus-
cle appears of a dark red colour, and is more readily torn than healthy muscles.

Abscesses in muscles. These are frequently met with in anatomical investigations. It does not appear, when an abscess is found in a muscle, that any part of the muscle is converted into pus, but the fibres have the appearance of being separated from one another, and compressed together, to make way for the formation of the abscess, and very frequently they are absorbed. This perhaps accounts for the speedy filling up of the space occupied by an immense abscess in two or three days after affording an exit to the pus; i.e., by the elastic and compressed muscular fibres regaining their former situation. The sides of the abscesses are not formed of muscular fibre, but of a condensed cellular membrane, and sometimes a tunic of coagulable lymph, in which an immense number of small arteries are found, as is evinced by dissection, and injections. When the latter are pushed to a great extent, and the injection is successful, small vessels are found to have shut out here and there, so as to give the internal surface of the abscess a somewhat flocculent appearance. In scrophulous abscesses between muscular fibres, the coat of the abscess is mostly much thicker than in other cases.

Gangrene of muscles. In this disease the muscle is pulpy, black, and fetid.

Flaccidity of muscles. This is occasionally observed to a considerable degree. In general it depends upon a sluggish action of the powers of life for some time before death.

Morbid contraction of muscles. This may arise from the want of action in the antagonists, or from some other causes. It consists in a permanent contraction of the muscle to a degree beyond its healthy contraction. It is met with principally in the flexors of the legs of the aged.
DOCTRINE OF THE BURSÆ MUCOSÆ.

Bursæ mucosæ are mucous bags, composed of a proper membrane, containing a kind of mucous fat, formed by the exhalting arteries of their internal surface. They are of different sizes and firmness, and connected here and there by cellular membrane, with the capular ligaments of cavities, tendons, bones, or ligaments. Their internal surface is highly vascularity, smooth, and thinning.—Situation. Various.

Division. Into vaginal and vesicular.

Use. To lubricate the muscles and tendons, which are very frequently in motion.

BURSÆ MUCOSÆ OF THE HEAD.

1. A bursa of the superior oblique muscle of the eye, situated behind its trochlea in the orbit.—2. The bursa of the digastricus, situated in the internal surface of its tendon.—3. A bursa of the circumflexus, or tensor palati, situated between the hook-like process of the sphænoid bone and the tendon of that muscle.—4. A bursa of the sternohyoides muscle, situated between the os hyoïdeus and larynx.

BURSÆ MUCOSÆ SITUATED ABOUT THE SHOULDER JOINT.

1. The external acromial, situated under the acromion, between the coracoid process, deltoid muscle, and capular ligament.—2. The internal acromial, situated above the tendon of the infra-spinatus and teres major: it often communicates with...
the former.—3. *The coracoid bursa*, situated near the root of the coracoid process: it is sometimes double, and sometimes triple.—4. *The clavicular bursa*, found where the clavicle touches the coracoid process.—5. *The subclavius bursa*, between the tendon of the subclavicularis muscle and the first rib.—6. *The coraco-brachial*, placed between the common origin of this muscle, the biceps, and the capsular ligament.—7. *The burza of the pectoralis major*, situated under the head of the humerus, between the internal surface of the tendon of that muscle and another bursa placed on the long head of the biceps.—8. *An external burza of the teres major*, under the head of the os humeri, between it and the tendon of the teres major.—9. *An internal bursa of the teres major*, found within the muscle where the fibres of its tendon diverge.—10. *A bursa of the latissimus dorsi*, between the tendon of this muscle and the os humeri.—11. *The humero-bicipital burza*, in the vagina of the tendon of the biceps. There are other bursae mucosae about the humerus, but their situation is uncertain.

**BURSAE MUCOSÆ SITUATED NEAR THE ELBOW JOINT.**

1. *The radio-bicipital*, situated between the tendon of the biceps, brachialis, and anterior tubercle of the radius.—2. *The cubito-radial*, between the tendon of the biceps, supinator brevis, and the ligament common to the radius and ulna.—3. *The anconaeal burza*, between the olecranon and tendon of the anconeus muscle.—4. *The capitulo-radial burza*, between the tendon common to the extensor carpi radialis brevis, and extensor communis digitorum and round head of the radius. There are other bursae, but as their situation varies, they are omitted.
Bursæ of the inferior part of the fore-arm and hand.

On the inside of the wrist and hand.

1. A very large bursa, for the tendon of the flexor pollicis longus.—2. Four short bursæ on the fore part of the tendons of the flexor sublimis.—3. A large bursa behind the tendon of the flexor pollicis longus, between it and the fore part of the radius, capsular ligament of the wrist, and os trapezium.—4. A large bursa behind the tendons of the flexor digitorum profundus, and on the fore part of the end of the radius, and fore part of the capsular ligament of the wrist. In some subjects it communicates with the former.—5. An oblong bursa, between the tendon of the flexor carpi radialis and os trapezium.—6. A very small bursa between the tendon of the flexor carpi ulnaris and os pisiforme.

On the back part of the hand and wrist.

7. A bursa between the tendon of the abductor pollicis longus and the radius.—8. A large bursa between the two extenfores carpi radiales.—9. Another below it, common to the extenfores carpi radiales.—10. A bursa at the insertion of the tendon of the extensor carpi radialis.—11. An oblong bursa, for the tendon of the extensor pollicis longus, and which communicates with 9.—12. A bursa, for the tendon of the extensor pollicis longus, between it and the metacarpal bone of the thumb.—13. A bursa between the tendons of the extensor of the fore, middle, and ring fingers.—14. A bursa for the extensores of the little finger.—15. A bursa between the tendon of the extensor carpi ulnaris and ligament of the wrist. There are also bursæ mucosæ between the musculi lumbricales and interossei.
BURSÆ SITUATED NEAR THE HIP JOINT.

On the fore part of the joint.

1. The ilio-puberal, situated between the iliacus internus, ploas magnus, and the capsular ligament of the head of the femur.—2. The pectineal, between the tendon of the pectineus and the thigh-bone.—3. A small bursa of the glutaeus medius muscle, situated between it and the great trochanter, before the insertion of the pyriformis.—4. A bursa of the glutaeus minimus muscle, between its tendon and the great trochanter.—5. The gluteo-fascial, between the glutaeus maximus and vastus externus.

On the posterior part of the hip joint.

6. The tubero-ischiatic bursa, situated between the obturator internus muscle, the posterior spine of the ischium, and its tuberosity.—7. The obturatorary bursa, which is oblong, and found between the obturator internus and gemini muscles, and the capsular ligament.—8. A bursa of the semimembranosus, under its origin and the long head of the biceps femoris.—9. The glutæo-trochanteral bursa, situated between the tendon of the ploas muscle and the root of the great trochanter.—10. Two glutæo-femoral bursæ, situated between the tendon of the glutæus maximus and os femoris.

A bursa of the quadratus femoris, situated between it and the little trochanter.—11. The iliac bursa, situated between the tendon of the iliæus internus and the little trochanter.

BURSÆ MUCOSÆ SITUATED NEAR THE KNEE JOINT.

1. The supra-genual, which adheres to the tendons of the vastus and crurals and the fore part of the thigh-bone.—2. The infra-genual bursa, situated under the ligament of the patella, and often communicates with the above.—3. The anterior ge-
nual, placed between the tendon of the sartorius, gracilis, and semi-tendinosus, and internal and lateral ligament of the knee.
—4. The posterior genual, which is sometimes double, and is situated between the tendons of the semi-membranosus, the internal head of the gastrocnemius, the capsular ligament, and internal condyle.—5. The popliteal, conspicuous between the tendon of that muscle, the external condyle of the femur, the semilunar cartilage, and external condyle of the tibia.—6. The bursa of the biceps cruris, between the external part of the tendon of the biceps cruris, and the external lateral ligament of the knee.

BURSAE MUCOSÆ SITUATED IN THE FOOT.

On the back, side, and hind part of the foot.

1. A bursa of the tibialis anticus, between its tendon, the lower part of the tibia, and capsular ligament of the ankle.—2. A bursa between the tendon of the extensor pollicis pedis longus, the tibia and capsular ligament of the ankle.—3. A bursa of the extensor digitorum communis, between its tendons, the tibia, and ligament of the ankle.—4. A large bursa, common to the tendons of the peronei muscles.—5. A bursa of the peroneus brevis, proper to its tendon.—6. The calcaneal bursa, between the tendo Achillis and os calcis.

In the sole of the foot.

1. A bursa for the tendon of the peroneus longus.—2. A bursa common to the tendon of the flexor pollicis pedis longus, and the tendon of the flexor digitorum pedis communis longus profundus.—3. A bursa of the tibialis posterior, between its tendon, the tibia, and astragalus.—4. Five bursae for the flexor tendons, which begin a little above the first joint of each toe, and extend to the root of the third phalanx or insertion of the tendons.

DISEASED
DISEASED APPEARANCES OF THE BURSÆ.

The bursæ mucosae are very frequently found inflamed, relaxed, and containing a diseased fluid.

ANGIOLOGY;

OR,

DOCTRINE OF THE VESSELS.

Veins are long membranous canals which carry blood, lymph, chyle, or a secreted fluid.

DIVISION. Into arteries, veins, absorbents, and excretory ducts.

SITUATION. Except the epidermis, membrana arachnoidea, and nails, every part of the body has vessels, which injections demonstrate.

OF ARTERIES.

Arteries are elastic membranous canals, which pulse. They always become narrower as they proceed from the heart towards the extremities.

ORIGIN. From the ventricles of the heart; namely, the pulmonary artery from the right, and the aorta from the left ventricle: so that there are only two arteries, the rest being branches of these two.

TERMINATION. In veins, exhaling vessels, or they anastomose with one another.

COMPOSED of three membranes, called coats; an external one, a middle coat, which is muscular, and an inner one, which is smooth.
USE. To convey blood from the heart to the different parts of the body, for nutrition, preservation of life, generation of heat, and the secretion of different fluids.

AORTA.

The aorta arises from the left ventricle of the heart, forms an arch towards the dorsal vertebrae, then descends through the diaphragm into the abdomen, in which it proceeds by the left side of the spine to the last vertebra of the loins, where it divides into the two iliac arteries. In this course it gives off, just above its origin, two coronary arteries to the heart, and then forms an arch.

Oxification of the coronary arteries of the heart is not an uncommon disease. It is supposed by some to be the cause of angina pectoris. In three instances, however, where these arteries were completely become bone to the extent of two and three inches, no such disease existed.

The ascending portion of the aorta and its arch are most frequently the seat of aneurism.

The arch of the aorta gives off three branches, which supply the head, neck, and arms with blood; these are,

I. Arteria innominata, which divides into the right carotid and right subclavian arteries.

II. The left carotid.

III. The left subclavian.

The carotid arteries, having emerged from the chest, run up along the neck, one on each side of the trachea, to the angle of the lower jaw, where they divide into external and internal.

The external carotid has been the seat of aneurism; and, in one case, two aneurisms were found in the left carotid.
The external carotid gives off eight branches to the neck and face:

1. Arteria thyroidae, which is very tortuous, supplies the thyroid gland, and gives off branches to several adjacent muscles.

2. Arteria lingualis, which lies flat upon the side of the tongue, and gives off the ramus hyoideus, dorsalis linguae, sublingualis, and ranina.

3. Arteria labialis, called also the external maxillary, the angular, and facial artery: it gives off the palatina inferior, the submental, and the coronary of the lips.

4. Arteria pharyngea inferior, which sends a number of small twigs about the faucæ and basis of the cranium.

5. Arteria occipitalis, from which the posterior temporal arises.

6. Arteria posterior auris, which supplies the parts about the cartilages of the ear with blood, and transmits the arteria tympani and stylo-mastoidea.

7. Arteria maxillaris interna, which is extremely tortuous, and gives off—the spinal artery to the dura mater; the lower maxillary artery, which is included in the lower jaw, and supplies the teeth and face; the pterygoid arteries, which nourish the pterygoid muscles; two deep temporal arteries, which lie wider than the temporal musculæ. The internal maxillary then gives off a branch, which almost immediately divides into the alveolar and infra-orbital; then an artery to the palate, the superior palatine; the upper pharyngeal, which plays about the sphenoid sinus; and lastly, the subal artery, which is transmitted through the sphenopalatine oramen to the cavity of the nostrils.

8. Arteria temporalis, which perforates the parotid gland, and sends off the transversalis faciei, which inoculates with the arteries of the face; and several branches which go to the ear, forehead, and about the temples.
This artery is frequently opened in inflammatory affections of the head.

The internal carotid leaves the external at the angle of the jaw, and proceeds by the par vagum and intercostal nerve to the carotid canal in the petrous portion of the temporal bone, where it is shaped like the letter $f$, and enters the cranium at the side of the sella turcica, having given off two very small twigs to the pituitary gland, and 3d, 4th, and 5th pair of nerves; and when it has reached the anterior clinoid processes, it sends off—

1. Arteria ophthalmica, which is distributed on the eye.

2. A. anterior cerebri, which proceeds before the sella turcica, unites with its fellow, and forms the circle of Willis, from which a branch proceeds to the third ventricle, septum lucidum, and the arteria corporis calloso.

3. A. media cerebri, which runs between the anterior and middle lobes of the brain, gives off the artery of the choroid plexus, and is lost on the middle lobe of the brain.

4. A. communicans, which proceeds backwards, and soon inosculates with the vertebral.

The cerebral arteries are mostly ossified, or have opacities which are progressive to ossification, in old age. In every instance of apoplexy in aged people, from extravasated blood in the brain, this diseased state of the arteries exists.

The subclavian artery arises on the right side, from the arteria innominata; and on the left, from the arch of the aorta.

The subclavian artery is sometimes morbidly dilated. Aneurism arising by the side of the clavicle has been incautiously opened, by mistaking it for a common abscess.

Each subclavian gives off five branches:

1. The
1. The internal mammary, from which arise the A. thymica, A. comes phrenici, the pericardiac, and the phrenico-pericardiac.

2. The inferior thyroid, from which arise the ramus thyroideus, the tracheal arteries, the ascending thyroid, and the transversalis humeri.

3. A. vertebralis, which proceeds into the vertebral fora-mina, to ascend into the cavity of the cranium, where it unites upon the cuneiform process of the occipital bone with its fellow of the other side, and forms the basilary artery, which immediately gives off the posterior artery of the cerebellum; it then proceeds upon the tuberculum annulare, to give off four branches, two to the right, and two to the left, which constitute the A. anterior cerebelli, which branch to the crura cerebelli, the cerebellum, vermis, crura cerebri, corpora quadrigemina, pineal gland, and fourth ventricle; and the A. posterior cerebri, which is joined by the communicans, and supply the thalami nervorum opticorum, the centrum geminum, semicircular infundibulum, and crura fornixis, and the posterior lobes of the brain, inosculating with several arteries.

4. A. cervicalis profunda.

5. A. cervicalis superficialis, both of which are distributed about the muscles of the neck.

6. A. intercostalis superior, which lies between the two upper ribs.

7. A. suprascapularis, which sometimes arises from the A. thyroidea, when it is called the transversalis humeri.

As soon as the subclavian has arrived in the axilla, it is called the axillary artery, which runs into the arm, where it is termed the brachial.

The axillary artery gives off—

1. The four mammary arteries, called thoracica superior, thoracica longior, thoracica humeriana, and thoracica alaris or axillaris, which supply blood to the muscles about the breast.

2. The
2. The subscapularis, which supplies the lower surface of the scapula.

3. The circumflexa posterior.

4. Circumflexus anterior, which ramify about the joint.

The brachial or humeral artery gives off—

1. Many lateral vessels.
2. A. profunda humeri superior.
3. A. profunda humeri inferior.
4. Ramus anastomoticus magnus, which anastomoses round the elbow joint.

The brachial artery is frequently the seat of aneurism.

The brachial artery then becomes the ulnar, and gives off the radial.

The ulnar or cubital artery sends off—

1. The recurrent branches, which anastomose with the ramus anastomoticus magnus.
2. A. interossea communis. It then sends small branches to the adjacent muscles, as it proceeds down to the wrist; just before it arrives here, it gives off A. dorsalis ulnaris, which goes round to the back of the little finger. At the wrist it gives off A. palmaris profunda; then forms a great arterial arch, called the superficial palmar arch, which supplies branches to the fingers.

The radial gives off the radial recurrent, proceeds to the wrist, where the pulse is felt, and gives off the superficialis volae, and then divides into the A. dorsalis pollicis, A. radialis indicis, A. magna pollicis, and A. palmaris profunda.

The radial artery is generally felt by the physician to count the frequency of the pulse. Malformation or disease about the arm often causes the pulse in one arm to be different from that of the other; therefore both pulses should be felt.
The radial artery is frequently ossified throughout; it then feels knotty, and the pulsation is very obscure, and often wanting.

The DESCENDING AORTA gives off, in the breast—
1. The bronchial, which nourish the lungs.
2. The esophageal, which go to the oesophagus.
3. The intercostals, between the ribs.
5. The inferior diaphragmatic.

Within the abdomen it gives off eight branches—
1. The celiac, which divides into three branches:
   1. Arteria hepatica, which gives off—
      a. A. duodeno-gastrica, which sends off the right gastro-epiploic and the \textit{pancreatico-duodenalis}. The latter transmits the pilorica inferior and the \textit{transverse pancreatic}.
      b. A. pilorica superior hepatica.

The hepatic artery then ramifies through the liver.
2. A. coronaria ventriculi, or gastrica, which gives off the superior coronary and superior piloric arteries.
3. A. splenica, from which arise the \textit{pancreatica magna} and \textit{pancreatica parva}, the posterior gastric arteries, the left gastro-epiploic artery, and the \textit{vasa brevia}.

The celiac artery has been found aneurismatic.

2. The superior mesenteric, or mesenteric, of which the \textit{colica media}, \textit{colica dextra}, and the \textit{ileo-colica}, are branches.
3. The renal arteries, or emulgents, which are short, and divide into three or four branches in the pelvis of the kidney.
4. The spermatic arteries, which are very small and long, and proceed with the spermatic cord to the testicles.
5. The inferior mesenteric, from which arises the \textit{le\'t colic artery} and the \textit{internal hemorrhoidal}.

6. The
6. The lumbar arteries, which nourish the muscles and vertebrae of the loins.

7. The middle sacral artery, which is distributed about the sacrum.

The aorta then bifurcates, and becomes the iliac arteries. The iliac soon divides into internal and external. Each internal iliac, or hypogastric artery, gives off five branches:

1. The lateral sacral arteries, three or four in number.
2. The gluteal, which ramify upon the back of the iliac portion of the os innominatum, and supply the gluteal muscles.
3. The ischiatic, which turns downwards along the hip, and gives off the coccygeal artery.
4. Arteria pudica communis, which is sometimes a branch of the sciatic artery; it proceeds out of the pelvis, through the sciatic notch, returns into the pelvis, and runs towards the symphysis of the pubis. In this course it gives off branches to the vesiculae feminales and prostate gland; and the lower or external hemorrhoidal artery to the anus, and then forms the A. perinei, the A. penis, which proceed one on each side; and a branch which plunges deep into the substance of the penis.

5. The obturator, which passes through the oval foramen, and is distributed on the thick muscles in the centre of the thigh.

Each external iliac gives off—

1. The epigastric, which is reflected from Poupart's ligament, upwards, along the abdomen.

This artery is occasionally wounded by the trochar, in the operation of tapping an ascites, when a fatal haemorrhage takes place. In one instance the patient died about twenty minutes after perforating the abdomen, which was found, post mortem, full of blood. The improved method of tapping, however, in the linea alba, does away this inconvenience.
5. *y*.

Ifac*, which runs, backwards, along the *crista ili.*

The **EXTERNAL ILIAC** then passes under Poupart’s ligament, becomes the **FEMORAL** of CRURAL ARTERY, and is continued along the thigh into the popliteal. In this course, it gives off, near the groin—

1. The **profunda femoris**, which gives off the *A. perforans prima*, the *A. perforans secunda magna*, the *A. perforans tertia*, the *A. perforans quarta*, which nourish the muscles of the thigh. The femoral artery then makes a spiral turn round the os femoris, and sends off small branches of no importance to adjacent muscles. About two hands breadth from the knee it gives out—

2. The *ramus anastomoticus magnus*, which ramifies about the knee joint.

The femoral artery, having reached the ham, is called the **POPLITEAL**, which gives off several small branches about the joint, and divides below the ham into the *tibialis antica* and *tibialis postica*.

The popliteal artery is more frequently affected with aneurysm than any other.

The *tibialis antica* soon perforates the interosseous ligament, and passes along the tibia over the bones of the tarsus, and then inoculates with the back arteries. In this course it gives off—

1. The *recurrent*, which inoculates with the anterior branches of the popliteal; it then sends off small branches to neighbouring muscles as it passes down the leg.

2. *A.malleolaris interna*, about the inner ankle.

3. *A. malleolaris externa*, about the outer ankle.

4. *A. tarfect*, which lies upon the bones of the tarsus.
5. *A. metatarsea*, to the tendons of the peronei muscles.

6. *Dorsalis externa hallucis*, which runs along the metatarsal bone of the great toe.

The *tibialis posterior* passes along the back part of the tibia, goes round the inner ankle, and divides at the heel into the two plantar arteries. In this course it sends off—

1. *A. nutritia tibiae*, which gives branches to the popliteus, soleus, and tibialis anticus muscles, before it enters the bone.

2. Many small branches, as it passes downwards.

3. *A. plantaris interna*, which runs along the inner edge of the sole of the foot, and sends off four branches about the foot.

4. *A. plantaris interna*, which forms an arch and inosculates with the anterior tibial artery, and gives off the digital branches to the toes.

**PULMONARY ARTERY.**

The pulmonary artery arises from the right ventricle of the heart, and conveys the dark-coloured blood into the lungs, which is returned to the heart, of a florid colour, by the veins. It does not convey this blood into the lungs for their nutrition, but to receive from the air in the lungs a certain principle, necessary for the continuance of life, and which the arterial blood distributes to every part of the body. The pulmonary artery soon divides into a right and left; the right going to the right lung, and the left to the left lung; where they divide into innumerable ramifications, and form a beautiful net-work, or plexus of vessels, upon the air vessels, and then terminate in the pulmonary veins, which convey the blood, now become florid, to the left side of the heart.

The pulmonary artery seldom becomes diseased; and is very rarely attacked with aneurism. One case, however, of aneurism of the pulmonary artery, the author has seen, which was of the size of his fist.
OF THE ACTION OF THE ARTERIES.

The arteries, by the impulse of the blood from the ventricles of the heart, are dilated and irritated, and by means of their muscular coat contract upon the blood, and thus propel it to the glands, muscles, bones, membranes, and every part of the body; for their nutrition and the various secretions; and then into the veins. This dilatation and contraction is called the pulse, which is perceptible in the trunks and branches of the arteries, but not in the capillary vessels, except when inflammation is going on.

DISEASED APPEARANCES OF THE ARTERIES.

The diseases of arteries, which are detected by the anatomist post mortem, are, aneurism, white patches, ossification, inflammation, and redness of the internal membrane.

OF VEINS.

Veins are membranous canals which do not pulsate; they gradually become larger as they advance towards the heart, in which they terminate, and bring back the blood from the arteries.

Origin. From the extremities of the arteries by anastomosis.

Termination of all the veins is into the auricles of the heart.

Division. Into trunks, branches, ramuli, &c.

Situation. They run by the sides of arteries, but more superficially.

Composed,
COMPOSED, like arteries, of three membranes, but which are semi-transparent; and more delicate.

VALVES are thin semi-lunar membranous folds, which prevent the return of the blood in the vein.

The blood is returned from every part of the body into the right auricle:—the vena cava superior receives it from the head, neck, thorax, and superior extremities; the vena cava inferior, from the abdomen and inferior extremities; and the coronary vein receives it from the coronary arteries of the heart.

THE VENA CAVA SUPERIOR.

This vein terminates in the superior part of the right auricle, into which it evacuates the blood from

The right and left subclavian veins, and the vena azygos.

The right and left subclavian veins receive the blood from the head and upper extremities, in the following manner:

The veins of the fingers, called digitalis, receive their blood from the digital arteries, and empty it into—

1. The cephalic of the thumb, which runs on the back of the hand along the thumb, and evacuates itself into the external radial.

2. The saltvatella, which runs along the little finger, unites with the former, and empties its blood into the internal and external cubital veins. At the bend of the fore-arm are three veins, called the great cephalic, the basilic, and the median.

This vein, the saltvatella, is frequently opened to take away blood; the hand should be soaked for some time before in warm water, and a ligature put round the wrist.

The great cephalic runs along the superior part of the fore-arm, and receives the blood from the external radial.

The basilic ascends on the under side, and receives the
blood from the external and internal cubital veins, and some branches which accompany the brachial artery, called *vena satellitum.*

The *median* is situated in the middle of the fore-arm, and arises from the union of several branches.

Either of these veins may be opened with the greatest ease; and it is at the bend of the arm that blood is most frequently taken from one of these branches.

*Thrombus* is nothing more than some blood that has escaped into the cellular membrane surrounding the vein which is opened;—a mere ecchymosis, or extravasation.

When the lancet penetrates the vein, and perforates the artery which lies underneath at the same time, the arterial blood rushes into the vein. This communication between the artery and vein continues ever after, and the vein becomes dilated and serpentine, from the continual influx of the blood from the artery; and this constitutes what is called a *varicose aneurism.*

These three veins all unite above the bend of the arm, and form—

The *brachial vein,* which receives all their blood, and is continued into the axilla, where it is called

The *axillary vein.* This receives also the blood from the scapula, and superior and inferior parts of the chest, by the superior and inferior thoracic vein, the *vena muscularis,* and the *scapularis.*

The axillary vein then passes under the clavicle, where it is called the *subclavian,* which unites with the external and internal jugular veins, and the vertebral vein which brings the blood from the vertebral sinuses; it receives also the blood from the mediastinal, pericardial, diaphragmatic, thymic, internal mammary and laryngeal veins; and then unites with its fellow,
to form the vena cava superior, or, as it is sometimes called, vena cava descendent.

The blood from the external and internal parts of the head and face is returned in the following manner into the external and internal jugulars, which terminate in the subclavians.

The frontal, angular, temporal, auricular, sublingual, and occipital veins receive the blood from the parts after which they are named; these all converge to each side of the neck, and form a trunk, called the external jugular vein.

The external jugular may be opened with more facility than the veins in the arm. In ophthalmias it gives speedier and more certain relief, and in many diseases of the head is preferable to taking blood from the arm. The application of a bandage under the arm is useless; simple pressure with the finger is far better.

The blood from the brain, cerebellum, medulla oblongata, and membranes of these parts, is received into the lateral sinuses, or veins of the dura mater, one of which empties its blood through the foramen lacerum in basi cranii into the internal jugular, which descends in the neck by the carotid arteries, receives the blood from the thyroidea and internal maxillary veins, and empties itself into the subclavians within the thorax.

The vena azygos receives the blood from the bronchial, superior oesophageal, vertebral, and intercostal veins, and empties it into the superior cava.

**VENA CAVA INFERIOR.**

The vena cava inferior is the trunk of all the abdominal veins, and those of the lower extremities, from which parts the blood is returned in the following manner.

The veins of the toes, called the digital veins, receive the
Blood from the digital arteries, and form on the back of the foot three branches, one on the great toe, called the cephalic; another, which runs along the little toe, called the vena saphena; and one on the back of the foot, vena dorsalis pedis; and on the sole of the foot they evacuate themselves into the plantar veins.

The three veins in the upper part of the foot, coming together above the ankle, form the anterior tibial; and the plantar veins, with a branch from the calf of the leg, called the sural vein, form the posterior tibial; a branch also ascends in the direction of the fibula, called the peroneal vein. These three branches unite before the ham, into one branch, the sub-popliteal vein, which ascends through the ham, carrying all the blood from the foot; it then proceeds upon the anterior part of the thigh, where it is termed the crural or femoral vein, receives several muscular branches, and passes under Poupart's ligament into the cavity of the pelvis, where it is called the external iliac.

The veins of the leg and thigh are more frequently found in a varicose state than any other veins, especially in females.

The arteries which are distributed about the pelvis evacuate their blood into the external hemorrhoidal veins, the hypogastric veins, the internal pudendal, the vena magna ipsius penis, and obturator veins, all of which unite in the pelvis, and form the internal iliac vein.

The external iliac vein receives the blood from the external pudendal veins, and then unites with the internal iliac at the last vertebra of the loins, and forms the vena cava inferior, or ascendens, which ascends on the right side of the spine, receiving the blood from the sacral, lumbar, right sperma-
mats veins, and the vena cava hepatica; and, having arrived
at the diaphragm, it passes through the right foramen, and
enters the right auricle of the heart, into which it evacuates
all the blood from the abdominal viscera and lower extremities.

The vena cava inferior at its very commencement has
been found morbidly distended, and filled with a coagulum; as in aneurism of the arteries.

VENA CAVA HEPATICA.

These veins ramify in the substance of the liver, and bring
the blood into the vena cava inferior from the branches of the

VENA PORTAE.

A great vein which carries the blood from the abdominal
viscera into the substance of the liver. The trunk of this
vein, about the fissure of the liver, in which it is situated, is
divided into the hepatic and abdominal portions. The abdom-
inal portion is composed of the splenic, mesenteric, and internal
hemorrhoidal veins. These three venous branches carry all the
blood from the stomach, spleen, pancreas, omentum, mesen-
tery, gall bladder, and the small and large intestines, into the
sinus of the vena portae. The hepatic portion of the vena portae
enters the substance of the liver, divides into innumerable ra-
mifications, which secrete the bile, and the superfluous blood
passes into corresponding branches of the vena cava hepatica.

DISEASED APPEARANCES OF THE VEINS.

These are, redness of the internal membrane, aneurism,
obliteration, air in the veins, varix, and abscess.
THE ACTION OF THE VEINS.

Veins do not pulsate; the blood which they receive from the arteries flows through them very slowly, and is conveyed to the right auricle of the heart, by the contractility of their coats, the pressure of the blood from the arteries, called the *vis à tergo*, the contraction of the muscles, and respiration; and it is prevented from returning back in the vein by the valves, of which there are a great number.

OF THE ABSORBENTS.

Absorbents are very thin and pellucid vessels, which carry the lymph from every part of the body; substances applied to the surface of the body, and the chyle from the intestines, into the thoracic duct.

**Division.** Into *lacteals* and *lymphatics*. They are called *lacteals* in the intestines and mesentery, and *lymphatics* in every other part.

**Figure.** Branching, becoming broader as they proceed towards their termination.

**Valves.** Numerous, giving them a knotted appearance.

**Situation.** It is supposed that they exist in every part of the body, although they have not been as yet detected in some, as the brain, &c.

**Origin.** The cellular membrane, the viscera, the excretory ducts of the viscera, the external surface and every part of the body.

**Termination.** In the thoracic duct, subclavian vein.

The ancient opinion of lymphatics terminating in neighbouring veins,
veins, is now justly exploded, and supported only by the ipse
dixit of a few. 

LYMPHATIC OR CONGLOBATE GLANDS are situated every where in the course of the lymphatics.

SUBSTANCE. They consist of tender, pellucid, strong tunics.

The use of the absorbents is to carry back the lymph from different parts; to convey the chyle from the intestines to the thoracic duct, where they become mixed and diluted; and to absorb substances from surfaces and parts on which they originate.

ABSORBENTS OF THE HEAD AND NECK.

Absorbents are found on the scalp and about the viscera of the neck, which unite into a considerable branch that accompanies the jugular vein. Absorbents have not been detected in the human brain; yet there can be no doubt of there being such vessels. It is probable that they pass out of the cranium through the canalis caroticus and foramen lacerum in base craniae, on each side, and join the above jugular branch, which passes through some glands as it proceeds into the chest to the angle of the subclavian and jugular vein.

ABSORBENTS OF THE UPPER EXTREMITIES.

The absorbents of the upper extremities are divided into superficial and deep-seated. The superficial absorbents ascend under the skin in every direction to the wrist, from whence a branch proceeds upon the posterior surface of the fore-arm to the head of the radius, over the internal condyle of the humerus, up to the axilla, receiving several branches as it proceeds. Another branch proceeds from the wrist along the anterior part of the fore-arm, and forms a net-work, with a branch coming over the ulna from the posterior part, and ascends
ascends on the inside of the humerus to the glands of the axilla.

The deep-seated absorbents accompany the larger blood-vessels, and pass through two glands about the middle of the humerus, and ascend to the glands of the axilla. The superficial and deep-seated absorbents having passed through the axillary glands, form two trunks, which unite into one, to be inserted with the jugular absorbents into the thoracic duct, at the angle formed by the union of the subclavian with the jugular vein.

**ABSORBENTS OF THE INFERIOR EXTREMITIES.**

These are also superficial and deep-seated. The superficial ones lie between the skin and muscles. Those of the toes and foot form a branch, which ascends upon the back of the foot over the tendon of the cruræus anticus, forms, with other branches, a plexus above the ankles, then proceeds along the tibia over the knee, sometimes passes through a gland, and proceeds up the inside of the thigh to the subinguinal glands.

The deep-seated absorbents follow the course of the arteries, and accompany the femoral artery, in which course they pass through some glands in the leg and above the knee, and then proceed to some deep-seated subinguinal glands.

The absorbents from about the external parts of the pubis, as the penis, perineum, and from the external parts of the pelvis, in general proceed to the inguinal glands. The sub-inguinal and inguinal glands send forth several branches, which pass through the abdominal ring into the cavity of the abdomen.
ABSORBENTS OF THE ABDOMINAL AND THORACIC VISCERA.

The absorbents of the lower extremities accompany the external iliac artery, where they are joined by many branches from the uterus, urinary bladder, spermatic cord, and some branches accompanying the internal iliac artery; they then ascend to the sacrum, where they form a plexus, which proceeds over the psoas muscles, and meeting with the lacteals of the mesentery form the receptaculum chyli, which, in adults, is about the size of a large pea, and is the commencement of the

THORACIC DUCT.

The thoracic duct, or trunk of the absorbents, is of a serpentine form, about the size of a crow-quill, and runs up the dorsal vertebrae, through the posterior opening of the diaphragm, between the aorta and vena azygos, to the angle formed by the union of the subclavian and jugular veins. In this course it receives—

The absorbents of the kidneys, which are superficial and deep-seated, and unite as they proceed towards the thoracic duct.

The absorbents of the spleen, which are upon its peritoneal coat, and unite with those of the pancreas.

A branch from a plexus of vessels passing above and below the duodenum, and formed by the absorbents of the stomach, which come from the lesser and greater curvature, and are united about the pylorus with those of the pancreas and liver, which converge from the external surface and internal parts towards the porta of the liver, and also by several branches from the gall-bladder.

The absorbents of the diaphragm, pleura, lungs, heart, and pericardium.

The lacteals are considered in Splanchnology.
DISEASED APPEARANCES.

Lymphatics morbidly distended with lymph—_inflammation of the lymphatics—serophulous thickening of the coats of the lymphatics—cancerous thickening of the coats of the lymphatics—lymphatics enlarged and filled with serophulous or febacious matter.

PHYSIOLOGY OF ABSORPTION.

Absorption is the taking up of substances which are applied to the mouths of absorbing vessels; thus the chyle is absorbed from the intestinal tube by the lacteals, the vapour of circumscribed cavities, and of the cells of the cellular membrane by the lymphatics of those parts; and thus mercury and other substances are taken into the system, when rubbed on the skin.

The principle by which this absorption takes place is a power inherent in the mouths of absorbing vessels, a vis infita, dependent on the high degree of irritability of their internal membrane, by which the vessels contract and propel the fluid forwards. Hence the use of this function appears to be of the utmost importance, viz. to supply the blood with chyle; to remove the superfluous vapour of circumscribed cavities; otherwise dropies, as hydrocephalus, hydrothorax, hydrocardis, ascites, hydrocele, &c. would constantly be taking place; to remove the superfluous vapour from the cells of the cellular membrane dispersed throughout every part of the body, that anaasarca may not take place; to remove the hard and soft parts of the body; and to convey into the system medicines which are applied to the surface of the body.
SANGUIFICATION:

Sanguification appears to be nothing more than the mixing, by the action of the blood-vessels, of the chyle with the blood; for as it passes from the subclavian vein, it changes its colour, and, when it has reached the heart, cannot be distinguished from the mass of circulating blood.

NEUROLOGY;

Nerves are long, whitish, pulpy cords, composed of bundles or fasciculi of fibres, which serve for sensation.

OR,

DOCTRINE OF THE NERVES.

Origin. The cerebrum, cerebellum, medulla oblongata, and medulla spinalis. Those which arise from the cerebrum, cerebellum, and medulla oblongata, are termed cerebral nerves; and those from the spinal marrow, spinal nerves. All the other nerves of the body arise from these.

Termination. The organs of sense, viscera, vessels, muscles, bones, &c.

Division. Into trunks, branches, ramuli, capillary fibres, papillae, nervous plexuses, and ganglions, or knots.

Number. Thirty-nine pair;—nine pair of cerebral nerves, and thirty pair of spinal. The nine pair of cerebral nerves are, 1. The olfactory. 2. The optic. 3. Oculorum motorii. 4. The pathetic, or trochleatores. 5. The trigemini, or divisi. 6. The abducent. 7. The auditory and facial. 8. The par vagum, or great sympathetic nerves. 9. The lingual pair.
The thirty pair of spinal nerves are divided into eight pair of cervical, twelve pair of dorsal, five pair of lumbar, and five pair of sacral nerves.

All the cerebral and spinal nerves are covered at their origin by the pia mater, and at their egress from the skull and spine by the dura mater, which last constitutes the vagina of the nerve, in the form of a firm cellular texture, but when the nerve arrives at its place of destination, where it appears in a soft pulpy state.

The ganglia, or knots of nerves, are whitish red bodies, of various size and figure, somewhat harder than a nerve found in the course of many of the nerves. They consist of medullary and fibrous substance: their use is not known.

When nerves are woven together like a net, they form a plexus: these are common about the abdominal viscera.

Use. Nerves are the organs of sensation, constituting the organs of the five external senses,—touch, sight, hearing, smelling, and taste; nor can the motion of muscles be performed without the nervous influence.

OF THE NERVES OF THE BRAIN.

The first pair, or olfactory nerves, arise from the corpora striata, in a triangular form; pass forwards, becoming flatter, over the sphenoid and frontal bones, one to each side of the cristâ galli, where they are flattened and enlarged, and send down a number of branches, which go through the cribiform foramen of the ethmoid bone, to be distributed on the pituitary membrane of the nose.

Use. They form the organ of smelling on the pituitary membrane of the nose.

A want of energy in these nerves gives rise to anosmia, or want of smell, which is mostly symptomatic.
The second pair, or optic nerves, arise from the thalami nervorum opticorum, turn round the crura cerebri, becoming thinner, decussate each other, or are united together, then pass through the foramina optica, and perforate the bulb of the eye, and in it form the retina.

The optic nerves being the organs of sight, most of their diseases produce blindness. A diseased appearance, consisting of a change of colour into a brown, and a pulpiness, have been sometimes noticed about the junction of these nerves.

The third pair, or oculorum motorii, arise from the crura cerebri, near the pons Varolii, pass forwards towards the top of the petrous portion of the temporal bone, where they perforate the dura mater, and proceed to the orbital fissure, to be inserted into the muscles of the bulb of the eye, which they move. There is sometimes a branch given off from this nerve to join a branch of the fifth pair in the orbit, and form a ganglion, which is termed the lenticular or ophthalmic ganglion, from whence small branches proceed to the choroid membrane of the eye, the iris, uvea, and tunica sclerotica.

The fourth pair, or the pathetic nerves, arise from the crura of the cerebellum laterally, pass forward, and pierce the dura mater below the third pair, and proceed with them through the orbital fissure to be inserted into the trochlearis muscle of the eye.

The fifth pair, or trigemini, arise from the anterior part of the crura of the cerebellum, and are divided within the cavity of the cranium into three branches, viz. the ophthalmic or orbital, and the superior and inferior maxillary.

The orbital nerve gives off a branch, near its origin, which unites with a branch of the sixth pair, to form the great interscostal nerve; it then divides into three branches.

The four pairs of cranial nerves are all essential for the innervation of the eye and its surrounding structures, performing various functions such as vision, movement of the eyeball, and autonomic functions. The optic nerves, specifically, are responsible for transmitting visual information from the retina to the brain.
1. The *frontal*, which goes through the supræciliary foramen to the muscles and integuments of the forehead.

2. The *lachrymal*, which goes to the lachrymal gland.

3. The *naso-, which goes forwards to the inner canthus of the eye, where it gives off a branch or two, then returns into the cranium, and passes through the cribriform plate of the ethmoid bone, and is distributed on the pituitary membrane.

The *superior maxillary* nerve goes through the foramen rotundum, and is divided into—

1. The *sphæno-palatine*, which goes through the sphænopalatine foramen, sends twigs to the internal pterygoid muscle, then enters the cavity of the nostrils, and is lost on the Eustachian tube, soft palate, and pituitary sinus of the sphænoid bone.

2. The *posterior alveolar* branch, which descends through the foramen by the last grinder, and is distributed to the molares.

3. The *infra-orbital* nerve, which goes through the infraorbital foramen, and is distributed on the muscles of the cheek, nose, lips, and communicates with the facial nerve.

The *inferior maxillary* goes out of the cranium, through the foramen ovale, giving branches to the muscles and glands in its course, and to the facial nerve, and divides as it passes over the pterygoid muscle, into—

1. The *internal lingual*, which is connected with the chorda tympani, and supplies the sublingual glands and contiguous muscles, but more especially the tongue.

2. The more proper *inferior maxillary*, which goes into the canalis mentalis of the lower jaw, gives a branch to each tooth, and comes out again to supply the lower lip and chin.
The distributions of the fifth pair of nerves on the face are subject to a peculiar disease, the *tic doloureux*, which is occasionally relieved by dividing the nerves, and, hitherto, by no other means.

The sixth pair, or *abducent nerves*, arise from the posterior part of the pons Varolii, proceed forwards, perforate the dura mater, and send off some branches near the sella turcica, which unite with branches of the ophthalmic nerve of the fifth pair, to form the great intercostal nerve; they then accompany the third and fourth pair through the orbital fissure, and are distributed on the recti externi muscles of the bulb of the eye.

The seventh pair, or *auditory nerves*, as they are commonly called, originate on each side by two branches, the *portio dura* and *portio mollis*.

The *portio dura* is, in fact, a nerve of the face, and is therefore, with more propriety, called the *facial nerve*: it arises from the fourth ventricle of the brain, passes through the petrous portion of the temporal bone, where it gives off the *chorda tympani*, proceeds through the stylo-mastoid foramen, perforates the parotid gland, and then divides into seven or eight branches, which constitute the *pes anserinus*, supply the ear, parotid gland, and muscles of the face, and communicate with the branches of the fifth pair on the face.

The *portio mollis*, or auditory nerve, arises from the medulla oblongata and the fourth ventricle, enters the internal auditory passage, and is distributed by innumerable branches on the membrane of the cochlea, vestibulum, forming the immediate organ of hearing.

The eighth pair, or *par vagum*, arise by several branches, partly from the medulla oblongata, and partly from the fourth ventricle behind the pons Varolii. It is connected at its origin with the *accessory nerves of Willis*, which ascend through the great occipital foramen from the fifth cervical nerve. These
nerves proceed together through the foramen lacerum in bafi
cranii. The accessary nerves then separate from the par vagum,
and vanish in the sternocleidomastoideus and sternalis mus-
cles: the par vagum then gives off branches in the neck to the
tongue, larynx, and thyroid gland, from which parts they
acquire names, and then descends into the cavity of the thorax,
where it gives off—

1. The right and left recurrent: the former arises on the right
side, near the subclavian artery, which it surrounds, and then
returns upwards to the thyroid gland: the latter arises under
the arch of the aorta, which it surrounds, and then ascends to
the oesophagus. Both nerves are lost in the muscles of the
larynx and pharynx.

2. Several branches which proceed to the superior part of the
pericardium, to form with other nerves the cardiac plexus,
which sends branches to the heart.

3. The par vagum then extends on the posterior surface of
the lungs, on each side, and gives off some branches, which,
with others from the cardiac plexus and recurrent nerves,
form a right and left pulmonic plexus, which supplies the lungs
and trachea.

4. Both trunks of the par vagum then descend with the
oesophagus, and give off many ramifications, which form the
oesophageal plexus, from which the oesophagus and adjoining
parts are supplied.

5. Having passed the diaphragm with the oesophagus, they
form, about the cardia, two stomachic plexuses: the anterior is
expanded over the anterior surface of the stomach, and its
greater curvature; the posterior over the posterior surface and
lesser curvature, and it transmits also branches to the liver,
pancreas, and diaphragm.

6. The par vagum also sends some branches to unite with the
great
great intercostal, and thus concurs in forming the hepatic, splenic, and renal plexuses.

The ninth, or lingual pair of nerves, arise from the medulla oblongata, between the corpora olivaria and pyramidalia, pass out of the skull through the foramina condylidea anteriora, and communicate with the par vagum and first pair of cervical nerves; they then proceed forwards between the jugular vein and carotid artery, to be distributed on the muscles of the tongue and os hyoides.

Thus it appears that the olfactory, ophthalmic, and oculorum motorii arise from the cerebrum; the trochleatores and trigemini from the cerebellum; and the auditory, par vagum, and linguales, from the medulla oblongata.

OF THE NERVES OF THE MEDULLA SPINALIS.

Those nerves are called spinal which pass out through the lateral or intervertebral foramina of the spine.

Each nerve arises by two twigs, which unite and form a small ganglion before the nerve leaves the vertebral canal. They all receive a covering from the dura and pia mater, which accompanies them to their ultimate terminations.

The spinal nerves are divided into cervical, dorsal, lumbar, and sacral nerves.

CERVICAL NERVES.

The cervical nerves are eight pairs, and are to be distinguished from the nerves which pass from the brain along the neck.

The first are called the occipital; they arise from the beginning of the spinal marrow, pass out between the margin of the occipital foramen and atlas, form a ganglion on its transverse process, and are distributed about the occiput and neck.
The second pair of cervical nerves send a branch to the accessory nerve of Willis, and proceed to the parotid gland and external ear.

The third cervical pair supply the integuments of the scapula, cucullaris, and triangularis muscles, and send a branch to assist in forming the diaphragmatic nerve.

The fourth pair send off two branches; one to unite with branches from the second and fifth cervical pairs, and this union forms the accessory nerve of Willis; the other, to unite with a branch from the third and fifth cervical, which forms the diaphragmatic nerve.

The fourth, fifth, sixth, seventh, and eighth pairs all converge to form the brachial plexus, from which arise the accessory nerves of Willis, the diaphragmatic nerve, and the nerves of the upper extremities, which are therefore to be considered here.

ACCESSORY NERVE OF WILLIS.

This arises on both sides of the neck from the union of branches from the second, fourth, and fifth pairs, proceeds upwards through the great occipital foramen to the medulla oblongata, where it joins the par vagum, and accompanies it out of the skull, through the foramen lacerum in basi cranii, and then leaves it to be distributed on the cucullaris and sternocleido-mastoideus muscles.

DIAPHRAGMATIC NERVE.

The diaphragmatic nerve, which is also called the phrenic nerve, is formed in the neck by the union of the branches from the third, fourth, and fifth cervical pairs, and by a branch coming from the first pair of dorsal nerves, and another from the great intercostal. From the neck it passes between the
clavicle and subclavian artery into the thorax, and descends along the pericardium to the upper surface of the diaphragm, where it divides into numberless branches, which are lost in its substan-

ERVES OF THE UPPER EXTREMITIES.

All the nerves of the upper extremities arise from the brachial plexus, situated in the neck, which is chiefly con-
stituted by the union of the five lowermost cervical nerves, and a large branch of the first pair of the back. Several small branches first are given off to contiguous parts, and then—

1. The axillary nerve, which sometimes arises from the radial nerve. It runs backwards and outwards around the neck of the humerus, and ramifies in the muscles of the scapula.

2. The external cutaneous, which perforates the coraco-
brachialis muscle, to the bend of the arm, where it accom-
panies the median vein as far as the thumb, and it is lost in its integuments.

3. The internal cutaneous, which descends on the inside of the arm, where it bifurcates. From the bend of the arm, the anterior branch accompanies the basilic vein, to be inserted into the skin of the palm of the hand; the posterior branch runs down the internal part of the fore-arm, to vanish in the skin of the little finger.

4. The median nerve, which accompanies the brachial artery to the cubit, then passes between the brachialis internus, pro-
nator rotundus, and the perforatus and perforans, under the ligament of the wrist to the palm of the hand, where it sends off branches in every direction to the muscles of the hand, and then supplies the digital nerves, which go to the extremities of the thumb, fore and middle fingers.

5. The ulnar nerve, which descends between the brachial artery and basilic vein, between the internal condyle of the humerus,
humerus, and the olecranon, and divides in the fore-arm into an internal and an external branch. The former passes over the ligament of the wrist and sesamoid bone, to the hand, where it divides into three branches, two of which go to the ring and little finger, and the third forms an arch towards the thumb in the palm of the hand, and is lost in the contiguous muscles. The latter passes over the tendon of the extensor carpi ulnaris, and back of the hand, to supply also the two last fingers.

6. The radial nerve, which sometimes gives off the axillary nerve. It passes backwards, about the os humeri, descends on the outside of the arm, between the brachialis externus and internus muscles to the cubit; then proceeds between the supinator longus and brevis to the superior extremity of the radius, giving off various branches to adjacent muscles. At this place it divides into two branches; one goes along the radius, between the supinator longus and radialis internus, to the back of the hand, and terminates in the interosseous muscles, the thumb, and three first fingers; the other passes between the supinator brevis and head of the radius, and is lost in the muscles of the fore-arm.

DORSAL NERVES.

The dorsal nerves are twelve pairs in number. The first pair gives off a branch to the brachial plexus. All the dorsal nerves are distributed to the muscles of the back, intercostals, serrati, pectoral, abdominal muscles and diaphragm. The five inferior pairs go to the cartilages of the ribs, and are called costal.

LUMBAR NERVES.

The five pair of lumbar nerves are bestowed about the loins and its muscles, the skin of the abdomen and loins, scrotum, ovaria,
ovaria, and diaphragm. The second, third, and fifth pairs unite and form the *obturator nerve*, which descends over the psoas muscle into the pelvis, and passes through the foramen thyroideum to the obturator muscle, triceps, pectineus, &c.

The third and fourth, with some branches of the second pair, form the *crural nerve*, which passes under Poupart's liga-
ment with the femoral artery, sends off branches to the adja-
cent parts, and descends in the direction of the vastus muscle to the internal condyle of the femur, from whence it accom-
panies the saphena vein to the internal ankle, to be lost in the
skin of the great toe.

The fifth pair are joined to the first pair of the sacral nerves.

**SACRAL NERVES.**

There are five pair of *sacral nerves*, all of which arise from the *cauda equina*, or termination of the medulla spinalis; so called from the nerves resembling the tail of a horse. The four first pair give off branches to the pelvic viscera, and are afterwards united to the last lumbar, to form a large *plexus*, which gives off—

The *ischiatric nerve*, the largest in the body, which imme-
diately at its origin sends off branches to the bladder, rectum, and parts of generation; proceeds from the cavity of the pelvis through the ischiatic notch, between the tuberosity of the is-
chium and great trochanter, to the ham, where it is called the *popliteal nerve*. In the ham it divides into two branches:

1. The *peroneal*, which descends on the tibia, and distrib-
utes many branches to the muscles of the leg and back of the
foot.

2. The *tibial*, which penetrates the gastrocnemii muscles to the internal ankle, passes through a notch in the os calcis to the sole of the foot, where it divides into an *internal* and *external plantar*
The great intercostal or sympathetic nerve arises in the cavity of the cranium from the union of a branch of the sixth with a recurrent twig of the second branch of the fifth pair. It passes out of the cranium through the carotid canal, and descends on the sides of the cervical, dorsal, and lumbar vertebrae and sacrum, in which course it is joined by filaments from all the spinal nerves, forming small ganglions at their junctions.

In the neck it forms only three ganglions, which are called cervical.

1. The uppermost is situated upon the second vertebra behind the pharynx; it sends branches which concur in forming the pulmonic and cardiac plexuses; and several other twigs, which unite with the lingual nerve, the par vagum, and the two other ganglions.

2. The middle ganglion, which is situated on the fourth cervical vertebra.

3. The lowermost ganglion, which is the least, and placed on the last cervical vertebra. The branch goes off from it, and surrounds the subclavian artery and several others, which unite with other branches from the par vagum, and form the cardiac plexus.

The trunk of the great intercostal then descends behind the subclavian artery by the sides of the transverse processes of the dorsal vertebrae, through the cavity of the chest, receiving two branches from each of the dorsal nerves coming from the spinal marrow, as it passes along, and forming as many small ganglions. It then quits the side of the vertebrae, accompa-
The aorta, and having reached the sacrum, it produces several ganglions, with the spinal branches coming from this part; and, lastly, the great intercostal is reflected inwards about the os coccygis, and joins its fellow of the opposite side. Having thus described the course of this nerve, so justly termed the great sympathetic, it still remains to enumerate the several abdominal plexuses which arise from it,—for the viscera of the abdomen are all supplied from the great intercostal.

The fifth dorsal ganglion of the intercostal sends off a nerve into the thorax; the third dorsal ganglion also sends off a nerve; a nerve proceeds from the seventh dorsal ganglion; one also goes from the eighth ganglion; and another nerve is given off from the ninth and tenth, or sometimes from the eleventh dorsal ganglion. These five branches, given off by the dorsal ganglia, descend in the thorax in the course of the vertebrae, and pass through the diaphragm into the abdomen, where they all unite into one trunk on each side; and this nerve is called the splanchnic, or little, or anterior intercostal.

The splanchnic intercostal nerve proceeds a very little way from the diaphragm before it produces a large ganglion on the anterior part of the aorta: this ganglion is of a semilunar form, and termed the semilunar ganglion; some small twigs pass a little from it, and form net-work, which is termed the solar plexus. The two semilunar ganglia send several branches to unite with and form the other abdominal ganglia; thus—

1. The celiac plexus. This surrounds the celiac artery, and is formed by the union of several branches from the solar plexus and semilunar ganglion.

2. The hepatic plexus. This arises from branches given off from the celiac plexus, uniting with those coming from the semilunar ganglion. The hepatic plexus supplies the vena portarum,
portarum, the gall-bladder, liver, duodenum, and omentum, with nerves.

3. The splenic plexus. Which arises from branches given off from the coeliac plexus and right semilunar ganglion; it passes with the vessels into the spleen, and sends branches to the stomach and pancreas.

4. The superior mesenteric plexus. Formed by the union of several branches from the semilunar and solar ganglion, and the former plexuses. It sends nerves to the mesentery, mesocolon, and mesenteric glands.

5. The renal plexus. Formed by branches of the semilunar ganglia, and the superior mesenteric plexus: the kidneys are supplied with nerves from this plexus.

6. The inferior mesenteric plexus. Situated near the inferior mesenteric artery.

7. The mesocolic, or posterior mesenteric plexus. This arises from the union of several nerves sent over the aorta from the superior mesenteric and renal plexuses, and supplies the mesentery and intestines.

8. The hypogastric plexus. Branches from the superior and inferior mesenteric plexus form this, which is situated at the fourth vertebra of the loins. The hypogastric plexus soon divides into two branches, in each of which is a ganglion that sends nerves to the urinary bladder, rectum, and contiguous parts.

9. The spermatic plexus. Which supplies the spermatic vessels, testes, ovaria, &c.

DISEASED APPEARANCES OF NERVES.

Although more liable than any other part of the body to disease, yet they seldom present the anatomist with any morbid appearance,
appearance, post mortem. Those which have been noticed are a general wasting away and a tumour of a nerve. The vagina of a nerve has been found highly inflamed, from a spicula of bone irritating it, and producing convulsions and tetanus.

**PHYSIOLOGY OF THE FUNCTIONS OF THE NERVOUS SYSTEM.**

Nerves are the organs of our senses. Bodies applied to certain parts of our system produce changes in those parts, which changes are conveyed in an unknown manner to the brain, by means of the nerves only, and sensation is produced; so that sensation is a property peculiar to the nervous fibre, as irritability is to the muscular fibre; and hence all sentient parts are supplied with nerves, although they cannot be detected by the eye.

The senses are distinguished into internal and external:

The **internal senses** are ideas which the sensourium commune, or mind, forms to itself, and may be produced from the external senses, or they may be excited spontaneously; such are, memory, imagination, conscience, the passions of the mind, and reasoning, by the superior excellence of which, man differs so eminently from the brute.

The **external senses** are, smelling, seeing, hearing, tasting, and touching.

**SMELLING.**

Smelling is a sensation by which we perceive the smell of substances.
first pair of nerves, which are distributed on every part of the
pituitary membrane of the nose.

Seeing is a sensation by which we perceive bodies around us,
and their visible qualities.
The organ of sight is the retina, an expansion of the optic
or second pair of nerves.
The object of light is the rays of light, which penetrate the
bulb of the eye and stimulate the retina.

Light is a subtile and solid material, which emanates from
the sun or any lucid body with a very rapid motion, in right
lines, which are called rays of light, and penetrate to the retina
in the following manner: the rays of light fall on the pellucid
and convex cornea of the eye, by whose density and convexity
they are united into a focus, which passes the aqueous humour
and pupil of the eye, to be more condensed by the crystalline
lens. The rays of light thus concentrated, penetrate the vi-
treous humour, to stimulate the retina, upon which they im-
press the image of external objects to be represented to the
mind through the medium of the optic nerves.

Hearing is a sensation by which we perceive the sound of
any sonorous body.

Sound is a tremulous motion of the air excited by striking
any sonorous body. Sound is conveyed to an enormous dis-
tance in the atmosphere, in straight lines, which are called
sonorous rays. Soft bodies diminish oristle sound; elastic
ones increase it.
The organ of hearing is the portio mollis of the seventh pair
of
The nervous papillae of the ninth or lingual pair of nerves, whose pulp is beautifully distributed upon the anulæ of the membranous semicircular canals, the barbula, and the zona mollis of the cochlea.

Hearing is performed in the following manner: the rays of sound emanating from a sonorous body arrive at the ear, which, by its elasticity and peculiar formation, concentrates them, that they may pass along the external auditory foramen to the membrana tympani, which they cause to vibrate. The trembling tympanum communicates its vibrations to the malleus, which is in contact with it: the malleus conveys them to the incus, the incus to the os orbiculare, and the os orbiculare to the stapes. The stapes adhering to the fenestra ovalis causes it to vibrate. The trembling fenestra ovalis communicates its vibrations to the water contained in the membranous semicircular canals, and to the cochlea, and causes very gentle motions of the nervous expansion of those parts, which transmit them to the senforium commune, where the mind is informed of the presence of sound, and judges of its difference. Gravity and acuteness of sound depend upon the number of vibrations given at the same time.

TASTING.

Tasting is a sensation by which we distinguish the qualities of bitter, sweet, sour, &c. substances.

The nervous papillae of the ninth or lingual pair of nerves, which are situated in the apex and margins of the tongue, are the chief organs of taste.

The parts subservient to taste are—

1. The tongue, which gives a convenient situation to the nervous papillae, and by its extensive motion applies them to the substance to be tasted.

2. The
2. The epidermis of the tongue, which moderates any excessive stimuli.

3. The saliva and mucus of the mouth, which assist the organ of taste when it is necessary that the substance should be dissolved in order to be tasted, and which also keep the nervous papillæ moist.

**TOUCHING.**

Touching is a sensation by which we distinguish the qualities of hardnefs, softnefs, heat and cold, &c. of substances, and by which we perceive any substance that comes in contact with the skin, particularly at the points of the fingers.

The organs of touch are the nervous papillæ of the skin, which are extremely numerous and sensible at the points of the fingers.

Too great a sensation is moderated by the epidermis, which also defends the papillæ from being dried by the air.

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**ADENOLOGY;**

**OR,**

**DOCTRINE OF THE GLANDS.**

A gland is a small, round, vascular body, which serves for the secretion or alteration of a fluid.

**DIVISION.** Into folliculofe, globate, glomerate, and conglomerate; they are also divided from the liquid they secrete or change, into sebaceous, muciparous, lymphatic, lachrymal, salival, bilious, lacteal, &c.

A *folliculofe* gland consists of an hollow vascular membrane,
having an excretory duct; as the muciparous and sebaceous glands.

A globate gland consists of a glomer of lymphatic vessels, connected together by cellular membrane, and has no cavity nor excretory duct, as the lymphatic glands of the lymphatic vessels.

A glomerate gland is formed of a glomer of sanguineous vessels; has no cavity, but is furnished with an excretory duct, as the lachrymal and mammary glands.

A conglomerate gland is a gland composed of many glomerate glands, whose excretory ducts unite, and form one large canal or duct. The pancreas and salival glands belong to this class.

The excretory duct of glands is a thin canal, which goes out of the gland, and excerns the secreted fluids by the contractility of its coats.

The nerves and vessels of glands are numerous, and, in most instances, come from the neighbouring parts. Some particular glands are, however, supplied with vessels proper to them, as the visceral glands, the thyroid, proftate, &c.

Glands are connected with other parts by cellular membrane. They are larger in infants than in adults.

GLANDS OF THE SKIN.

The subcutaneous glands are sebaceous, and situated under the skin, which they perforate by their excretory ducts.

These glands are frequently found diseased. A collection of a white sebaceous substance in the excretory duct is amongst the most common diseased appearances. It arises from a diseased action of the gland separating an unhealthy sebaceous substance.

They are frequently found enlarged and inflamed after death, constituting the diseases called phyma and furunculus.
GLANDS IN THE CAVITY OF THE CRANIUM.

1. The glands of the dura mater, called also, after their discoverer, Pacchionian, are small fatty substances, situated near the superior longitudinal sinus of the dura mater, in peculiar fovealae of the os frontis and parietal bones.

The Pacchionian glands vary very much in their appearance in the dead body. One, which is certainly a diseased appearance, is a general enlargement, which causes, in some cases, an absorption of the superincumbent bone. The nature of these fatty or glandular substances is not known, neither in their natural nor diseased state.

2. The glands of the choroid plexus, which are globate, and situated in the choroid plexus of the lateral ventricles of the brain.

The glands of the choroid plexus are sometimes changed into a white substance, the size of a pin's head, which is hard, and apparently of the nature of scirrhus. Whether the globular vesicles, called hydatids, are diseased appearances of these glands, is not ascertained.

3. The pituitary gland, situated in a duplicature of the dura mater, in the fella turcica of the sphenoid bone. The intundibulum of the brain terminates in this gland.

The pituitary gland occasionally is converted into a hard subcartilaginous structure; and, it is said, into bone. It has been completely absorbed, in consequence of pressure from disease of the brain.

GLANDS OF THE EYES.

1. Meibomius's glands. These are small and numerous sebaceous glands, situated under the skin of the eyelids, near their margins.
margins. Their excretory ducts open on the margins of the tarsoa, and are called *punca ciliaria*.

These glands are sometimes found converted into white sebaceous spots; and this state generally accompanies other marks of scrophula in the habit.

2. The *lacrymal gland*, which is glomerate, and situated above the external angle of the orbit, in a peculiar depression of the os frontis. This gland has six or eight excretory canals, through which the tears are conveyed, and which open upon the internal surface of the upper eyelids.

The lacrymal gland is sometimes found without the orbit near the external canthus.

3. The *caruncula lacrymalis*, a small and red prominence, obvious in the internal angle of the eye, between the tarsi of the eyelids. It consists of small sebaceous glands, which secrete a sebaceous humour.

**GLANDS OF THE NOSTRILS.**

The pituitary membrane lining the nostrils and its sinuses is everywhere furnished with *muciporous glands*, which secrete the mucus of the nose.

Inflammation of these glands constitutes, in conjunction with a similar affection of the membrane itself, *catarrh*.

**GLANDS OF THE EAR.**

The *ceruminous glands* are situated under the skin of the meatus auditorius externus, and secrete the wax of the ears.
GLANDS OF THE MOUTH.

The glands of the mouth, which secrete the saliva, are called salivary; they are,

1. The parotids. Two large conglomerate glands, situated one under each ear, between the mamillary processes of the temporal bones and angle of the lower jaw. The excretory canal of this gland opens in the mouth, and is called, from its discoverer, the Stenonian duct.

The mumps is a particular affection of this gland of an inflammatory nature, and is called cynanche parotidea, or parotis.

2. The maxillary. Which are conglomerate glands, situated under the angles of the lower jaw. The excretory ducts of these glands are also called, after their discoverer, Warthonian.

These glands are very frequently affected with scrofula.

3. The sublingual glands. Situated under the tongue.

4. The glands of the cheek, situated on the internal surface of the cheeks.

5. The labial glands, on the internal surface of the lips, under the common membrane of the mouth.

6. The molar glands, situated on each side of the mouth, between the masseter and buccinator muscles. Their excretory ducts open near the last dens molaris.

EXTERNAL GLANDS OF THE NECK.

1. The jugular glands, which are globate, and found under the skin of the neck about the external jugular veins: they are in general about twenty in number.

These glands are frequently enlarged and scrofulous.

2. The
2. The submaxillary glands, also globate, and situated in the fat under the jaw.

3. The cervical, found under the cutis in the fat about the neck.

4. The thyroid. A large gland lying upon the cricoid cartilage, trachea, and horns of the thyroid cartilage. It is uncertain whether it be globate or conglomerate. Its excretory duct has never been detected, and its use is unknown.

The thyroid gland is often the seat of bronchocele, which is a morbid enlargement, either from a deposition of adventitious matter, or distention from air.

GLANDS OF THE FAUCES.

The glands situated under the membrane which lines this cavity, are muciparous, and divided, from their situation, into palatine, uvular, tonsil, lingual, laryngeal, and pharyngeal.

The tonsil glands, which are also called the almonds of the ear, are subject to inflammation, forming the syringe tonsillaris—suppuration—enlargement—scurrus.

GLANDS OF THE BREASTS.

The mammary, or latical glands, are situated under the fat of the breasts. Their excretory ducts are called tubuli lactiferi, and tubuli galactoferi; they proceed to the nipple, in which they open.

The tubuli galactoferi are often distended with milk, so as to induce inflammation of the breast.

Inflammation of the breast, either of the cellular substance or glandular part, is called mastodynia, or mastitis.
GLANDS OF THE THORAX.

1. The thymus, a large gland, peculiar to the foetus, and which disappears soon after birth: it is situated in the anterior duplicature or space of the mediastinum, under the superior part of the sternum, and above the pericardium. An excretory duct has not been as yet detected, but lymphatics are seen going from this gland to the thoracic duct.

2. The bronchial, which are large blackish glands near the end of the trachea, and beginning of the bronchia, and which secrete a blackish mucus.

The bronchial glands are not unfrequently found ossified.

3. The oesophageal glands, found under the internal membrane of the oesophagus, and which secrete the mucus of that canal.

4. The dorsal glands, situated upon the fourth or fifth vertebra of the back, between them and the posterior surface of the oesophagus. They have no excretory ducts.

GLANDS OF THE ABDOMEN.

1. The gastric glands, which are muciparous, and situated under the external membrane of the stomach.

It should be remembered, that these glands only secrete the mucus of the stomach, and not the gastric juice, which is separated by arteries.

2. The intestinal glands, which are also muciparous, and found under the internal membrane of the intestines, especially the large.

3. The mesenteric glands, situated here and there in the cellular membrane of the mesentery. The chyle from the intestines passes through these glands to the thoracic duct.

Mesenteritis,
Mefenteritis, or inflammation of the mesentery, is, in fact, inflammation of these glands.

Mesenteric obstruction arises from disease of these glands, and is a frequent cause of the marasmus and atrophy of children: the chyle being prevented passing the glands in sufficient quantity to form good blood.

4. The hepatic glands, also called acini bilioli, and penicilli, which form the substance of the liver, and separate the bile into small ducts, which at length terminate in the ductus hepaticus. See Liver.

Diseases of the glandular part are not yet distinguished from the diseased appearances of the cellular connecting substance, and the other vessels of the liver.

5. The cystic glands, which are muciparous, and found under the internal membrane of the gall-bladder, especially about its neck.

6. The pancreatic glands, which constitute the pancreas: a small duct arises from each gland, which unite to form the ductus pancreaticus. See Splanchnology.

7. The epiploric, or omental glands, which are globate, and situated in the omentum.

GLANDS OF THE LOINS.

1. The supra-renal glands, situated in the adipose membrane, one above each kidney. An excretory duct has never been detected, and their use is unknown.

2. The kidneys. See Splanchnology.

3. The lumbar glands, which are globate, and situated about the beginning of the thoracic duct.

4. The iliac glands, found about the beginning of the iliac vessels.

5. The
5. The *sacral*, which are globate glands, and adhere to the os facrum.

GLANDS OF THE ORGANS OF GENERATION OF MAN.

1. The *odoriferous glands* of the glans penis, which are sebaceous, and situated around the *corona glandis*.

2. The *mucous glands of the urethra*, situated under the internal membrane of the urethra. The mouths of their excretory ducts are called *lacuna*.

When these glands secrete a bland yellow fluid, which they often do from relaxation, it forms a gleet, or *leucorrhoea*; and when an increased and morbid secretion takes place from venereal virus, it is called *gonorrhoea*.

3. *Cowper’s glands*, so called from their discoverer, are three large muciparous glands, two of which are situated before the prostate gland under the *acceleratores urinarum*, and the third more forward before the bulb of the urethra.

4. The *prostate*, a very large, heart-like, firm gland, situated between the neck of the urinary bladder and bulbous part of the urethra. It secretes a lacteal fluid, which is emitted into the urethra by ten or twelve ducts near the verumontanum, during coition.

The prostate gland is very frequently found diseased by abscess, scrophula, *scirrhus*, *calculi*, enlargement of its ducts, and a diminution in size.

GLANDS OF THE FEMALE ORGANS OF GENERATION.

1. The *odoriferous glands of the labia majora and nymphae*, which are sebaceous, and situated under the skin of those parts.

2. The *odoriferous glands of the clitoris*, which are numerous, situated
situates about the bases of the clitoris, and are of the same nature as the former.

3. The mucous glands of the urethra, situates under the internal membrane of the female urethra.

4. The mucous glands of the vagina, situates under the internal membrane of the vagina.

These glands furnish the puriform fluid in leucorrhoea and gonorrhoea.

GLANDS OF THE EXTREMITIES.

The glands in the groin, or inguinal glands, are globate, or lymphatic: they are situates in great numbers in the cellular membrane of the inguinal region, and receive the lymphatic vessels from the glans penis and lower extremities.

These are the glands which inflame and form bubo in the venereal disease from absorption and sympathy.

The subaxillary glands are also globate, and are situates in the cellular membrane of the arm-pit; they are also numerous, and receive the lymphatic vessels from the breasts and superior extremities.

The axillary glands sometimes form bubo from absorption of venereal and putrid matter.

GLANDS OF THE JOINTS.

The small fat-like masses, situates within the moveable joints, are erroneously called synovial glands; their structure is not glandular, they are composed of adipol and an arrangement of the internal vascular membrane of the joint, which gives them a fimbriated appearance. By these little masses the synovia is separated from the blood for the easy motion of the joint.

PHYSIOLOGY
PHYSIOLOGY OF SECRETION.

Secretion is a particular function in an animal body, by which a fluid is separated from the blood, different in its properties from the blood.

The organs which secrete the various humours are the glands.

The proximate or immediate cause of secretion is a specific action of the arteries of the glands; for every secretion is formed from the extremities of arteries. The secretion of the bile is no exception to this law, for the vena porta takes upon itself the function of an artery; thus the mucous glands secrete mucus; the salival glands, saliva; the penicilli of the liver, bile; the cryptæ of the kidneys, urine, &c.

The secreted fluids are the proper stimuli to the receptacles and ducts, through which the secretion is to pass to its place of destination; so that the secretions move along the excretory ducts by means of the contractility of the coats of the ducts and the assistance of neighbouring moving powers.

SPLANCHNOLOGY;

or,

DOCTRINE OF THE VISCERA.

The human body is divided into head, trunk, and extremities. The head is divided into face and hairy scalp.

The face comprehends the frons, or forehead; tempora, or temples; nasus, or nose; aures, or ears; oculi, or eyes; os, or mouth; buccæ, or cheeks; and mentum, or chin.

The hairy scalp is subdivided into vertex, or crown of the head;
head; *sinciput,* or fore part; *occiput,* or hinder part; and *lateral,* or sides.

The **trunk** is divided into *neck,* *thorax,* *abdomen,* and *pelvis.*

The *neck* is distinguished into an anterior and posterior part. On the former is an eminence in males formed by the scutiform cartilage, called the *pomum Adami;* because the forbidden fruit is said to have stuck there; the latter is termed the nape of the neck, or *nucha colli.*

The *thorax* is divided into an anterior and posterior part, and two sides.

The anterior part of the thorax is termed the *sternum;* at its bottom is a hollow, the pit of the stomach, or *frophiculus cordis,* and the breasts are situated on each side of the sternum.

The posterior part of the thorax is termed the *dorsum,* or back; and its sides, *lateral thoraci.*

The abdomen is distinguished into *regions.* The anterior part into three regions:

1. The *epigastric,* which lies over the stomach, and whose sides are termed the *hypochondriac regions.*
2. The *umbilical,* surrounding the navel, and whose sides are called the *flanks.*
3. The *hypogastric,* which lies over the urinary bladder, and whose sides are called *groins.*

The *pubes* is the hairy part under the abdomen, between the groins. Under the *pubes* are the parts of generation—in men, the *scrotum* and *penis;* in women, the *labia,* and *rima vulvae.*

The space between the genitals and anus is called the *perineum.*

The **extremities** are divided into superior and inferior.

The **superior extremity,** into *top of the humerus, brachium,* *fore-arm,* and *hand.*

The
The hand, into carpus, metacarpus, and fingers.

Fingers, into pollex, index, digitus medius, digitus annularis, digitus auricularis.

The inferior extremity is divided into femur, or thigh; crus, or leg; and extremity of the foot.

The foot, into tarsus, metatarfus, and ton.

The internal division of the body is into three cavities, viz. cavity of the cranium, thorax, and abdomen.

Of the common integuments.

These are so called, because they are the common coverings, as it were, to the body; they consist of the epidermis, rete mucosum, cutis, and membrana adiposa.

Epidermis.

Epithelium. Cuticula.

The epidermis, scar-fkin, or cuticle, is a thin, pellucid, insensible membrane, covering the whole external surface of the body. It is perforated by the hairs, inhaling and exhaling vessels. Its outer surface is dry and horny, and marked with many lines, in which perforations are evident. Its internal surface is moist and shaggy, and connected to the cutis by the rete mucosum, which lies between them; and the vessels and hairs.

The epidermis not only covers the external surface of the body, but also many of the internal parts, as the nose, mouth, anus, vagina, urethra, &c. The thickness of the scar-fkin varies in different parts; it is very delicate over the lips, tongue, glans penis, vagina, and rectum; very thin at the finger-ends, over the face, &c.; and very thick on the soles of the feet, and palms of the hand.

The colour of the epidermis is white, which proves that it
is a peculiar secretion, and not formed by a drying of the rete mucosum, which, in Ethiopians, is black.

The use of this common integument is to cover the very sensible cutaneous papillae.

The epidermis is often seen peeling off in small scales: this constitutes the disease called furfur.

RETE MUCOSUM.

Mucus Maltipighianus, Rete Maltipighianum, Corpus mucosum, Corpus reticulare.

A mucous substance, said to be disposed in a net-like form, between the epidermis and cutis.

The difference of colour in mankind depends on this substance: in Europeans it is white; in Ethiopians, black, &c.

There is great variety in the thickness and transparency of the rete mucosum: in the lips, mouth, over the glans penis, nymphæ, vagina, &c. it is transparent and very delicate. It is thickest in the scrotum.

CUTIS.

Dermis, Cutis vera.

The true skin is an elastic, sensible, extremely porous, and thick membrane, situated between the rete mucosum and adipose membrane, covering the whole body.

It is composed of a fibrous, vascular, and nervous structure. Its external surface is covered by the rete mucosum, and immediately over it is the cuticle: it is here that a vast number of nervous fibrils, called papillé, are everywhere projecting from its surface to constitute the organ of touch: these are of various forms, and are most exquisitely sensible on the lips, finger-ends, &c. The use of the skin is to cover the whole body.
body, and afford a situation for the organ of touch, exhalation, and inhalation. See Physiology of Absorption.

**Physiology of Perspiration.**

Perspiration is a species of secretion by which the blood is freed of a quantity of aqueous fluid by the exhalent arteries of the skin.

It is divided into *insensible* and *sensible* perspiration: the former is continually going on, by which means the surface of the body is kept smooth and moist, and may be detected by placing any part of the skin near a looking-glass, which will become foiled. The latter, commonly termed *sweat*, is observed occasionally.

**Ungues.**

The nails are horny laminae, situated in the extremities of the fingers and toes.

**Use.** To defend the nervous papillae from contusion.

**Pili.**

The hairs are thin, elastic, dry filaments, growing out from the skin.

**Colour and situation,** various. They are termed *capilli* on the head; *superficia*, or eyebrows, above the eyes; *cilia*, or eyelashes, on the margin of the eyelids; *vibrissae*, in the nostrils; *pili auriculæs*, in the meatus auditorius; *myclus*, on the upper lip; *barba*, on the lower jaw, &c. &c.

**Membrana cellulosa.**


The cellular membrane is composed of laminae and fibrous texture, so disposed as to form cells and a web-like structure.
is found in almost every part of the body, connecting them together, and is well exemplified by the butchers blowing up their veal, and by macerating any soft part. The cellular membrane is extremely vascular, especially that which lies immediately under the skin, that about the kidneys, mesentery, &c. and these vessels occasionally separate oil from the blood into the cellular structure, when it becomes adipose membrane. This does not take place generally; hence there is no adeps about the penis, tunica conjunctiva, lungs, &c.

The use of the cellular membrane is very considerable; it connects parts together; it constitutes the bed for the origin of the absorbents; it allows of friction by its elasticity, without deforming the part; and it forms the substance of almost all the membranes.

Diseases. The cellular membrane is subject to a variety of diseases, such as anasarca—ecchymosis—emphysema—cirrhosis, &c.

OF THE HEAD.

The parts which form the head are divided into external and internal.

The external parts are the common integuments, hair, a tendinous expansion, three pair of muscles, pericranium, and cranium itself.

The internal parts are, the dura mater, membrana arachnoidea, pia mater, cerebrum, cerebellum, medulla oblongata, nine pair of nerves, four arteries, and twenty-two venous sinuses.

Dura Mater.

Dura meninx.

A strong, thick, fibrous, inelastic membrane, situated immediately under the cranium, to which it adheres very firmly, and covering the external surface of the brain.
It is composed of two strong membranous layers, or *laminae*. The external lamina lines the internal surface of the cranium, supplying the place of periosteum, for the internal table of the cranium is nourished by its vessels. The internal lamina is closely connected to the external by cellular structure: in many places, however, they are separated so as to form a space, or sinus, in which the blood passes as through veins to be returned towards the heart. The internal lamina also forms several processes, the chief of which are the following:

1. The *falx*, or *falciform process*, or *septum cerebri*. This originates, by a very firm attachment, from the middle of the sphenoid bone and crista galli, within the cranium, and rises upwards like a bow, adhering to the external lamina of the dura mater, immediately covering the middle of the frontal bone, the sagittal suture, and occipital bone, until it arrives at the meeting of the internal crucial spine of the occipital bone, where it unites to the tentorium. In this course the falx lies between the hemispheres of the brain and its acute edge, being in contact with the *corpus callosum*. The superior part of the falx contains the longitudinal sinuses.

2. The *tentorium*, or *septum transversum*. This production of the internal lamina of the dura mater arises from the clinoid processes of the sphenoid bone, and passes horizontally backwards, attached to the horizontal ramus of the crucial spine of the occipital bone. It separates the cerebrum from the cerebellum. In the outer edge of this process passes the lateral sinuses of the dura mater.

3. The *septum cerebelli* is a production passing below the tentorium, as if it were a continuation of the falx, and lying between the lobes of the cerebellum. There are several smaller processes which need not be mentioned.

The veins or sinuses of the dura mater are—

1. The
1. The longitudinal sinus. It commences at the origin of the falx, and passes within it, of a triangular form, upwards, and immediately under the sagittal future of the cranium to the occipital tubercle, where it bifurcates into.

2. The lateral sinuses. These are continued, one along each transverse or horizontal branch of the crucial spine of the os occipitis downwards to the foramen lacerum in basi crani, where it passes out of the cranium, and commences internal jugular vein.

3. The torcular Herophili. This is a small vein, or sinus, in that part of the processes formed by the meeting of the tentorium, falx, and septum cerebelli; it proceeds directly backwards to the bifurcation of the longitudinal sinus.

Besides these sinuses, many other small ones may be noticed. The arteries of the dura mater are beautifully disposed in an arborescent form; they are branches of the arteria spinosa, the meningia anterior and posterior.

Some anatomists assert it has nerves, whilst others deny it.

A number of small fatty particles are found near the longitudinal sinus on the internal surface, about the middle, called Pacchionian glands, or glands of the dura mater.

The use of this membrane is to constitute the periosteum of the internal table of the skull; to envelope the brain, and form processes which prevent one part from pressing upon another, and afford a situation for the blood to collect and pass out of the cranium.

Diseased appearances.—The diseased appearances of this membrane are, inflammation—adventitious membrane—coagulum between it and the cranium—gangrene—spongy tumours—sclerophalous tumours—ossification—coagulum, or, as it is improperly called, polypus in the sinus—obliteration of the sinus—abscesses of the sinus—the dura mater of a yellow colour.
MEMBRANA ARACHNOIDES.

Membrana arachnoides. Tunica arachnoides.

A very delicate and transparent membrane, situated between the dura and pia mater, and surrounding the cerebrum, cerebellum, medulla oblongata and spinalis. It resembles a spider's web only about the basis of the cranium, where it is very vascular: in other parts it is a diaphanous lamina, similar to the pleura and peritoneum. It not only covers the parts above mentioned, but it enters the cavities of the brain, which it lines, and forms the membrane covering the thalami nervorum opticorum, corpora striata, pedes hippocampi, and fourth ventricle.—The use of this membrane is unknown.

DISEASED APPEARANCES.—The arachnoid membrane of the brain is found adhering to the dura mater—covered with pus—distended with coagulable lymph and serum—opaque and thickened—highly inflamed.

PIA MATER.

Pia meninx.

The pia mater is the third covering of the brain, cerebellum, medulla oblongata and spinalis. It is a highly vascular, delicate membrane, embracing those parts closely, penetrating between their convolutions, and sending a vast number of vessels to the cortical substance of the cerebrum and cerebellum.

The tomentum cerebri consists of the fine vessels that are sent from this membrane into the brain, which, when pulled out by artificial means, gives the internal surface of the pia mater a floccose appearance.

Processes are sent from the pia mater, between the convolutions of the brain. Where one or two convolutions meet, there is a larger space formed, and the pia mater falls, as it were, down
down into these spaces; and the arachnoid membrane, going directly over these excavations, forms a space: these are termed the intergyal spaces of the pia mater.

The veins of the pia mater evacuate their blood into the sinuses of the dura mater.

The arachnoid membrane is said, by some anatomists, to be the external lamina of the pia mater.

The uses of this membrane is to distribute the blood to the various parts, by affording a convenient situation for the cerebral arteries to ramify on.

DISEASED APPEARANCES. The diseased appearances of this membrane are inflammation—thickening of the pia mater—pus below it—blood extravasated into it—turgescency of vessels—abscess between it and the brain.

CEREBRUM.

Encephalon. Sessorium commune.

The cerebrum, or brain, is a large viscus, somewhat of an oval figure, situated in the cavity of the cranium. That which is called brain, in common language, consists of the cerebrum, cerebellum, and medulla oblongata.

The brain is composed of three substances, the medullary, cortical, and black substance. Some anatomists have enumerated a fourth.

1. The substantia medullaris, of a delicate white colour: it composes the greater part of the whole brain.

2. The substantia corticalis, called also cineritia, which encircles the whole brain, and is found in many of the internal parts; the portion which covers the external part is highly vascular, receiving the vessels from the pia mater.

3. The
3. The **substantia nigra** is observed by making a transverse section through the crura cerebri, in the middle of which it is situated.

Upon viewing the superior surface of the cerebrum, it exhibits an uniformly convex oval, with a large fissure dividing it into two **hemispheres**. The under surface of the brain is more irregular, and presents six distinct **lobes**, which correspond to the six depressions, or *sulci*, in the basis of the skull; so that the two anterior lobes lie on the frontal bone; the two middle, in the depressions made by the sphenoidal bone; and the two posterior lobes pass over the cerebellum to occupy the superior occipital depressions.

When the pia mater is removed, the brain has somewhat the appearance of an irregular convoluted mass heaped together; the spaces between the **gyri**, or *convolutions*, allow the processes of the pia mater to pass some way down, and are termed **intergyral spaces** of the brain.

Upon the under surface of the brain, between the middle lobes, two processes are sent downwards and backwards, like legs; these are termed the **crura cerebri**; they are soon encompassed by the crura cerebelli, to form the *pons Varolii*. There are also two round white bodies seen before these, like two peas, called the **corpora candida**.

When the two hemispheres of the brain are separated a little from one another, a white substance presents itself; this is the **commissura superior**; it is also termed the **corpus callosum** and **commissura magna cerebri**; and the elevated line running along its middle is the **raphe**. The commissura superior is covered by a portion of the hemispheres of the brain, which laps as it were, over it on each side; these portions are termed the **labia cerebri**.

All the parts that have been hitherto enumerated may be seen...
seen without cutting the cerebrum, except the three substances of the brain.

When the hemispheres of the cerebrum are cut away in a direct line with the surface of the commissura superior, a large surface of the medullary substance is brought into view; this is the centrum ovale: the commissura superior cerebri, its raphe, and striæ, and the cortical substance of the brain, may now be examined minutely.

There are four cavities within the remaining portion of the cerebrum, called ventricles; two of these are situated laterally, and are called lateral ventricles: at their upper part they are separated from each other by a very delicate partition, in which is another cavity, but inferiorly they are at a greater distance from each other, so as to allow of a considerable portion of brain, and a cavity, to be situated between them; and this cavity is the third ventricle.

An incision must now be made, on either side of the raphe of the commissura superior cerebri, into one of the lateral ventricles, and its upper and outer parietes removed so as to completely expose the cavity. It is termed lateral from its situation: its figure is triangular, having three horns; hence it is also called the tricorn cavity. The following are to be noticed in each cavity:

1. A very delicate and pellucid membrane separating one cavity from the other, called septum lucidum. There is, occasionally, a small cavity between the laminae composing this septum, called the fifth ventricle.

2. A convex brown-coloured body, in the anterior cornu, called corpus striatum; it is of a pyriform shape, its round end turned towards the face, and its taper end, or crus, backwards.

3. A portion of a white convex body, called thalamus ventriculi optici, situated behind the former, and separated from it by an
spake line, in which there is sometimes a blood-veissel; the line of separation is called geminum centrum semicircularis and tenia semicircularis.

4. A very vascular substance lying between these parts and the bottom of the septum lucidum, termed plexus choroides. This plexus comes into the lateral ventricle at its superior and anterior cornu; and the hole through which it comes is the foramen Monroianum.

Many have denied that this foramen is open when no force has been used to separate it. In collections of water in the cavity, it is always open, and very often when there is no water and no force used.

The choroid plexus passes over the portion of the thalamus of the optic nerve in this ventricle, into the inferior cornu.

5. The corpus fimbriatum, a flat tape-like substance, which goes downwards from the bottom of the septum lucidum into the posterior and inferior horns of this cavity.

6. The unguis, a convex body like the nail of the little finger, situated in the posterior horn of the ventricle, and arising from the corpus fimbriatum.

7. The pes hippocampi, a long convex substance occupying the whole of the inferior cornu, and arising from the corpus fimbriatum.

8. A triangular space between the unguis and pes hippocampi.

9. A number of columns, more evident in some brains than in others, passing round the superior and posterior parietes of the lateral ventricle, called columna anonyma.

The lateral ventricles are covered with a fine membrane, formed by a reflection of the pia mater, or tunica arachnoides, which secretes a very subtle fluid to lubricate the cavities and prevent parts from growing together.

Having demonstrated the lateral ventricles, the situation of the
the fornix, the third ventricle, and some other parts, are next to be shewn.

Keeping in view the commissura superior cerebri, and the process going directly downwards, called the septum lucidum, the fornix will not be difficult to understand. It is, in fact, the bottom of the septum lucidum, which arises by the inside of each corpus striatum, and passes upwards and backwards, like an ancient arch, and then divides posteriorly; and all this in less than the space of an inch. It arises, by two pillars, about a quarter of an inch in length, and the thickness of a crow-quill, one from each side below the corpus striatum. These two pillars are called the anterior crura of the fornix: one lies over the choroid plexus, and forms the superior part of the foramen of Monro. These crura are connected by a medullary substance, which has no name. Having passed over the choroid plexus, the crura unite, and continue united for a very little way; they then separate, and proceed backwards and outwards, by the name of the posterior crura of the fornix, and are soon flattened, when they become the corpora fimbriata, which pass round into the posterior and inferior horns of the lateral ventricles. The space between the posterior crura of the fornix is triangular, and marked with a number of depressed lines, not always conspicuous; it is termed the psalterium, or lyra, from its supposed resemblance to David's harp. These circumstances are seen by dividing the two anterior crura of the fornix, and turning it backwards with the septum lucidum and commissura superior cerebri. This being done, a space or cavity is perceived between two large rounded bodies; which space is the third ventricle. The sides are formed by the thalami nervorum opticorum: a part of them only was seen in the lateral ventricles, but the whole is now brought perfectly into view. There are mostly one or two.
two elevations on the thalami; one sometimes in the portion within the lateral ventricles, and one under the corpus striatum; these are termed the colliculi of the thalami nervorum opticorum. In the third ventricle are to be noticed:

1. The anterior commissure, commissura anterior cerebri. This is a band like a nerve, the thickness of a crow-quill, going across the anterior part of the third ventricle, and uniting, as it were, one side of the cerebrum to the other; it lies horizontally immediately below the anterior crura of the fornix; and if the brain be carefully dissected away, by which the striated appearance of the corpus striatum will be exposed, it can be traced penetrating an inch and a half on each side.

2. The third ventricle runs forwards under this commissure, becoming smaller, until it terminates in a slender red substance, which is sometimes solid and sometimes hollow; this funnel-shaped portion is the infundibulum; it ends in the pituitary gland situated in the sella turcica.

3. The bottom of the third ventricle is formed by a portion of the medullary substance of the brain going across from one side to the other, in the same way as the commissura superior does; it is therefore termed the commissura inferior cerebri.

4. There is an elevated line on the side of each thalamus nervi optici in the third ventricle, which runs backwards; these meet posteriorly, and have a small, heart-shaped, pulpy substance attached to them, which is the pineal gland; and the lines are termed the peduncles, or crura of the pineal gland. It requires that the plexus of vessels about this part be carefully dissected away to shew the gland, which will then be seen lying over the corpora quadrigemina to be described. It is the number of vessels about this gland which gives the lines on the pflanterium which covers the gland.

5. Before
5. Before the gland, and below its crura, is a nervous band opposed to that in the anterior part of the ventricle, and called commissura posterior. It cannot be traced penetrating the brain like the anterior.

6. Immediately under this commissure is an opening, opposed to the iter ad infundibulum; this penetrates through the medulla oblongata, and is termed the aqueduct of Sylvius, or iter a tertio ad quartum ventriculum. Behind the posterior commissure are four rounded eminences, called corpora quadrigemina; two are situated superiorly, and two inferiorly: they were formerly called nates andテストs.

The third ventricle is lined by a delicate membrane, a reflection of the pia mater, or membrana arachnoidea, which secretes the subtile vapour by which it is lubricated.

The lateral ventricles of the brain, which are separated from each other by the septum lucidum, it is asserted by some writers, communicate with one another. The third ventricle having been demonstrated, and the situation of the fornix, this circuitous communication may be explained. In the anterior part of the lateral ventricles there is the foramen of Monro, which is sometimes completely shut; and when this is the case, there can be no communication whatever between the lateral ventricles; but it is occasionally open, and then a probe may be passed under the anterior crus of the fornix into the third ventricle; and if a probe be passed through the foramen of the opposite ventricle, the probes will meet in the third ventricle. The communication, therefore, between the lateral ventricles is by the intervention of the third ventricle.

A section of the pedes hippocampi from near their origin obliquely
obliquely outwards, exhibits an undulated line, which has the appearance of a ram's horn; this is called *cornu Ammonis*, or *cornu arietis*.

Three pair of nerves only arise from the cerebrum:

1. The olfactori. These arise from the corpora striata, are somewhat triangular at their beginning; they proceed forwards under the anterior lobes of the cerebrum, and become flat and pulpy over the ethmoid bone, where they send off nerves to the nose.

2. The optic nerves. These originate from the thalami nervorum optici, by broad beginnings, which proceed around the superior part of the crura cerebri, to join one another: from this junction two round nerves go off through the optic foramen to the eye.

3. The motori oculorum. These arise from the crura cerebri, at their lower end, and pass forwards to penetrate the dura mater just above the petrous ridge of the temporal bone.

**Diseased appearances of the cerebrum.**—These are, a morbid softness—a morbid firmness—a general change of colour—inflammation—a part of a pulpy consistence—abscess—ulceration—a morbid hardness of a part—serpulphous tumours—extravasation of blood—vesicles or hydatids—fungal—absorption of the brain.

In the lateral ventricles. Inflammation of the membrane lining them—hydrocephalus internus, or water in these ventricles—an alteration of form from vesicles or other bodies protruding.

*Corpora striata.* Totally destroyed by disease—a number of brown specks in their substance.

*Geminum centrum semicirculare.* A morbid opacity.

*Thalami nervorum optici.* Thalami united in the third ventricle—a morbid commissure between them.

*Choroid plexus.* Inflammation—turgescency of vesicles—
varix—vessels—hydatids?—small glandiform substances in the plexus of a subcartilaginous consistence—worms.

Septum lucidum. A morbid opacity—water in the cavity between its laminae.

Third ventricle. Water collected—the shape altered by the coalescence of the thalami nervorum opticorum.

Pineal gland. Converted into a gritty substance—converted into an earthy substance—scirrhus—a small yellow body growing to it—a general enlargement.

Plexus of vessels surrounding the pineal gland. Anasarca—surrounded with coagulable lymph—surrounded by pus.

Cerebellum.

The cerebellum, or little brain, is of a round figure, and situated under the tentorium of the dura mater in the inferior occipital depressions. It is divided into two lobes by a process of the dura mater, and sends four processes, or crura, forwards, which, with the crura of the cerebrum, appear to constitute the medulla oblongata. The cerebellum is composed, like the brain, of a cortical substance, and a medullary. It is closely covered by the pia mater, which sends processes between its convolutions, that appear more regular than the convolutions of the cerebrum. They first divide the external surface of the cerebellum into laminae, and each lamina is again subdivided like the leaf of the male fern, so that when the cerebellum is cut transversely, this arrangement of the cortical substance has the appearance of a tree and its branches; and this is termed the arbor vitae.

The two lobes of the cerebellum are separated anteriorly, by a long triangular space, the fourth ventricle, which has a communication with the third by means of a long canal; the iter a tertio ad quartum ventriculum, in the medulla oblongata.
The fourth ventricle is formed anteriorly by the medulla oblongata, posteriorly and laterally by the cerebellum; hence it is common to both. In it are to be observed—

1. A thin medullary portion connecting the medulla oblongata to the cerebellum, and lying immediately between the crura, superiorly and above the opening of the iter into the fourth ventricle; this is called the valvula magna cerebri.

2. A plexus of vessels, and apparently small glands, called the plexus of Haller.

3. A depressed line, extending down the medulla oblongata in the cavity, which is termed the calamus scriptorius.

4. Two or three delicate white lines like nerves, which are the origins of one branch of the portio mollis, or auditory nerve.

The vermiciform processes are situated before and behind the crura cerebelli, and are merely a portion of the cerebellum, more protuberant than the rest, whose convolutions are bundled round like a number of small worms.

DISEASED APPEARANCES OF THE CEREBELLUM.—Most of the diseased appearances enumerated under the head cerebrum have also been noticed in the cerebellum, viz. inflammation—morbid softness—morbid firmness—pulpiness of a part—abscess—hardness of a part—tuberculous tumour—extravasation of blood—hydatids—and also bone in the cerebellum—gangrene.

Fourth ventricle. Water in the ventricle. This is a very rare occurrence; or perhaps the fluid escapes before the cavity can be examined—œdema of the membrane lining it.

MEDELLA OBLONGATA.

A white, firm, medullary substance situated beneath the cerebrum, and before the cerebellum, and lying upon the cuneiform process of the occipital bone. It is broad and rounded
rounded above, and narrower below, where it is continued into the medulla spinalis. From its appearance it favours the idea of its being formed by the crura cerebri in its middle, encompassed by the crura cerebelli, becoming flattened as they pass over the former.

If there be any part of the brain in which the fibres, or atoms, all concentrate, it is in the medulla oblongata. Upon its anterior surface are to be observed—

1. The *pons Varolii*, called also *corpus annulare*, which forms the upper and anterior part: it is convex, and covered with many ftriae. The basilar artery runs over it.

2. The *corpora pyramidalia*. Two somewhat pyramidal eminences proceeding from the pons Varolii towards the medulla spinalis.

3. The *corpora olivaria*. Two more oval eminences, one on each side the corpora pyramidalia.

4. A *falcus*, between the corpora pyramidalia and olivaria.

Through the middle of the medulla oblongata, just before the corpora quadrigemina, the *iter tertio ad quartum ventriculum* runs.

Three pairs of nerves have been described as originating from the cerebrum; and six more remain to be enumerated, which arise from the cerebellum and medulla oblongata.

The *fourth pair*, which are very delicate and long, and are to be seen arising from the valvula magna cerebri.

The fifth pair, or *trigemini*, are very large, and proceed forwards from the anterior part of the crura cerebelli.

The sixth pair, or *abducentes*, are less than the former, and arise from the lower end of the pons Varolii.

The *seventh pair* originate about the fourth ventricle.

The eighth, or *par vagum*, proceed from the corpora olivaria by many small branches.
The ninth pair arise from the fulcus between the corpora oblivia and pyramidalia.

The arteries of the cerebrum, cerebellum, and medulla oblongata, are branches of the carotids and vertebral arteries, which unite in the cranium, and form the circulus arteriosus Willisii; the basillary artery, the anterior cerebri, and posterior cerebri.

The veins proceed to the sinuses of the dura mater.

The brain has no nerves, but sends off nine pairs.

The use of the cerebrum, cerebellum, and medulla oblongata, is to constitute the sensorium commune, the organ of all the senses.

Diseased appearances of the medulla oblongata.

The right inferior eminence of the corpora quadrigemina has been converted into a brownish pulpy substance, which diseased appearance extended a little way internally.

Medulla spinalis.

The spinal marrow is a continuation of the medulla oblongata; beginning from the great occipital foramen, and passing down the vertebral canal, through the cervical, dorsal, and lumbar vertebrae, where it terminates in a vast number of long nerves, which, from their resemblance to a horse's tail, are called the cauda equina.

It is composed, like the brain, cerebellum, and medulla oblongata, of nervous matter, which is distinguished into medullary and cortical substance: the former is external, and the latter internal.

Throughout its whole course, the spinal marrow is covered by the pia mater, tunica arachnoides, and dura mater; and there is a ligamentous band in the interstices of the origin of the
...the nerves, from the first cervical to the twelfth dorsal vertebra, called the *ligamentum flavum*, or *denticulatum*.

Thirty pairs of nerves are given off from the spinal marrow in its course along the spine, which are termed spinal nerves.

**OF THE ACTION OF THE CEREBRUM, CEREBELLUM, MEDULLA OBLONGATA, AND MEDULLA SPINALIS.**

The most important functions of an animal body are those of the brain. In order to explain these accurately, it is necessary to mention a few experiments which have been made upon animals.

Upon dividing, compressing, or tying a nerve, the muscles to which the nerve goes become paralytic. If the nerve thus divided, compressed, or tied, had any particular sensation, that sensation no longer exists; but upon untying or removing the compression, its peculiar sense returns.

If the cerebrum, cerebellum, or medulla oblongata, be irritated, dreadful convulsions take place all over the body.

If any part of the brain be compressed, that part of the body is deprived of motion which has nerves from the compressed part.

From these phenomena, it is evident that the cause of every sensation and motion in an animal body arises from the brain and spinal marrow, and that from these parts it is conveyed to every sentient part through the medium of the nerves. Hence it follows, that the nerves are the organs by which the various sensations are produced. The manner, however, in which the nerves exercise sense and motion; how the will is conveyed from the brain to the different parts; and how, from the different
ferent parts sensations are conveyed to the brain, remains involved in obscurity; several hypotheses have been deduced to explain it, but none appear to be satisfactory. See also page 157.

OCULUS.

The eye is the organ of vision, and is situated in the orbits on each side the nose.

The parts which form the eye are divided into external and internal.

The external parts are,

1. The supercilia, or eyebrows: a layer of hair which begins at the root of the nose, and forms an arch over the eye. Its use is to shade the eye from too strong a light, and defend it from the sweat flowing down the forehead: by means of its muscle it also is corrugated, to express certain passions of the mind.

2. The eyelids, which are two semilunar productions; covered internally by the conjunctive membrane and Meibomius's glands, and formed externally by common integuments and a cartilage: they are extremely moveable, especially the upper. The cartilage between the conjunctive membrane and the common integuments of the eyelid is semilunar, and termed the tarfus. The edges of the eyelids have a number of short hairs arising from them and turned outwards, called cilia, or eyelashes. The use of the eyelids is to cover the eyes during sleep; to defend them from dust and other substances, and too strong rays of light; and to lubricate the conjunctiva by frequently moving its secretion over the surface of the eye.

3. The puncta lachrymalia, two small orifices, one of which is seen at the end of each eyelid near the nose. From these open-
ings, a canal goes downwards and inwards; and meeting about half an inch from their origin, they form a fac, called faccus lachrymalis, which is continued downwards through the ductus ad nasum into the nose. The tears are absorbed by the puncta lachrymalia, and conveyed into the nose through the fac and canal.

4. The lachrymal gland, which is situated in the superior part of the orbit in a peculiar depression: it is hard, conglobate, of an oval form, and has a number of excretory ducts which convey the fluid called tears, secreted by this gland, on the surface of the eye.

5. The caruncula lachrymalis, a small red tubercle in the internal canthus of each eye. It has a number of hairs, and secretes a smegma: it is also of use to direct the tears into the puncta lachrymalia.

6. The tunica conjunctiva, a transparent vascular membrane, reflected from the edge of one eyelid over the internal part of the eyelid across the bulb, to which it adheres very firmly, and then over the internal part of the other eyelid to its edge. It is more loosely connected with the eyelids than the eye; and where it passes the cornea transparentis, it adheres so firmly that it cannot be separated. Its use is to lubricate the eye by the moisture secreted from its transparent arteries.

The internal parts of the eye are termed the bulb; they constitute the eye, properly so called, and are—

1. The sclerotic membrane. A very firm, hard, white, horny tunic, into which the muscles of the eye are inserted. The anterior part of this coat is glasy and transparent, and projects somewhat; it is called cornea transparentis, to distinguish it from the other part, which is also termed cornea opaca. The optic nerve is inserted into the posterior part of the sclerotic.
rotic membrane, which appears to be an expansion of its external tunic, continued from the dura mater.

2. Immediately under the sclerotic membrane is a very vascular, soft, and rough membrane, called the \textit{membrana}, or \textit{tunica choriodea}. It adheres to the sclerotic from the optic nerve all around to the edge of the transparent cornea by vessels; but when it arrives here, instead of being continued around the concavity of the cornea transparent, it passes straight downwards and inwards, forming the coloured part of the eye, which is sometimes black, blue, &c. This black or blue part is called the \textit{iris}, which possesses a contractile power, by some supposed to arise from muscular fibres, so as to enlarge or contract the opening in its middle, which is the \textit{pupil}. The edge of the choroid membrane that adheres to the ambit of the cornea transparent is covered with a white fringe, to which the name of \textit{ciliary circle} is given. Some anatomists have supposed the choroid membrane was formed of two laminae. The posterior surface of the iris is termed the \textit{uvea}.

The pupil of a foetus of six months is covered by a vascular membrane, called \textit{membrana pupillaris}. It is continued across from the sides of the iris.

3. The posterior surface of the \textit{tunica choriodea} is covered with a black mucus known by the name of the \textit{pigment} of the choroid membrane and uvea.

4. Upon the inside of the choroid membrane, corresponding to the ciliary circle on the outside, are a number of white \textit{fibres}, which are called \textit{ciliary processes}.

5. There is a whitish, pulpy, vascular membrane covering the pigment of the choroides, which is the immediate organ of vision, and called the \textit{retina}. It passes forward from the optic nerve, and terminates in the ciliary processes.
The membranes which have been described are distended with the vitreous humour, crystalline lens, and aqueous humour.

1. The vitreous humour, substance of body, is a soft, round, and very transparent substance, filling the whole hollow surface of the retina. It has a cavity in its anterior surface, and is surrounded with a delicate membrane, called the hyaloid membrane, which sends a number of laminae, internally forming cells; and these cells are distended with a transparent fluid.

2. The crystalline lens lies in the depression in the anterior part of the vitreous humour. It is a solid, transparent, lenticular body, like ice, and is enclosed in a capsule, called the capsule of the crystalline lens.

3. The aqueous humour is very fluid and transparent, and fills the space between the crystalline lens and the cornea transparent.

The space between the anterior surface of the crystalline lens and posterior surface of the transparent cornea, has the iris hanging like a curtain in its middle, and which divides it into two spaces; these spaces are distinguished by the name of anterior and posterior chambers.

The arteries of the eye are the ophthalmic, central artery of the optic nerve, and the ciliary arteries; these convey their superfluous blood into small veins, which at length form the ophthalmic vein, a branch of the external jugular.

The optic nerve is entirely lost in the retina. The eye has also the ophthalmic nerve of the fifth pair, and another branch of the third pair, which form a ganglion that supplies the bulb.

The use of the eye is to receive, refract, and unite the rays of light into a focus, and paint the objects on the retina. See Vision.
Diseased appearances. — Eyebrows. Eyebrows wanting, called madaro/ys.

Eyelashes. A double set, called distichiasis.

Eyelids. A growing together, called ankyloblepharon — adhesion to the globe of the eye, called symblepharon — inflammation, or blepharophthalmia — edema — emphysema — atheroma — sarcoma — felthus — cancer — hordeolum, or sty — a pellucid vesicle, or hydatid— warts—a turning outwards of the eyelid, or entropium — a turning inwards, or entropium — a thickening of the margin, or stylos.

Lachrymal passages. Obstruction of the ducts—dropy of the saccus lachrymalis — fistula lachrymalis— tumour on the outside of the fac, or anaylips. Caruncula lachrymalis. An enlargement, or excrescence, called encanthurus—wanting, or rhyas.

Conjunctive membranes. Inflammation, or ophthalmia — vesicles, or phlyctena—a hard tubercle adhering to it, or papula.

Cornea transparens. A morbid thicknes, and opacity, or staphyloma — abscess, or cera — too great a convexity, causing shortness of sight, or myopia — too flat, causing presbyopia, or long sight.

Bulb of the eye. Cancer—a protrusion, or ophthalmoptosis.

Iris. No pupil, or synecrisis.

Aqueous humour. Pus instead of water, or hydropium — a white humour, or hypogala.

Crystalline lens. Cataract, several species.

Vitreous humour. A turbidity, or glaucoma.

Retina. Inflammation.

Operations performed on the eye. Removal of ex­­cr­ferences — operation for fistula lachrymalis — syringing the lachrymal passages — operation for cataract — extraction and couching—removal of a cancerous eye.
The ear is the organ of hearing. It is distinguished into the external and internal ear.

The external ear is formed of an oval cartilage, concave before, having several eminences and depressions; and convex behind, covered with common integuments.

1. The external ridge is called the helix; it curls inwards.
2. The antihelix, a ridge situated more internally than the helix.
3. The concha, or cavity, bounded by the antihelix and tragus.
4. The tragus, a cartilaginous eminence covered with long hairs.
5. The antitragus, a small depression opposite to the tragus, at the bottom of the antihelix.
6. The lobule of the ear, which hangs downwards, and is bored for rings.

The bony meatus auditorius of the ear is lined by a cartilage and common integuments, between which are the glands that secrete the wax. This canal, the meatus auditorius externus, is terminated by a membrane of the tympanum.

The external ear has several muscles and ligaments, which have been described.

The internal ear lies concealed within the petrous portion of the temporal bone; it is divided into the tympanum, mastoid cells, and labyrinth.

The tympanum is an irregularly round cavity covered by a muscle, called the membrana tympani, like a drum by its parchment. It contains four delicate bones, the malleus, incus, stapes, and os orbiculare, and some muscles belonging to them, and the membrana tympani. It is everywhere, even the bones, covered with a very vascular membrane, and has several openings, which, with the mastoid cells, are described in the Osteology.

The labyrinth is composed of the cochlea and semicircular canals;
canals; these have also been described in the Osteology. There remain, however, to be described the soft parts which are found within them, and which are the immediate organ of hearing: these are—

1. The membranous semicircular canals, which are situated within the bony semicircular canals, and loosely connected to their periosteum by a fine cellular membrane, a quantity of fluid being interposed, which circulates through the labyrinth. Each of these membranaceous semicircular canals proceeds from the vestibule, and at its commencement swells into an oval ampulla; and these oval ampullae originate from a membranaceous facculus within the vestibulum, which is termed the alveus communis. This facculus, the ampullae, and membranaceous canals, therefore, occupy the vestibulum and osseous semicircular canals; and it is by means of the alveus communis that the membranous canals all communicate with one another, they being, as it were, tubes going from the facculus. They are distended by a very limpid fluid.

2. The auditory nerve is expanded upon the sides of the alveus communis and ampullae, in a beautiful manner, like a fan or beard, resembling very much the mucous expansion of the optic nerve in the form of the retina. There is one more evident expansion of the nerve adhering to the spiny processes of the vestibule, which is termed the barbula.

3. The zona mollis of the cochlea; which is composed of two substances: the one is of a consistence between cartilage and membrane, somewhat of a coriaceous texture; the other is perfectly membranous, and almost of a mucous consistence. The former adheres very firmly to the spiral lamina of the cochlea, which it accompanies throughout; and the latter, which appears to be formed of a duplicature of the periosteum, is continued from the coriaceous part to the side of the cochlea.
so that it completes the septum, dividing the cochlea into two scalae.

The auditory nerve, having supplied the vestibule, proceeds to the cochlea, and terminates by a vast number of fibres, which proceed through bony canaliculi of the modiolus, and come out on the zona mollis, forming a beautiful nervous \textit{pulp}. Physiologist of hearing:

The physiology of hearing has been already considered at page 158, which the reader may consult, and then return to following more minute explanation.

The basis of the stapes jets within the vestibulum, in that part where, as in a centre, it looks towards the common channel of the membranous semicircular canals, and the office of the scala vestibuli; therefore the sonorous vibrations of the stapes are communicated to the water of the labyrinth, and the undulations sent out from this part as from a centre to a circumference, and strike first the alveus communis, and are then propagated throughout the liquor of the labyrinth which surrounds the membranous semicircular canals. These undulations strike the membranous semicircular canals on their whole surface, and the canals agitate the fluid they contain as well as that in the alveus communis; and these agitations now affect the nervous expansions in the alveus communis and membranous semicircular canals. One scala of the cochlea opens into the vestibulum, whilst the other begins from the fenestra ovalis; both scalae are filled with the water of the labyrinth, and communicate with each other at the apex of the cochlea; so that the sonorous vibrations are communicated also to the scala of the cochlea. In the middle between the scalae of the cochlea, is the zona mollis, on which the nerve is also spread; hence the undulations are commu-
nicated to the nerves of the cochlea. In all these afflictions of the auditory nerve, namely, in that of the ampulla of the semi-circular canals, the alveus communis, and the spiral zone of the cochlea, hearing suffers. The auditory nerve conveys these vibrations to the fenestra, where the mind is informed of the presence of sound, and judges of its differences. Gravity and acuteness of sound depend upon the number of vibrations given at the same time.

**Nose.**

The nose is a prominence of the face, between the eyes and mouth.

It is divided into the external nose, properly so called, and an internal one. The former is distinguished into root, back, apex, and alae; the latter into two nostrils, five cartilages, the frontal, ethmoidal, and maxillary sinuses.

1. The root is the superior part, contiguous to the forehead.
2. The back, or bridge, is the middle prominence, which goes downwards.
3. The alæ, or pinnae, are the lateral and movable parts.
4. The apex, or tip, is the inferior round part.
5. The cartilages of the nose are, one in the middle, which, with the vomer, completes the septum narium, and two on each side of the septum, which form the round tip, and opening into the nostrils.
6. The frontal sinuses these communicate with the superior part of the nostrils.
7. The sphenoidal sinuses, which opens into the posterior nostrils.
8. The maxillary sinuses, which open into the anterior nostrils at their sides.
9. Besides these parts, the nostrils have the turbinated portions
The opening of the ductus ad nasum.

All these parts are covered with a very vascular pituitary membrane, called the Schneiderian, from its discoverer, upon which the excretory ducts of the mucous glands open, and the olfactory nerves are beautifully distributed so that the pituitary membrane not only covers the nostrils, but the muscles communicating with them.

The arteries of the internal soft parts are branches of the internal maxillary and internal carotids.

The veins terminate in the orbital, temporal veins, which convey their blood to the internal jugular.

Besides the olfactory nerves, the nose is supplied by the ophthalmic nerve and superior maxillary.

The nose is the organ of smelling; and it assists in respiration and speech.

Diseased appearances. Inflammation of the mucous membrane, called catarrhus—ulceration, called zona—morbid thickening—polypus—obstruction in the ductus ad nasum—an adventitious opening through the lachrymal bone—abscess of the antrum.

Operations performed on the nose. Syringing the ductus ad nasum—removing polypi—passing a hollow tube through the nostril into the oesophagus—perforating the antrum of Highmore—plugging up the nostrils in cases of haemorrhage.

MOUTH.

The cavity of the mouth is covered by the cheeks and lips.

The cheeks are composed of common integuments and various muscles going downwards from under the eye, over the superior maxillary, to the inferior maxillary bone.
The lips are composed of common integuments and muscles, and are highly vascular, which gives them that beautiful redness in health. Where the lips meet together, it is called the angle or commissure of the lips.

The arteries of the lips are the coronary and angular arteries. Those of the cheeks are branches of the inferior orbital, alveolar, and facial arteries.

The veins empty themselves into the external jugular.

The nerves are, the infra-orbital, the labial nerve, a branch of the inferior maxillary, and the facial.

These nerves are sometimes the seat of the sicca doloro.

The cavity of the mouth is bounded superiorly by the hard and soft palate, inferiorly by the tongue, anteriorly and laterally by the teeth, and posteriorly it is open, communicating with the fauces; hence the gums, the palate, the velum pendulum palati, and the membrane covering these, are to be considered here.

1. The gums, a red, vascular, spongy substance of a peculiar nature, encompassing the necks of the teeth, and lying on each side the alveolar processes.

The edges of the gums have the power of secreting the tartar sometimes found upon the teeth.

When the gums bleed, are more spongy than ordinary, and ulcerate along their margin; they cause a fetor of the breath, and the disease is called stomatace.

The gums are often the seat of abscess, called epulis, or gum-boil.

They occasionally shoot out a very vascular production, or fungus, difficult to cure.

2. The palate. The roof of the mouth is called the palate; the anterior portion is much harder than the posterior, being partly
partly formed of bone, and hence distinguished into hard and soft palate. The hard palate is that portion of the roof which is formed by the palate bones and palatine portions of the superior maxillary bones; it is covered with periosteum and the common membrane of the mouth, which is formed into rugæ. The soft palate, or *velum pendulum palati*, extends backwards from the hard palate, forming two arches: it is composed of the internal membrane of the mouth, a number of glands and muscles. From the middle of the velum pendulum palatinum there hangs down over the tongue a conical body like a nipple, seen when the mouth is opened, which is the uvula. From the sides of the uvula, towards the sides of the tongue, the soft palate forms two arches: the anterior of these is fixed to the sides of the tongue, but the posterior extends backwards to be inserted into the pharynx. Between these two arches, on each side, at their bottom, is an oblong gland, called the tonsil; it has several excretory ducts opening upon its surface.

The hard palate is seldom found diseased; but the soft palate, uvula, and tonsils are quite the reverse. Inflammation—ulceration—relaxation—enlarged tonsils—tonsils filled with a sebaceous substance—tonsils perforated—complete loss of the soft palate, are amongst the most frequent diseased appearances.

3. The membrane covering the mouth is a reflection of the skin and epidermis: it is very spongy and cellular, having a number of small glands under it, and their excretory ducts opening upon its surface.

It is subject to inflammation, which, about the tonsils and soft palate, is called *cynanche tonsillaris*, and gangrene in those parts called *cynanche maligna*.

The salivary glands, whose excretory ducts pour the saliva into this cavity, are considered in Adenology.
The mouth is the organ of mastication and deglutition, and also affords a passage to the air in breathing, and assists in forming the sounds for speaking.

Physiology of Mastication.

Mastication is the comminution of the food between the teeth, effected by the jaws, the tongue, cheeks, and lips. The powers which move these parts are their various muscles, by which the lower jaw is pulled from the upper, and again brought to it, whilst the tongue perpetually puts the food between the teeth, and the cheeks and lips impede it, when masticated, from falling out of the mouth. By this process, the food is divided, lacerated, and, as it were, ground, and then mixed with the saliva, mucus of the mouth, and the atmospheric air, and thus rendered fit to be swallowed and digested; so that mastication is, in fact, an incipient digestion.

Tongue.

A muscular body, moveable in every direction, and situated in the inferior part of the mouth. It is divided into a base, body, back, an inferior surface, and two sides.

The base is that part which lies on the os hyoides.

The body is the middle and larger part, which ends in the more moveable part.

The superior surface is called the back: on it are to be noticed the opening of several glands.

The inferior surface is connected to the parts below by the membrane of the mouth, which forms a bridle, or frenulum, behind the middle incisors.

The tongue is formed of a number of muscular fibres, which...
The parts which form the neck are divided into external and internal.

The external parts are the common integuments, the muscles of the neck, eight pairs of cervical nerves, two carotid arteries, two vertebral arteries, two external jugular veins, two internal jugular

are considered in Myology, covered by the common integuments.

The external surface is everywhere covered with nervous papillae, some of which are pyramidal, others conoid, and some fungiform: they are most numerous on the sides and apex, and upon the middle of the back.

This organ is plentifully supplied with arteries, which come off from the carotid, and are termed ranine, or lingual.

The smaller veins empty themselves into the great lingual vein, which proceeds to the external jugular.

The nerves of the tongue are also numerous, arising from the fifth, eighth, and ninth pairs.

The use of this viscus is to constitute the organ of taste, and assist in chewing, swallowing, sucking, and tasting.

DISEASES OF THE TONGUE. Inflammation, called glossitis—abscesses: where it appears under the tongue it is called ranula—gangrene—ulceration; small white ulcers are called aphthæ; besides common ulcers, there is a species of ulceration along the sides, of a chronic nature—cancer—fronum too short; when the person is said to be tongue-tied—small vesicles on the sides of the tongue, or hydatids.

OPERATION. The clipping the fronum when too short.
jugular veins, the jugular glands, the thyroid gland, the eighth pair of nerves of the cerebrum, and the great intercostal.

The internal parts are the fauces, pharynx, oesophagus, larynx, and the trachea.

FAUCES.

The cavity behind the soft palate and tongue, which ends in the pharynx.

It is bounded posteriorly by the bodies of all the cervical vertebrae, superiorly by the cuneiform process of the os occipitis and middle of the sphenoid bone, inferiorly by the pharynx, and is surrounded by muscles.

The posterior nostrils open into the fauces behind the velum pendulum palati.

There are also, at the sides of the fauces, the openings of the Eustachian tubes.

The whole of this cavity is lined with a very vascular and mucous membrane continued from the mouth and nostrils, on which are the opening of many mucous glands.

The arteries of this cavity come from the internal maxillary, and neighbouring branches.

The veins evacuate their blood into the external jugular.

The nerves are branches of the fifth and eighth pairs.

The use of the fauces is for deglutition, respiration, speech, and hearing.

Diseases of the FAUCES. Inflammation, or syphilitic ulcers, which may be either venereal, or have hardened edges, like a syphilitic sore, but be merely a chronic ulceration, or aphthae, polypus hanging from the nostrils, obstruction of the Eustachian tubes — anusarea, or any inflammation of the fauces and pharynx.
Opéraions. Removal of the nasal polypus when in the fauces—furring the Eustachian tubes.

PHARYNX.

The pharynx is a muscular sac, like a funnel, situated behind the larynx, adhering to the fauces, and terminating in the oesophagus.

It is connected, by means of muscles, with the cranium, vertebrae, and os hyoides.

Its use, to receive the masticated food, and convey it into the oesophagus.

OESOPHAGUS.

The oesophagus, or gullet, is a membranous and muscular tube, situated between the pharynx and stomach, and descending behind the trachea down the neck, and along the posterior space of the mediastinum into the abdomen.

It is composed of three tunics, or coats—

1. A common tunic, which is a condensed cellular membrane.
2. A muscular one, which consists of very dilatable muscular rings.
3. A villous coat, situated on the inside; between this and the former tunic are a number of muciparous glands which secrete the mucus of the oesophagus.

The oesophagus conveys the food into the stomach.

Diseases. Inflammation, or oesophagitis—coagulated lymph thrown out on the internal surface—ulceration—contraction—scirrhus—cancer—converted into cartilage—fungus—pouched.

Opérations. Oesophagotomy, or cutting into the oesophagus—introduction of the probing—the introduction of a flexible hollow tube, to convey any stimulating substance into the
the stomach to recover drowned persons—caustic bougies, to remedy stricture.

**ARTERIES.** Branches of the aorta.

**VEINS,** empty themselves into the vena azygos.

**NERVES,** from the eighth pair and great intercostal.

**USE,** for deglutition.

**PHYSIOLOGY OF DEGLUTITION.**

Deglutition is the conveying of the masticated food from the cavity of the mouth into the fauces, and from the fauces through the oesophagus into the stomach. This is performed by the jaws shutting, so as to prevent the food from falling out of the mouth; the tongue is then applied to the palate, by which the food lying upon the back of the tongue is pressed into the cavity of the fauces, where it is received by the dilated pharynx. The pharynx then is irritated to contract, by which the food is expelled into the oesophagus, by the contraction of whose muscular fibres it is conveyed through the cardia into the stomach.

The pharynx is dilated by its dilatatory muscles, and by the root of the tongue, os hyoide, and larynx being drawn forwards and backwards by their proper muscles.

The food is prevented, during the act of swallowing, from passing into the posterior opening of the nostrils, the Eustachian tube, and larynx, by the velum pendulum palati and uvula being pressed against the former, and the epiglottis being bent backwards over the glottis.

When a fluid is to be drank, the head inclines backwards, the same actions take place, and the fluid passes on each side of the epiglottis.

During deglutition, the food is covered with the mucus of the fauces and oesophagus.

**LARYNX.**
LARYNX.

A hollow body, composed of cartilages, muscles, and ligaments, situated at the root of the tongue, in the fore part of the neck.

It is attached above to the os hyoides by muscles and ligaments, and posteriorly to the basis of the tongue by membranes, and to the pharynx by various muscles.

The cartilages which form the larynx are the following:

1. The thyroid, or sextiform, which forms the anterior and superior part, and by far the greater part of the larynx. It appears to consist of two cartilages, joined together anteriorly, and forming a projection in the male neck, called the pomum Adam, but receding from each other in the posterior part. At the upper end of each posteriorly is a little projection; these are termed the cornua of the thyroid cartilage; they are joined to the cornua of the os hyoides by ligament.

2. Two arytenoid cartilages, which are found behind the former, placed perpendicularly upon the cricoid, and forming a space between them, the opening into the larynx, called glottis, or rima glottidis.

3. The cricoid cartilage, which is the basis of the others: it is narrow before, and broad behind; and is immediately above the larynx.

4. The epiglottis, an oval cartilage, at the root of the tongue, which covers the glottis when the food passes into the pharynx.

The larynx is everywhere covered with a very sensitive, vascular, and mucous membrane, a continuation of the membrane of the mouth.

The larynx is variously contracted and dilated by muscles, which are considered in Myology.

The arteries of the larynx are given off from the external carotid.
carotid and subclavian. The veins evacuate their blood into the external jugulars.

It has nerves from the eighth pair, or par vagum.

The thyroid gland covers the thyroid cartilage, and is considered in the Adenology.

The use of the larynx is to form the voice and its various modifications, and to afford a passage to the air into, and out of, the lungs.

Diseases. Inflammation of the pituitary membrane, or laryngitis—ulceration—enlargement of the epiglottis—ossification of the thyroid and cricoid cartilages.

Operation. The introduction of a flexible hollow tube to throw air into the lungs for the recovery of drowned persons.

PHYSIOLOGY OF THE VOICE.

The voice is caused by the sound of the air propelled through the glottis; so that the organ of the voice is the larynx and its muscles.

The shrillness and roughness of the voice depends on the diameter of the glottis, its elasticity, mobility, and lubricity, and the force with which the air is expelled; thus, when the diameter is increased, the voice is more bass, and vice versa.

SPEECH

Is the modification of the voice in the cavity of the mouth and nostrils.

VENTRALOQUISM

Consists in the motion of the uvula, epiglottis, and fauces, by which the sounds are modulated without the lips, teeth, or
The mouth being nearly shut, and the voice re-

founding between the larynx and cavity of the nose, the sound is returned as if emitted by some one at a distance.

TRACHEA.

A tube which descends from the larynx in the anterior part of the neck, before the oeophagus, into the thorax, where it divides into two branches, called bronchia.

It is composed of cartilages, muscles, and membranes:

1. The cartilages are round, but not complete rings, for they are fleshy posteriorly, where they lie over the oeophagus.

2. The muscles of the trachea pass between these rings, and are called mesochondriac. They are of two kinds:

a. Musculi mesochondriaci longitudinales. These are composed of muscular fibres, which go directly downwards from one cartilage to the next throughout the minutest ramifications of the bronchia.

b. Musculi mesochondriaci transversales. A number of muscular fibres, which go across from one end of the cartilage to the opposite.

3. The internal surface of this tube is lined with an exquisitely sensible and vascular mucous membrane continued from the larynx.

The bronchia, entering the substance of the lungs, divide into innumerable little branches, which terminate in the ves-
culae pulmonales, or air-cells.

The vessels of the trachea are common with the larynx.

It has nerves from the recurrent branch of the eighth pair.

The use of the trachea is to admit the ingress and egress of the air into the lungs.

Diseases: Inflammation of the mucous membrane, or eynanche trachealis, which is of two kinds:
1. A high state of inflammation, known by seeing an immense number of red vessels, which are not found in a healthy state.

2. A specific inflammation, known by the formation of an adventitious membrane formed of coagulated lymph, and sometimes without any apparent increase of red vessels.

Ulceration—diseased state of the softer parts, from scirrhus and cancer of the oesophagus—polypus—scirrhus—ossification.

Operation. Tracheotomy, to admit of respiration.

**OF THE THORAX.**

The thorax, or chest, is that part of the body which is situated between the neck and belly, and to whose sides the upper extremity is attached.

The thorax is in figure pyramidal; broad and convex below, where it is separated by the diaphragm from the abdomen; and obtuse above, where it is terminated by the pleura, cellular structure, muscles, and vessels; hollow behind, owing to the convexity of the ribs as they approach the spine; convex laterally; somewhat flattened in front.

The cavity of the thorax is divided internally into five cavities:

1. Into a right and left cavity of the thorax.
2. Into the cavity of the pericardium.
3. Into the anterior space of the mediastinum.
4. Into the posterior space of the mediastinum.

The parts which constitute the chest are divided into external and internal.
The external parts are the common integuments, the breasts, various muscles, and bones.

The internal parts, or *viscera* of the thorax are, the pleura, the lungs, the thymus gland, the oesophagus, ductus thoracicus, arch of the aorta, branches of the vena cava, the vena azygos, par vagum, and great intercostal nerves.

**Diseases.** Besides the affections of the thoracic viscera, this part is subject to *empyema*, or a collection of pus in the lateral cavity—*hydrothorax*, or water in the chest—a collection of pus in the anterior space of the mediastinum.

**Operations.** *Paracentesis thoraci*, for empyema and hydrothorax—trepanning the sternum, to give an exit to the pus collected in the anterior space of the mediastinum—taking up the intercostal artery.

**MAMME.**

The breasts are two soft hemispheres, adhering to the anterior and lateral parts of the chest, over the pectoral muscles. In the male, the breasts are termed *mamilla*; in women, *mammae*; and in brutes, *abora*.

The human breast is composed of much soft fat, which gives it the rotundity, and is of a glandular fabric, plentifully supplied with blood-vessels, nerves, &c. which secrete the milk, and convey it by its excretory ducts to

The *papilla*, or nipple, a very irritable prominent body; in the centre of each breast, in which the excretory ducts of the glands of the breast, called *galactopherous* and *laciferous ducts*, open.

The nipple is surrounded by a brown circle, called the *areola*, or halo.

The arteries of the breasts are branches of the internal and external mammary arteries, many of which anastomose with the epigastric
artery. The veins bear the same name, and accompany the arteries, emptying their blood into the subclavian and axillary vein.

The nerves are very numerous, and arise from the superior intercostals, which are given off from the dorsal nerves.

The breasts are plentifully supplied with lymphatics, which proceed to the subaxillary glands.

The use of these organs is to secrete and contain the milk for new-born infants.

DISEASES. Inflammation, or mastitis, or mastodynia—scirrhus—cancer—induration of the glandular lobe.

OPERATIONS. Opening of mammary abscess—removal of cancerous breast.

PLEURA.

A transparent smooth membrane, which lines the internal surface of each lateral cavity of the thorax, and covers its viscera. Its external surface is attached by vessels and cellular membrane to the ribs, intercostal muscles, sternum, bodies of the dorsal vertebrae and diaphragm; so that it may be compared to two bags; the right lies close to the internal surface of the ribs, down to the diaphragm, passes over it, giving it a tunic; and having reached the heart-bag, near the middle of the inferior part of the chest, it adheres to it, and goes up to the sternum, to the very top of the chest, where the bronchia enter, and the lungs begin; and in this part the pleura is reflected over them:—the left bag lines the left cavity in the same way. The pleurae of both cavities at the sides of the bodies of the vertebrae go directly forwards to the sternum, without coming into contact with one another, a vast quantity of cellular structure being interposed, and thus divide the thorax into a right and left cavity. This partition of the chest is
Termmed mediastinum, in which are two spaces: the anterior space is directly behind the sternum; the posterior, immediately before the bodies of the dorsal vertebrae.

The pleura has arteries from the intercostals and internal mammarys, which, in a healthy state, are not visible; they return their blood by the intercostal and internal mammary veins.

The nerves of this membrane are few, and arise from the superficial branches of the cardiac plexus.

The use of the pleura is to form the mediastinum, to divide the thorax into two cavities, to render the surface moist by the vapour it exhales, and to give a membrane to the lungs and pericardium.

Diseases. Inflammation, called pleuritis—adhesion to the lungs—converted into cartilage—ossified—small white bodies in the pleura, like scrophulous glands.

Operations. Perforating the pleura for empyema and hydrothorax.

Mediastinum.

The membranous partition formed of a duplicature of the pleura, which divides the chest into two cavities.

In the mediastinum, that is, between the two pleurae of which it is formed, are—in the anterior part, the pericardium, the thymus gland in children—in the posterior part, the oesophagus, large vessels of the heart, the par vagum, great intercostals, and thoracic duct.

Lungs.

Two visera, situated in the cavities of the thorax, by which we breathe.

Division. Into right and left lung: the right has three lobes, the left only two.
The substance of the lungs is bronchial, vesicular, vascular, nervous, glandular, and parenchymatous.

1. The bronchi are continuations of the trachea, and are formed exactly of the same materials, viz. cartilage, and inter-cartilaginous muscles.

2. The vessels of the lungs are called the pulmonary or air vesicles; they form by far the greater bulk of the lungs, and are placed at the very extremities of the ramifications of the bronchia; being apparently formed of the internal membrane lining the bronchia. It is on the internal surface of these vessels that the pulmonary artery forms a beautiful plexus of delicate vessels.

3. The vesicles of the lungs are— the pulmonary artery, whose ramifications are very numerous, forming a net of vessels on the internal surface of the air vesicles—the pulmonary veins, which return the blood from the pulmonary arteries—the bronchial artery, which nourishes the lungs, and returns its blood through corresponding veins into the vena azygos—the absorbents of the lungs, which are deep-seated and superficial.

4. The nerves of the lungs are derived from the par vagum and great intercostal, and form an anterior and posterior pulmonary plexus.

5. The glands about the bronchia are very numerous, and termed bronchial. Lymphatic glands are also found more internally.

6. The parenchyma of the lungs, or cellular membrane, connects the vesicles, bronchia, and vessels, and is very elastic. The lungs are connected with the heart by means of the pulmonary artery and veins, and with the trachea by means of the bronchia; the other part is loose in the cavity of the chest, having a coat from the pleura, called pleura pulmonalis.
DISEASES.

Inflammation, called pulmonitis—abcess, called tuberculated—scirrhus—air cells enlarged—converted into a substance like liver—earthy matter in the lungs—ossification—hydrodis— pleura pulmonalis inflamed—covered with a coat of coagulated lymph—thickened—cartilaginous—ossified—adhering to the pleura costalis.

PHYSIOLOGY OF RESPIRATION.

Respiration consists of inspiration, or the ingress of the air into the lungs, and expiration, or the egress of the air from the lungs.

During sleep, respiration is performed without our knowledge, and therefore termed spontaneous; but when it can be augmented or diminished according to our will, it is termed voluntary.

The exciting cause of inspiration is the air rushing into the lungs, and irritating its nerves, which irritation is, by consent of parts, communicated to the diaphragm and intercostal muscles, and compels them to contract. The contraction of the intercostal muscles and diaphragm, and the pressure of the elastic air, therefore dilate the chest. The air being deprived of its stimulus, the intercostal muscles and diaphragm become relaxed, the cartilages of the ribs and abdominal muscles, before expanded, return to their former state, and thus the air is expelled from the lungs. The small branches of the pulmonary artery form a beautiful net-work of vessels on the internal membrane of the air vessels. During expiration, the air vessels are collapsed; consequently the blood-threads become tortuous, and the blood is prevented passing: but in inspiration, the air vessels being diluted, the tortuous vessels are elongated, and a free passage afforded to the blood. The very delicate coats of these vessels are rendered so thin as to suffer a chemical action to take
take place between the air in the vessels and the blood in the vessels. This constitutes the primary use of respiration, viz. the blood absorbing the oxygen from the atmospheric air, by which the nervous energy is increased, and, it is generally believed, heat generated;—but this subject is yet undetermined.

PERICARDIUM.

A membranous sac surrounding the heart.

It adheres to the diaphragm, pleura, sterna, cartilages of the ribs, esophagus, aorta descendens, and the veins and great arteries going to and from the heart.

Arteries. Branches of the internal mammary and mediastinal.

Veins. empty themselves into the internal mammary.

Nerves. From the superficial cardiacs.

Use. To contain the heart, and to separate a fluid which may lubricate and preserve it from concretion with the pericardium.

Diseased appearances. Inflammation—a coat of coagulated lymph on the internal membrane—adhesions to the heart—dropy of the pericardium, or hydro-cardis—sarphulous tumours adhering to the pericardium—pericardium wanting.

THE ADULT HEART.

The heart is a hollow muscular viscus, situated in the cavity of the pericardium, by whose contractile power the blood is sent to every part of the body.

It is distinguished in the dead body, whilst in the pericardium, into an anterior and posterior surface and margins; a base from which the large arteries emerge, and an apex.

In the living body, the base of the heart is towards the dorsal
dorsal vertebrae; its apex towards the sixth rib of the left side; so that its situation is oblique, not transverse; the right ventricle being anterior, the left posterior, and the inferior surface lying upon the diaphragm.

The heart is distinguished into two auricles, which lie upon its base surrounding the larger arteries; two ventricles, or cavities, in the internal part; and the arteries and veins going from and terminating in it.

The right auricle is a large muscular sac, in which the superior vena cava, and the inferior, terminate: it has a little process, or cul de sac, like an auricula, or little ear, from which it took its name, and an opening at its bottom into the right ventricle.

In the right auricle are the following:

1. The tuberculum Loewii. A mere projection in the auricle, between the two vena cava.

2. The valve of Eustachius. A production of the inner membrane of the inferior vena cava, at its termination in the auricle. It is not always present, but in most instances is as complete a valve as any other.

3. The fleshy bundles crossing the auricle like the teeth of a comb, called musculi pectinati. Between these fasciculi the auricle is transparent and membranous.

4. The valve of the great coronary vein, which opens into this auricle.

5. Around the opening of the auricle into the right ventricle, and rather within the auricle, is a tendinous circle.

6. A flat, membranous, oval depression, more remarkable in some than in other hearts: which points out the former situation of the foramen ovale.

7. The foramina Thebaei; which are seldom seen. They are the minute openings of arteries or veins into the right auricle.
The right ventricle is a large cavity within the heart, and below the auricle. The right auricle opens into it, and a large artery, the pulmonary artery, emerges from it. In this cavity are to be noticed—

1. The muscular pillars or columns, called carnea columnae, which cross one another in every direction, and have deep grooves between them.

2. The cordis tendineae, which connect some of the carnea columnae with the valves, and insert others into the parietes of the heart.

3. The tricuspid, or pectinatus valves, which arise from the tendinous circle, around the opening of the auricle, into the ventricle, and form three points, which are fastened by the cordis tendineae to the parietes of the right ventricle.

4. The reticulated appearance of the carnea columnae, and the smooth surface leading to the artery.

5. Three semilunar valves placed just within the pulmonary artery. In the middle of each valve is a hard knob, called corpus fusciformis.

The left auricle is not so capacious as the right; it has no communication with it in a natural state; yet the foramen ovale, which is always open in the foetus, sometimes remains throughout life, or is forced open. The four pulmonary veins open into this cavity. It presents the reticulated appearance, or musculi pectinati, though not so strongly as the right auricle. The opening of this auricle into the ventricle is less than that of the right auricle, but it is surrounded by a tendinous circle in the same way.

The left ventricle is less than the right; its flabby walls, or parietes, are much stronger; and it has, like the right, an opening from the auricle, and an artery arising from it. In this ventricle we observe—

1. The
The valve arising from the circle of the auricular opening, which terminates in two fasciculi of tendons, and hence is called, from its resemblance to a bishop's mitre, *valva mitralis*. The two points are connected to the *carnaee columnae*.

The *carnaee columnae* are here remarkably strong and rounded, and the cordae tendineae very firm.

3. The smooth surface towards the arterial opening.

4. The semilunar valves, just within the artery, or aorta, with the corpora ischamoidea in their middle.

From this description of the heart, it appears that the auricles are separated from each other; the partition is termed *septum auricularum*; and that the ventricles are also divided the one from the other by a strong fleshy *septum ventriculorum*.

With regard to the structure of the heart, it is entirely muscular; its cavities are lined by a smooth and very irritable membrane, continued from the internal coat of the arteries and veins, and its external surface is covered by a reflection of the internal tunic of the pericardium.

The muscular fibres constituting the heart may be distinguished into three layers:

1. The *outermost*, which passes from the basis of the heart towards its apex, surrounding the whole heart.

2. The *middle layer*, which lie below the former, and pass in a transverse direction. It is by means of this layer that both ventricles appear to be formed.

3. The *internal layer*, which runs very irregularly, its fibres interlacing one another.

The heart is nourished with blood by two arteries, branches of the aorta, called coronaries, which return their blood by the coronary vein, into the right auricle. It has nerves from the cardiac plexus formed of branches from the *par vagum* and great intercostal; but these nerves are not.
under the influence of the mind, the heart being a muscle of involuntary motion.

The heart has aborbm, which accompany the direction of the arteries.

The use of this viscus is to constitute the primary organ of the blood's motion.

DISEASES. Inflammation—abscess—gangrene—pus, and coagulated lymph in the cavities—aneurism of the ventricle—hydatids in the ventricle—rupture—malformation—unusually large—ossification—a deposition of earthy particles in the muscular structure—inflammation of the external membrane—a coat of coagulated lymph on it; sometimes like a honey-comb—ossification—hydatids adhering to it—pus upon the surface—adhesions to the pericardium—a morbid thickening of valves—ossified—earth deposited in them—thickened—burst—valves between the auricles and ventricles thickened—ossified—earthy—the internal membrane of the heart of a florid colour—gangrenous—the coronary arteries ossified—converted into a cartilaginous substance.

CIRCULATION OF THE BLOOD.

The blood is continually in motion, passing from the auricles of the heart into the ventricles; from the ventricles into all the arteries of the body, and from the arteries into the veins, which return it again to the auricles.

The blood is brought from every part of the body to the heart by the two vena cavae (the superior bringing it from the head, upper extremities, and thorax, and the inferior from the abdomen and inferior extremities), which terminate in the right auricle. The right auricle, when distended with blood, contracts,
contracts, and empties itself into the right ventricle; the right ventricle then contracts, and propels the blood into the pulmonary artery, the opening between the ventricle and auricle being shut by the tricuspid valves. The pulmonary artery conveys the blood by its numerous ramifications into the small branches of the air-cells of the lungs, where it undergoes a change, and passes into the veins, which bring it by four trunks into the left auricle of the heart. It is prevented, returning from the pulmonary artery into the right ventricle, by the three semilunar valves which are placed at its origin. The blood having thus passed through the lungs, and become of a florid colour, diffuses the left auricle, which is then stimulated to contract, and pours the blood into the left ventricle. The left ventricle next contracts, and propels the blood through the aorta, to be conveyed by its branches to every part of the body. The mitral valves, which are placed at the auricular opening into the left ventricle, prevent the blood from returning, when the ventricle contracts, into the auricle; and should the blood be prevented by any impediment passing immediately along the aorta, the three semilunar valves placed at its origin prevent its regurgitating into the ventricle. From the numerous arteries of the aorta the blood is conveyed into the veins, where it loses its florid colour and becomes darker, to be returned, in the way above mentioned, to the right auricle.

The blood, therefore, of the right auricle and ventricle, and of the pulmonary arteries, is of a dark colour; and that of the pulmonary veins, left auricle, ventricle, and all the arteries (except the pulmonary), of a florid hue.

From what has been said, it is evident that the action of the heart consists in the alternate contraction and dilatation of its auricles and ventricles.
The dilatation of the heart is termed diastole, and the contraction systole.

The excessive sensibility of the membrane which lines the auricles and ventricles disposes them to contraction, which is effected by the irritation of the stimulus of the blood, and by that of the distention of its cavities.

**OF THE ABDOMEN.**

A cavity situated between the thorax and pelvis. Divided into several regions, as has already been mentioned. The external parts are the common integuments, five pair of abdominal muscles, and the peritoneum. The internal parts, or viscera, are the omentum, stomach, small and large intestines, liver, gall-bladder, mesentery, lacteal vessels, spleen, pancreas, kidneys, supra-renal glands, aorta descendens, and vena cava ascendens.

**MORBID APPEARANCES.** The diseased appearances of the viscera will be enumerated under their respective heads. The cavity of the abdomen is subject to ascites abdominalis, and a complete adhesion between all its viscera, so as totally to obliterate the cavity.

Parts of the viscera have protruded through the umbilicus, inguinal ring, diaphragm, &c. forming various species of hernia.

**OPERATIONS.** Paracentesis abdominis, to remove the fluid in dropy, and the operation for strangulated, umbilical, inguinal, and femoral herniae.

**PERITONEUM.**

A smooth delicate membrane lining the internal surface of the abdomen, and covering all its viscera. It is connected, by means
means of cellular membrane, with the diaphragm, abdominal muscles, vertebrae of the loins, bones of the pelvis, urinary bladder, uterus, intestinum rectum, and all the viscera of the abdomen.

**Vessels of the Peritoneum;** from the adjoining parts.

**Use.** To contain and strengthen the abdominal viscera, and to exhale a vapour to lubricate them.

**Morbid appearances.** An accumulation of the fluid thrown out to lubricate the viscera, constitutes ascites abdominalis—Coagulable lymph is often separated into the abdomen in large quantities by the vessels of the peritoneum—pus also has been observed. Inflammation of the peritoneum is termed peritonitis. The other diseased appearances are adhesion, thickening, dark spots on the peritoneum, a white, soft, granulated matter adhering to the peritoneum, cancerous tumours, hydatids, air in the cavity of the peritoneum, or tympanites.

**Operations.** Paracentesis abdominis, to remove the fluid in dropsy, and gastroraphy, or sewing of the abdomen.

**Omentum.**

The omentum, or epiploon, is an adipose membrane, a production of the peritoneum, attached to the stomach, and lying on the anterior surface of the intestines.

It is divided into large and small omentum. The former hangs pendulous from the great curvature of the stomach. The small omentum fills up the space between the small curvature of the stomach and liver.

Immediately behind the biliary ducts there is an opening in the omentum, which will admit the finger, called the foramen of Winslow. The omentum is supplied with arteries by the coeliac artery. The veins empty themselves into the vena portae.
Use. To lubricate the intestines, keep them warm, and to preserve them from concretion.

Diseased appearances. Inflammation, which is called omentitis, or epiploitis—bony and earthy matter in the omentum—fibrous enlargement like a bunch of grapes—contracted omentum—adhesions with various parts. When the omentum passes through the parietes of the abdomen, the rupture is termed an epiplocolae.

Operation. The removal of a gangrenous portion, either from strangulated hernia or rupture of the abdomen.

STOMACH.

A membranous receptacle, situated in the epigastric region, which receives the ingesta from the oesophagus. It is divided, when empty, into an anterior and a posterior surface; a great and little curvature; the cardia, or superior opening; and the pylorus, or inferior opening.

Connexion, with the oesophagus, duodenum, omentum, and pancreas.

It is composed of three membranes, or coats, viz. a peritoneal, muscular, and villous coat.

Arteries, branches of the coeliac—the coronaria, which goes to the small curvature—the gastrica sinistra, which is distributed to the great, and arises from the splenic artery—gastrica dextra, which passes to the great curvature—and the pylorica, supplying the pylorus; all of which unite with each other, and form a net-work of blood-vessels.

The gastric veins empty themselves into the vena portae, corresponding with the trunks of the arteries.

The nerves of the stomach are branches of the par vagum.

Absorbents. Those of the small curvature terminate in the thoracic duct, where the coeliac artery is given off, and these
those passing along the great curvature join with the absorbents of the spleen.

Glands, muciparous, under the internal tunic.

Use. To receive the ingesta from the oesophagus, and to retain, mix, digest, and expel it into the duodenum.

Diseased appearances. Inflammation, which is termed gastritis—ulceration—scirrhous—cancer—partly dissolved by gastric juice—tumour filled with a fatty substance in the stomach—calculi in the stomach—hernia of the stomach termed gastrocele—abscess between the peritoneum of the parietes and stomach bursting into the latter—coagulated lymph thrown out in the stomach—pouch formed in the stomach—a morbid contraction of the whole stomach—worms in the stomach.

Digestion.

Chymification.

Digestion, or chymification, is that change the food undergoes in the stomach, by which it is converted into chyme.

The circumstances necessary to effect a healthy digestion of food are—

1. A certain degree of heat of the stomach.
2. A free mixture of saliva with the food in the mouth.
3. A certain quantity of healthy gastric juice.
4. The natural peristaltic motion of the stomach.
5. The pressure of the contraction and relaxation of the abdominal muscles and diaphragm.

From these circumstances, the particles of the food are softened, dissolved, diluted, and intimately mixed into a soft pap, called chyme, which passes through the pylorus of the stomach into the duodenum, where the nutritious part is separated from it and absorbed by the lasticals. See Chymification.
INTESTINES.

The membranous tube, six times longer than the body, in the cavity of the abdomen, variously conformed from the pylorus of the stomach to the anus, is so called.

**Division,** into small and large intestines.

The **small** are the *duodenum*, which begins at the pylorus of the stomach, and is reflected over the spine under the peritoneum. It is about twelve fingers breadth in length, and has an oblique perforation near its middle, which is the common opening of the pancreatic duct and ductus communis choledochus. The *jejenum* and *ileum* compose the remainder of the small intestines. They always hang from the mesentery into the cavity of the pelvis. There is no alteration of structure in any part of the small intestines; the termination of the one and beginning of the other is imaginary. The *jejenum* constitutes the first half from the duodenum, the other half is *ileum*. The small intestines have internally a number of annular folds, which augment the surface for the situation of the lactic and other vessels; these are called *valvulae conniventes*, and are peculiar to the small intestines.

The **large** intestines are divided into the *caecum*, *colon*, and *rectum*. The *caecum* lies upon the right hip over the iliaca internus muscle, to which it is attached by cellular membrane; it is a large *cul de sac*: the small intestine opens obliquely into it, in such a manner as to form a valve to impede the return of the feces; and nearly opposite to this valve there arises from the *caecum* a small *vermiform* canal, perforated at its extremity, called the *appendicula cecii vermiformis*. The ascending portion of the large intestine is the *colon*; it proceeds towards the liver by the name of the *ascending portion of the colon*, and having reached the liver, forms a *transverse arch* across to the
other side. The colon then descends, forming what is termed its *sigmoid flexure* into the pelvis, where the gut is termed the *rectum*, which terminates in the anus. The large intestines are lobulated; have sometimes little fat portions adhering to them called *appendicula epiploicae*, and also three longitudinal bands upon their external surface.

**Composed** of three membranes, or coats; one peritoneal, a muscular one, and the third which is villous.

**Connection**, with the mesentery, kidnies, os coccygis, and urinary bladder, and in women with the vagina.

**Arteries**, branches of the superior and inferior mesenteric, duodenal, and internal hæmorrhoidal.

**Veins**, run into the mesenteric, which go to the vena portæ.

**Nerves**, productions of the eighth pair and intercostals.

**Lacteal vessels.** These arise from the small intestines, and run into the mesenteric glands.

**Glands**, muciparous, under the villous coat.

**Use**, to receive the chyme, and retain it for a time; to mix it with the enteric juice and bile; to separate and propel the chyle into the lacteal vessels; and to eliminate the faeces.

**Diseased appearances.** Inflammation, which is called *enteritis*—ulceration—mortification—abscesses—inus ulceratis—fracture—seirius—cancer—a morbid thickening of the coats of the intestines—a morbid transparency of the intestine—the inner membrane of the large intestine formed into white and yellow tubercles—the folds of the inner membrane of the great intestine enlarged and loaded with blood—little processæ of the inner membrane a little above the anus—hæmorrhoids—pouches in the small intestines—worms; *alcaris vermicularis, alcaris lumbricoides, trichuris, tænæ oceulis superficialibus; and tænæ oceulis lateralis, thickness of the valvula, con- niventæ—calculi in the intestines—lacteals morbibly distended.
with chyle—small tubercles hanging from the intestines into the cavity of the abdomen—adhesions of all the intestines into one mass.

**Operations.** Operation for strangulated intestinal hernia and wounds of the intestine.

**Chylification.**

This is the change of the chyme in the small intestines into chyle. The chyme in the duodenum is mixed with the pancreatic juice, the bile, and enteric juice; from which mixture, effected by the continual peristaltic motion of the intestines, a milk-like fluid is separated, termed chyle, which is absorbed by the pendulous openings of the lacteals, and conveyed through the mesentery into the thoracic duct, to be sent into and mixed with the blood, to form new blood.

Chylification is performed quicker than chymification, and both are effected within three hours.

The excrementitious particles of the food, called the feces, are propelled into the caecum, through the colon, where they acquire a peculiar smell, into the rectum, to be expelled.

**Expulsion of the Feces.**

The irritation of the feces in the rectum induces it to contract, the sphincter relaxes, and the feces are protruded through the aperture of the anus, by the pressure of the abdominal muscles, and the anus closed again by the contraction of its sphincter and levator muscles.

**Mesentery.**

The mesentery is a membranous production, formed of two laminae of peritoneum; between which are a quantity of cellular or adipose membrane, numerous glands, lacteals, lymphatics, arteries, veins, and nerves. It is distinguished into, *mesentery.*
fentery, which adheres to the three superior lumbar vertebrae, and has the small intestines hanging to it; mesocolon, which supports the colon; and mesorectum, a portion in the pelvis, enclosing the rectum.

The mesenteric arteries are branches of the aorta: they pass within the duplicature of the mesentery to the intestines.

The veins accompany the smaller ramifications, but empty their blood into the vena portæ.

The nerves of the mesentery are from the par vagum and great intercostals; they form a number of plexusses, which send off twigs to the intestines.

The glands are very numerous: the lacteals proceed from the intestines into these glands, and from them to the thoracic duct.

The use of the mesentery is to sustain the intestines and afford them a peritoneal coat, and to give a passage to the mesenteric vessels.

Diseases. Inflammation of its laminae, called peritonitis mesenterii—thickening of the laminae of the mesentery—inflammation of the mesenteric glands called mesenteritis—abscess—scirrhous—scrophulous enlargement—cancer—an earthy deposit in the glands—ossification—emphysema, or air in the mesentery—anafarca of the mesentery—aneurism of the mesenteric artery—hydatids adhering to the mesentery—a puckering or contraction of the mesentery.

LIVER.

The liver is the largest of all the abdominal viscera; it is of a deep red colour, and situated in the right hypochondriac region, and somewhat in the epigastric, hanging by its ligaments from the diaphragm.

The liver is convex above and concave below; it is extremely broad superiorly, but gradually becomes thinner in-
feriorly, and ends in a thin margin. Its surfaces are smooth, being covered by the peritoneum, which forms its several ligaments, viz. two which are attached to the diaphragm and are termed lateral; in the middle of its lower and anterior margin is a round ligament adhering to the navel, through which the umbilical vein, &c., of the foetus passed; between the round ligament and the diaphragm is another, called the suspensory ligament, which adheres to the peritoneum of the anterior part of the abdomen.

**Division.** Into three lobes, one of which is very large, the other smaller, and a third, which is very small, and called after its discoverer Spigelian, or lobulus Spigeli.

**Substance.** The liver is a gland composed of arteries, veins, nerves, lymphatics, and excretory ducts, united together by a particular substance: there is also an appendage on the concave surface of the liver called the gall-bladder.

The *artery* of the liver is the hepatic, which nourishes it: the blood it conveys does not appear to contribute anything towards the formation of bile. It is returned into the venæ cave hepaticæ.

The *vena portæ* is a large vein which conveys the blood from the spleen, mesentery, and stomach, into the liver. As it enters the liver it receives a strong tunic, which is termed the capsule of Glysson, and divided into innumerable branches, which, at their very minute ends, form an immense number of vessels, arranged like the hairs of a pencil brush, and hence called penicilli. These penicilli constitute the glandular fabric and bulk of the liver. From each penicillus arises a small duct which runs to a larger; this again unites with others, till at length they form vessels of a considerable size, which ultimately end in one duct. The smaller ducts are termed porti biliarii, and its trunk ductus hepaticus. The small branches of the
the vena porta open also into corresponding venules, which gradually become larger, and return the blood into the vena cava at the superior part of the liver: these are called *venae cavae hepaticae*.

From this description of the substance of the liver, the physiology of its functions may be explained. The liver is destined to separate bile from the blood. The blood is brought for this purpose by three large venal trunks from the stomach, omentum, spleen, large and small intestines, which three trunks become one; the *vena portae*, which conveys the blood to its penicillated ends, which penicilli, or glands, separate bile from it; and the bile passes into the beginnings of the port biliarii, and along them into the ductus hepaticus. The blood which is not wanted for this purpose, and that from which bile has been separated, then passes into the *venae cavae hepaticae*; so that the *vena portae* takes on the action and function of an artery, and, like an artery, its branches gradually become smaller.

The *nerves* of the liver are very numerous, arise from the hepatic plexus, and go into the substance of the liver with the hepatic artery.

The *absorbents* of the liver are superficial and deep-seated: the former are always seen very beautifully arborescent on the peritoneal coat; they pass through the diaphragm, and over the gall-bladder to the thoracic duct.

Diseased appearances. Inflammation of the peritoneal coat—general adhesions—partial conversion into cartilage—ossification—abscesses between the peritonum of the liver and integuments—inflammation of the liver called *hepatitis*—abscesses—mortification—tubercles of several kinds—morbid flaccidity—morbid firmness—general contraction—hydatids—cysts containing calcareous matter—worms in the port biliarii.

**GALL**
GALL-BLADDER.

An oblong membranous receptacle, situated under the liver, to which it adheres very firmly, in the right hypochondrium. It is divided into bottom, body, and neck, which terminates in the ductus cysticus.

The ductus cysticus arises from the gall-bladder, proceeds towards the duodenum, and unites with the ductus hepaticus, to form the ductus communis choledochus, which perforates the duodenum, and conveys the bile into the intestines.

The gall-bladder is composed of three membranes, a common, fibrous or muscular, and villous.

Art. Arteries, branches of the hepatic.
Veins, empty themselves into the vena portae.
Absorbents, very numerous.
Nerves, from the eighth pair and intercostals.
Glands, muciparous.

Use, to retain the gall, which regurgitates from the hepatic duct, there to become thicker, more bitter, and acrid.


Spleen.

A spongy viscus of a bluish red colour, situated in the left hypochondrium, near the fundus of the stomach, under the ribs. Figure, oval. Connexion, with the omentum, diaphragm, pancreas, and colon. Arteries, the splenic artery is a branch of the coeliac. Veins, empty themselves into the vena portae. Absorbents, rarely seen. Nerves, from the par vagum and great intercostal. Use, unknown.

Pancreas.
H3 PANCREAS.

A glandular body, of a long figure, compared to a dog's tongue, situated in the epigastric region, under the stomach.

It is composed of innumerable small glands, the excretory duets of which unite and form the pancreatic duct.

Its external membrane is from the mesocolon.

Arteries, from the neighbouring parts and splenic artery.

Veins, evacuate themselves into the splenic.

The pancreatic duct perforates the duodenum with the ductus communis choledochus, and conveys its secretion into the intestines.

Use, to secrete a humour similar to saliva, and carry it into the duodenum.


LACTEAL VESSELS.

The absorbent vessels of the mesentery which convey the chyle, a milk-like fluid, from the intestines into the thoracic duct.

They originate from the surface of the duodenum, jejunum, and ileum, and terminate in the thoracic duct, or trunk of the absorbents, which runs near the aorta on the spine, and empties its contents into the jugular vein.

As they run through the mesentery, they pass through a number of glands, in which the chyle is altered, and then proceed to their trunk.

Use, to carry the chyle from the intestines into the blood.

Diseased appearances. Lacteals distended with inspissated chyle—rupture of the lacteals.
KIDNIES.

Two somewhat oral viscera, situated behind the sac of the peritoneum, near the bodies of the superior lumbar vertebrae, which secrete the urine.

DIVISION. Into three kinds of substances: a cortical, which is external and very vascular; a papillous, which ends in several papillae or nipples in the pelvis; a tubular, which goes from the cortical to the papillous substance: and into a hollow part called the pelvis, lined by a smooth membrane, termed the pelvis of the ureter, which end in the ureter.

INTEGUMENTS, adipose membrane, and a membrana propria.

The renal arteries, or emulcients, are branches of the aorta descendens; they ramify very beautifully in the substance of the kidney, and terminate in cryptae, or convolutions of the artery upon itself.

The veins empty themselves into the cava inferior.

The nerves of the kidneys are branches of the eighth pair and intercostal.

The excretory ducts of the kidneys are called the ureters, canals which convey the urine from the kidneys into the bladder.

Use, to secrete urine, and convey it to the bladder.

DISEASED APPEARANCES. Inflammation—abscess—gangrene—morbid softness—cirrhosis—hydatids—converted into an earthy matter—calculi in the pelvis of the ureter—ossification—total destruction of the kidney by enlargement of the pelvis of its ureter—ulcerated surface of the pelvis of the kidney—kidney converted into cysts or hydatids.

EXCRETION OF THE URINE.

The urine is separated from the blood by the extremities of the renal arteries, or cryptae, which open in the substance of the
the kidney into the *tubuli uriniferi*, from whence it is received into the pelvis of the kidney, and passes along the ureter into the urinary bladder guttulim, where it usually remains a few hours, in consequence of the sphincter of the bladder being contracted. It is prevented returning into the ureters by their entrance being oblique and valvular. The urine having remained a few hours in the bladder, excites a desire to void it, by which stimulus the sphincter becomes relaxed, the muscular structure of the bladder contracts, and by the assistance of the abdominal muscles and the acceleratores urinae the urine is propelled along the urethra.

**SUPRA-RENAL GLANDS.**

*Renal capsulae.* *Renal glands.*

Two triangular flat bodies, situated one above each kidney. They are covered by a proper membrane, and anteriorly by the peritoneum. In a healthy state they have a small cavity in which there is a brownish fluid. They are plentifully supplied with arteries from the diaphragm, aorta, and renal arteries, from which circumstance one would suppose they were to answer some purpose in the animal economy, although unknown. Their veins pass into the cava and renal vein, and their absorbents and nerves are in common with those of the kidneys. No excretory duct has yet been detected, nor is their use known.

**Diseased appearances.** The suprarenal glands are frequently found containing a black aqueous fluid—inflamed—enlarged—filled with scrophulous abscesses—converted into a spongy sub stance, whose cells are distended with an aqueous fluid, containing small calculi of various forms and colour.
OF THE PELVIS.

The pelvis is a cavity below the abdomen, and under the pubes, containing the urinary bladder, rectum, and organs of generation.

VESICA URINARIA.

The urinary bladder is a membranous sac in the pelvis without the peritoneum, which, in part, gives it a coat or tunic. It is situated in men between the pubes and rectum; in women between the pubes and uterus, being fixed at its anterior and inferior part to the arch of the pubes by its neck and the urethra.

Anatomists divide the urinary bladder into a fundus, which is loose in the abdomen, and, when the bladder is distended, reaches the navel and even the stomach; a neck, before which the prostate gland is placed in men; and a body, or that part composing the chief bulk of the bladder, distinguished by an anterior and posterior part and sides.

The anterior half of this dilatable base is connected inferiorly in man to the rectum, and in women to the uterus: its middle part to the bones of the pelvis by means of cellular membrane and muscular fibres; and its superior part is attached loosely to the muscles of the abdomen.

It is composed of three membranes, like the intestines. Its arteries are branches of the hypogastric and haemorrhoidal.

The veins empty themselves into the hypogastric.

The nerves of the bladder are branches from the intercostal and sacral nerves.

Its internal surface is lubricated by mucus separated from muciparous glands under its internal coat.
The use of the bladder is to receive, retain, and expel the urine brought into it by the ureters, which perforate its inferior part near the neck of the bladder.

**Diseased appearances.** Inflammation—scirrhous—cancer—gangrene—ulceration—fungous and cancerous excrescences—polypus—puckering of the internal membrane—muscular fibres concentrated into bundles—mortal contraction—pouches of the bladder—calci of various kinds in the bladder—enlarged openings of the ureters—hydatids in the bladder—alarides in the bladder.

**Operations.** Lithotomy—puncturing the bladder in suppression of urine—passing the catheter into the bladder—vesicocutura.

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**THE MALE ORGANS OF GENERATION.**

These are, the penis, testicles, and vesiculae feminales.

**Penis.**

The penis, called also membra virile, or yard, is that cylindrical part which hangs down under the mons Veneris, before the scrotum. It is divided into root, body, and head, called glans.

The hairy prominence, which covers the pubes, is called mons Veneris.

**Substance.** The penis consists of common integuments, two corpora cavernosa, the corpus spongiosum urethrae; and the urethra.

The corpora cavernosa, which form the chief bulk of the penis, are composed of a cellular and very elastic substance, and arise by two crura, one from each ascending ramus of the ischium.
ischium. At their origin they are firmly attached to the bone by a dense cellular membrane; they then converge towards the pubis, where they are also firmly connected to the symphysis by a dense cellular membrane. About this place they meet and pass together, but do not unite, forming the greater part of the penis, and end abruptly behind the corona glandis. The corpora cavernosa, being each somewhat round, and lying together in the penis, a considerable excavation is left above and below; in the former the great vein of the penis passes, and in the latter the corpus spongiosum urethrae.

The corpus spongiosum begins before the prostate gland, and surrounds the urethra. At its beginning it forms the bulbous part of the urethra, and then proceeds forwards in the space between the two corpora cavernosa on the under surface, and is expanded at the extremity of the penis into a very vascular substance, called glans penis, naturally covered by a fold of the skin, called the prepuce, which, at the under part of the glans, is fixed to it by a frenum.

The urethra is a membranous canal, which proceeds from the bladder, through the prostate gland and the corpus spongiosum urethrae; and at the end of the glans penis its internal membrane is reflected over the glands forming the meatus, or opening in the glans. The urethra is endowed with a high degree of sensibility and contractility. In the urethra are to be observed, the verumontanum, or caput gallinaginis, a cutaneous eminence in the urethra, about an inch before the neck of the bladder—the openings of the ejaculatory ducts around the caput gallinaginis—the opening of the ducts of the prostate and Cowper's glands—the lacuna or openings of the ducts of the mucous glands of the urethra.


Arteries.
**Arteries.** The penis is supplied with blood by the pudical artery, which is continued to the symphysis of the pubis, where it pierces the cavernous substance, and divides into several branches, one going to the bulb of the urethra, another along the dorsum of the penis, and two branches enter the cells of the corpora cavernosa, and, by filling them with blood, cause an erection of the penis.

**Veins.** The blood of the penis is returned by a large vein, called the *vena magna isphiæ penis*, which conveys it to the hypogastric vein.

**Absorbents.** The lymphatics of this organ are deep-seated and superficial. The superficial arise from the prepuce in three divisions: one on the right side of the frenum, another on the left, and a third directly on the middle of the superior side. Those from the under side make a semicircular turn from the under to the upper side of the penis, whilst that on the superior side of the prepuce runs on the middle of the back of the penis, exactly in the direction of the symphysis pubis. At a little distance from the pubis the three divisions unite into one common trunk, which almost immediately separates again into two; one, going to the right groin, accompanies the veins going to the inguinal vein, and terminates near it in those inguinal glands which are nearest the symphysis pubis. The other trunk goes to the left groin, and terminates exactly in the same manner as the former. The deep-seated lymphatics accompany the arteries, and pass with them on the inside of the tuberosities of the ischia, or under the angle of the pubis.

**Nerves.** Branches of the sacral and ischiatic. Those distributed on the integuments and body of the penis are for common sensation; those which go to the *glans penis* are for the peculiar sense of that part.
The use of the penis is for erection, emission, diffusion of semen, and of urine.

Diseased appearances. Inflammation—ulceration, which, when caused by the venereal virus, is called a chancre; abscess—gangrene—phymosis—paraphymosis—elephantiasis—varix—anaemia—cancer—warts, or excrescences, from venereal or other causes—original mal-formation.

Urethra: Gonorrhoea—leucorrhoea—enlarged lacuna—stricture, which is either a general contraction for a greater or less space; or a constriction, like as if a piece of packthread were tied round the urethra; or a fine pellicle, or a caruncle—an artificial urethra—fistula—no meatus urinarius—urethra converted into bone.


TESTES.

The testicles are two oval bodies, situated originally within the cavity of the abdomen, from which they descend before birth, or soon after, into a bag, called the scrotum, placed under the root of the penis.

Substance. The adult testicle is composed of arteries, veins, and a peculiar set of vessels, which arise from the minute terminations of the arteries. This peculiar set of vessels are—

1. The vasa reba, which are found in the substance of the testicle, arising from the minute ramifications of the spermatic arteries. At the top of the testicle the straight vessels, which are the commencement of the excretory ducts, just as the biliary pores are of the ductus hepaticus, inosculate with one another, and form

2. The
2. The plexus of vesels sends off at the superior part of the testicle.

3. The vasa efferentia, which are ten or more in number. They pass from the body of the testicle, and soon uniting into one trunk, called vasa deferentia, form, by an immense number of convolutions, a somewhat hard substance, called the Epididymis. This is somewhat pyramidal, having a thin convex head, and a flat thin extremity; it is formed merely of a convolution of the vas deferens, or excretory duct of the testicle.

Vas deferens. This long but small duct is formed of a cartilaginous substance; its cavity is not sufficiently large to admit a small pin. It passes from the end of the epididymis in a zigzag manner up by the side of the pubes, where it is no longer convoluted, but proceeds straight into the cavity of the pelvis to the vesiculae seminales.

Coverings. The testicle has a strong, white, dense tunic, intimately connected to it; this is called the tunica albuginea testis. It completely encompases the body of the testicle, and advances over the epididymis.

The next tunic of the testicle is called tunica vaginalis. Anatomists consider it as a production of the peritoneum; but this opinion does not appear to be well founded. It is a delicate membranous bag, connected externally by cellular structure to the dartos; and the testicle, with its tunica propria or albuginea, adheres firmly to its outside, pushing itself, as it were, into it, in the same way as the heart into the pericardium, the lungs into the pleura, &c.; so that, when the tunica vaginalis is opened, the testicle is seen within it.

The dartos has already been described in Myology.

All these coverings of the testicle are surrounded by a very elastic
elastie cellular membrane and common integuments, to which the name of *scrotum* is given.

**Arteries.** The *spermatic* arteries, formerly termed *vasa preparantia*, arise on each side from the aorta, near the emul- 
gents, and sometimes from the emulgent, especially on the right side. The reason of the origin of these arteries being so remote from the testicles will appear from considering the situation of those organs originally. When the *spermatic* artery reaches the abdominal ring, it is surrounded by the *vas deferens*, the *spermatic* veins, and a quantity of cellular mem-
brane; all these together are called the *spermatic cord*, which passes through the ring.

**Veins.** The blood of the *spermatic* arteries is returned by a number of small venal branches from the testicles, which enlarge as they pass up the cord. Having passed through the abdominal ring, they form a plexus around the *spermatic* ar-
tery, to which the term *corpus pampiniforme* is given.

**Absorbents.** The lymphatics are distinguished into those of the integuments, those of the body of each testicle, those of the *rete testis*, and those of the *epididymis*; all of which proceed along the cord.

**Nerves.** The renal plexus of nerves sends off several branches to the testicles, as do also the mesenteric plexus, and the great intercostal, all of which accompany the *spermatic* artery. The *scrotum* is supplied by branches from the third and fourth lumbar nerves.

**Descent of the Testicle.** The testicles are always originally situated within the cavity of the abdomen. About the seventh month they generally leave that cavity, and pass through the abdominal ring into the *scrotum*. There is, however, great variety in the time of their descent, and cases are recorded, wherein they did not appear during the whole course...
course of the person's life. When in the cavity of the abdomen, each testicle is connected to the scrotum by a ligamentous substance, and there is a small pyramidal body at its beginning, close to the testicle, which, from its appearing to direct the course of the testicle, is called gubernaculum testis.

DISEASED APPEARANCES. Inflammation, which is termed orchitis, or hernia humoralis—suppuration—gangrene—scirrhns—serophulous enlargement—pulpy—cancer—converted into cartilage—ossified—small and wasted—hydrocele—hematocele—pneumatocele—cavity of the tunica vaginalis obliterated—filled with hydatids—the epididymis ending in a cul de sac—serophulous thickening—serophulous tumours—stircture—the spermatic veins varicose, called varicocele—the spermatic cord hardened—anafarcous—containing large cysts of water—cancer of the scrotum, peculiar to chimney-sweepers.

SECRETION AND EXCRETION OF THE SEMEN.

The semen is secreted by the minute branches of the spermatic arteries that deposit it into corresponding seminal vessels, called vasa recta, which compose the greater part of the body of the testicle. The semen is the proper stimulus to these vessels, which are therefore stimulated to contract, and, by a very slow motion, convey it into the vasa efferentia, which terminate in the epididymis. The vas deferens carries it through the inguinal ring into the pelvis, to be deposited in the vesiculae seminales, where it excites a desire to emit it.

The cells of the corpora cavernosa penis are distended with blood by the venereal stimulus; hence the penis swells, and is inclined for coition, during which action, at the time of the astrium venereum, the vesiculae seminales contract, and the semen is thrown with an immense force through the ejaculatory ducts, opening into the urethra, where it is mixed with
the secretion from the prostate gland, which is expelled at the same moment, and passes with it along the urethra, to be propelled by the contraction of the ejaculatory muscles into the cavity of the uterus.

**VESICULÆ SEMINALES.**

Two white membranous receptacles, situated on the back part of the bladder, close to its neck, which receive and contain the semen from the vasa deferentia.

**Substance.** Membranous, white, and resembling in their structure an intestine variously contorted, and covered with a fibrous substance. Each vesicula seminalis sends forth a duct, which passes through the prostate gland, and are called the ejaculatory ducts; they are some lines long, and enter the cavity of the urethra by a peculiar orifice at the top of the verumontanum.

**Vessels and nerves.** From the neighbouring parts.

**Absorbent vessels.** These arise from the vesiculae seminales, and run to the lymphatic glands about the loins.

**Use.** To contain, retain, instillate, and excreta the semen into the urethra.

**Diseased appearances.** Morbid adhesions to neighbouring parts—wholly converted into a scrophulous substance—ejaculatory ducts obliterated—one wanting—scirrhus—cancer—morbid enlargement of the cells.

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**THE ORGANS OF GENERATION IN WOMEN.**

The parts which serve for generation in women are divided into external and internal.
The external parts are...

1. The mons Veneris. The prominent portion of integuments, immediately over the osse pubis. It is formed by a quantity of fat under the skin; and, after puberty, is covered with a short hair.

2. The labia majora. These are the two external lips, of a soft consistence, and formed of very vascular common integuments. They begin from the symphyses of the pubis, are covered externally with hair, but their internal surface is smooth, and lubricated with the hymen of the odoriferous glands.

3. The clitoris. A small substance, placed just below the origin of, and within the labia majora. It resembles a penis in miniature, and, like it, is formed of two spongy substances, which arise by two crura from the ascending ramus of the ischium. The clitoris is also, like the natural penis, covered with a foreskin. During coition, it is the principal seat of pleasure, and is distended and erected by the venereal stimulus.

4. The nymphæ, or labia minora. These are the two inner folds, placed at the commencement of the vagina; they begin from the foreskin of the clitoris, enlarging as they pass downwards, and terminate in the under part of the beginning of the vagina. Their structure is highly vascular and sensible, and they have a number of sebaceous glands to lubricate them. Their use appears to be, to assist in creating the venereal pleasure, and to direct the urine flowing against them out of the urethra, in such a manner as to prevent it wetting the thighs.

5. The meatus urinarius. Which is a small triangular opening, situated immediately under the clitoris, behind the nymphæ, and beset with mucous glands.
6. The *hymen*. This is seldom met with but in children, in whom it is mostly a semilunar membrane, situated at the entrance of the vagina, behind the meatus urinarius. When once lacerated, it forms several fleshy excreences, which are called *carunculae myrtiformes*.

Diseased appearances. The *labia majora* are subject to inflammation—abscess—gangrene—adhesion with each other—warts—necrosis, or dry gangrene. The *clitoris*, to enlargement—and its prepuce, to excreences. The *nymphae* are often found elongated—cirrhou—carcinomatous. The *meatus urinarius* is frequently found inflamed—fimbriated—ulcerated. The *hymen*, imperforated.

Operations. Separating the labia majora—extirpating the enlarged clitoris, or nymphae—perforating the hymen—the mode of introducing the catheter.

The internal parts of generation are the vagina, uterus, Fallopian tubes, ovaria, broad and round ligaments of the uterus, and the urethra.

**Vagina.**

An elastic membranous canal, leading from the nymphae upwards, under the arch of the pubis, between the bladder and rectum; and terminating at the neck of the uterus, which it embraces.

Substance. It is composed of three membranes:

1. An *epidermis*, which enters from without.
2. A white, thick, elastic membrane, which, in the virgin vagina, forms an immense number of transverse rugae, or folds.
3. A cellular coat, which is external, and connects it to neighbouring parts.

Besides these coats, the vagina has also, especially at its anterior
anterior part, a number of muscular fibres, which surround it like a sphincter. In the vagina the following are to be noticed.

1. A number of lacunae, which excrete the mucus of the vagina.

2. In virgins, the hymen, and, where this has been once ruptured, the caruncula myrtiformes, or remains of the hymen.

3. The medius urinarius, immediately under the lymphytis pubis, behind the clitoris.

4. The vaginal portion of the uterus, or os uteri.

Vessels. The arteries of the vagina are very numerous; they arise from the pudical, forming a net-work around the vagina. The blood is returned into the haemorrhoidal vein.

When women menstruate during pregnancy, the catamenia are furnished by the vessels about the superior part of the vagina.

The absorbents of the vagina are also very numerous; they tend towards the iliac glands, into which they convey their contents.

Use. The vagina embraces the penis in coition, and, by its muscular fibres at its origin, and its elastic membranous substance, accommodates itself to the size of that organ. The catamenia pass from the uterus through the vagina; as does also the fetus, in labour.

Diseased appearances. Inflammation, of enteritis — abscesses—gangrene—adhesions of its sides—common ulceration, serophulous and cancerous—scirrous tumours—morbid narrowness—very short—leucorrhæa—gonorrhœa—ectrocele—prolapsus—morbid widening from pessaries, polypus, &c.

Operations. Application of pessaries—puncturing the urinary bladder through the vagina—dividing morbid adhesions—removing
removing enlarged caruncles myrtiformes—perforating the
hymen—removal of polyps.

UTERUS.

The uterus, or womb, is a spongy hollow receptacle, some-
what like a flattened pear, situated in the pelvis, between the
urinary bladder and rectum.

Anatomists divide the uterus into the vaginal portion, the
neck, the body, the fundus, and its appendages.

The vaginal portion is called the os uteri, and, from its resem-
blance to the mouth of a tench fish, os tinca; midwives usually
term it os internum, giving the name of os externum to the
orifice of the vagina. In virgins it is much less than in those
who have borne children: it consists of two labia, and an
opening between, which leads to the cavity of the uterus. In
the internal surface of the os uteri are situated a number of
folds, and occasionally several small vesicles, and a quantity
of transparent gelatinous mucus.

The neck of the uterus is also hollow, and contains several
plicae, or folds. In some uteri it is longer than in others; its
cavity leads to that of

The body of the uterus. Children and virgins have the uterus
more flattened than others; it is somewhat of a triangular
shape, having its appendages going from each superior angle,
whilst the body gradually diminishes towards the os uteri. The
cavity in the body of the uterus is also of a triangular shape: it
commences at the os uteri, is nearly of the same diameter all
along the neck of the uterus, and enlarges in the body. At
each superior angle, the cavity of the uterus receives that of
the Fallopian tube. The uterus is lined by a smooth vascular
membrane, whose vessels secrete the menstrual blood.

STRUCTURE,
STRUCTURE. The portion of the uterus which hangs into the cavity of the pelvis is covered by peritoneum, whilst the vaginal portion receives a tunic from the epidermis, continued from the vagina. The body of the uterus is composed of peculiar fibres, blood-vessels, absorbents, and nerves. These fibres do not appear, in an unimpregnated uterus, to be of the same nature as those of the impregnated uterus.

VESSELS. The arteries of the uterus are the spermatic and uterine, which are branches of the internal iliac. The veins accompanying the arteries return the blood into the external haemorrhoidal, internal iliac, and spermatic veins. The nerves of the uterus are branches of the sacral and great sciatic nerve; it also has branches from the mesocolic plexus. The absorbents are rarely seen: yet they are numerous, and proceed to the iliac glands.

APPENDAGES OF THE UTERUS. Under this term are comprehended the round and broad ligaments, the Fallopian tubes, and the ovaries.

1. Round ligaments. These are two vascular ligaments, about the size of a goose-quill, which arise one from each side of the uterus, near its fundus, and somewhat on its anterior surface, and proceed obliquely outwards and downwards to the ring of the external oblique muscle, which they pass through, and are lost in the fat about the labia majora.

Relaxation of these ligaments allows the uterus to descend into the vagina; and in many instances this relaxation is so great as to suffer the uterus to be wholly without the os externum.

2. The Fallopian tubes. These are also termed uterine tubes: they go one from each superior angle of the uterus directly across the pelvis, for the space of four inches, covered by the peritoneum, and terminate by a fringed body, the fimbría, which
which float in the cavity of the pelvis. The substance of the Fallopian tube is of a muscular nature, by which means it has a peristaltic motion. In the middle of the fimbria is the opening of the tube; so that if air were blown into the cavity of the vagina, it would pass into the cavity of the uterus, then along the Fallopian tubes into the cavity of the abdomen.

3. The broad ligaments, which consist of a duplicature of the peritoneum passing over the tubes and ovarium, and going in form of a broad expansion to the sides of the pelvis; so that the peritoneum of the upper and under surfaces of the uterus meeting at the sides, goes across the pelvis to its side, forming what is called the broad ligaments: in this passage it envelopes the tubes, ovaria, and blood-vessels.

4. The ovaria. Two oblong and rather flattened bodies, hanging in the duplicature of the peritoneum, at the sides of the uterus, about two inches from it, and behind the broad ligaments. Under the peritoneal coat of the ovarium is its proper substance, which is subcartilaginous. An adult virgin ovarium contains a number of highly vascular vessels, filled with a transparent fluid; these are ovula, and were first accurately described by De Graaf. Besides these vessels, there are occasionally two or more blackish spots; these are called corpora lutea; they were supposed to be a certain criterion of the woman’s having borne a child; but this is erroneous, for corpora lutea exist in virgins.

Use. The uterus and its appendages are for the purposes of generation, and the perfection of the young.
retroversion—fracture of the cavity—converted into bony and earthy matter—a mass of bone in the cavity of the uterus—calculi of the uterus—acarides in the uterus—hydatids—rupture of the uterus—two uteri—no uterus.

Ovaria. Inflammation of the peritoneal coat, called peritonitis ovarii—of the substance of the ovarium—of its vesicles, or ovula—scirrhus—abscess—gangrene—the tunic of the vesicles converted into a black membrane—coagulated blood in the vesicles—an increase of fluid in the vesicles, called hydrops ovarii—the ovaria converted into a fatty substance, with hair and teeth—a fetus in the ovarium—a morbid shrinking of the ovaria—an ovarium wanting—corpora lutea in virgins.

Fallopian tubes. Inflammation of the tube and its fimbræ—adhesions to neighbouring parts—hydatids adhering—dropsy—ending in a cul de sac, the fimbræ being wanting—a fetus in the Fallopian tube—scirrhous tumours growing to the tube—a tube wanting.

PHYSIOLOGY OF MENSTRUATION.

By a law of nature, women menstruate in this climate from about the age of fifteen to forty-five. Menstruation is the efflux of sanguineous fluid from vesicles opening into the cavity of the uterus. During pregnancy, the catamenia, or menœs, for to the discharge is called, stop, except in some few instances, where it is supplied by the vesicles of the vagina.

The nature of menstrual blood, if women be healthy, differs only from other blood in its not coagulating, which may be caused by its slow exit, and its mixture with the secretions of the uterus and vagina. It differs, however, in quantity, the period of its first appearance, its duration, and the symptoms which precede and accompany it, according to the age, temperament.
The congress between man and woman is called coition, which is so well known as to require no description.

During coition the nymphæ and clitoris are tumid with blood, and the fimbriae of the Fallopian tubes, by a power inherent in them, are stretched out, and applied over the surface of an ovum in the ovarium.

The pleasure which women experience during coition is very great, and a quantity of mucus is suddenly emitted from the glands of the vagina, during the venereal orgasm, which, in former times, was erroneously supposed to be the semen of the female; but now it is the opinion of physiologists that women have no semen, as anatomy cannot detect any organ destined to secrete it.

In order that a woman may conceive, it is requisite—

1. That she shall have menstruated.
2. That the ovum in the ovarium shall have arrived at a state of maturity.
3. That the fimbriae of the Fallopian tube shall be stretched over the mature ovum, so as to let the cavity of the Fallopian tube come immediately over it.

Under these circumstances, if the male semen be emitted into the uterus, its vivifying part, which is extremely subtile, and called the aura feminis, flies through the cavity of the uterus along the Fallopian tube to the mature ovum, and imparts to it...
OF THE GRAVID UTERUS.

The parts of the gravid uterus are, the uterine placenta, the umbilical cord, the membranous ovum of the fetus, the liquor amnii, and the fetus.

UTERINE PLACENTA.

A spongy mass, like a cake, generally adhering to the fundus of the gravid uterus, composed of a network of very numerous vessels.

SUBSTANCE. Cellular, like a sponge, and filled with vessels.

ABSORBENTS have been lately discovered.

USE. To receive and prepare the blood from the uterus for the fetus, and give off vessels to the umbilical cord.

FUNICULUS UMBILICALIS, OR UMBILICAL CORD.

A cord of an intestinal form, mostly about half a yard in length, which runs from the navel of the fetus to the center of the placenta. It is composed of a cutaneous vagina, or sheath, a cellular substance, filled with a peculiar gelatinous fluid, one umbilical vein, and two umbilical arteries.

USE.
The umbilical vein of the foetus conveys the blood from the placenta to the foetus, and the two umbilical arteries return it from the foetus to the placenta.

**MEMBRANOUS OVUM OF THE FOETUS.**

The foetus is enclosed in a membranous ovum, or bag, within the cavity of the uterus.

The ovum consists of three membranes: an outer, or filamentous, called decidua; a middle one, which in the embryo is shaggy, called the chorion; and an inner one, termed the amnion.

**Use.** To include the liquor amnii, to prevent its flowing into the uterus, and, at the commencement of parturition, to assist in dilating the os uteri.

**LIQUOR AMNII, OR LIQUOR OF THE AMNION.**

A lymphatic liquid, enclosed in the cavity of the ovum surrounding the foetus, secreted by the exhaling arteries of the membranes of the ovum.

**Quantity.** About the time of parturition, two or three pounds.

**Property.** Gelatinous, like turbid serum of milk.

**Use.** To defend the foetus from the pressure of the uterus, to give it nourishment, to dilate the orifice of the uterus in labour, and to lubricate the vagina.

**FOETUS.**

During the first month of pregnancy, the ovum is about the size of a pigeon's egg; the foetus swims in the middle of the liquor amnii, and represents a little cloud, which gradually enlarges.
enlarges, and its parts become more firm and perfect. The parts of the foetus at birth differ from the adult, in having a foramen ovale, a canalis arteriosus, a canalis venosus, an umbilical cord, and the thymus gland. The lungs are black, collapsed, and sink in water. The liver is large. All the small glands are also proportionately large, and the large intestines are filled with meconium.

**Peculiarities.** These are—1. An umbilical vein, which goes to the liver.—2. Two umbilical arteries, which arise from the internal iliac.—3. A canalis venosus, or vein, which proceeds from the sinus of the vena porta into the vena cava inferior.—4. An opening in the septum of the auricles, called the foramen ovale.—5. A canalis arteriosus, or artery, which arises from the pulmonary artery, and passes obliquely into the aorta.—6. The thymus gland, situated in the anterior space of the mediastinum. After birth these vessels gradually become impervious, and at length are removed by the absorbents.

**Circulation of the Blood in the Fætus.**

The foetus receives its blood from the mother through the umbilical vein of the funis, which transmits it along the ductus venosus into the vena cava, to be carried to the right auricle of the heart. From the right auricle it passes partly through the foramen ovale into the left auricle, and partly into the right ventricle. From the right ventricle it is propelled into the pulmonary artery, which sends a very small proportion through the lungs, and the remainder through the canalis arteriosus into the aorta. The blood is returned from the foetus by the two umbilical arteries, along the cord, to the mother.
HYDROLOGY;

OR,

DOCTRINE OF THE FLUIDS.

The fluids of the body are divided into crude, as the chyle; sanguineous, as the blood; lymphatic, as the lymph of the lymphatic vessels; secreted, or those separated from the blood; and excrementitious, as the urine, faces, &c.

The secreted fluids are subdivided into ialleal, as the juice of the prostate gland; aqueous, as the aqueous humour of the eye; mucous, as the mucus of the nostrils; albuminous, as the serum of the blood; oleous, as the oil of the adipose membrane; and bilious, as the bile.

The fluids of the body are also divided, from their motion, into circulatory, which continually circulate in the vessels; commorant, which circulate with a slow motion, as the semen, oil of the adipose membrane; flagrant, which remain for a certain time in any receptacle, as cystic bile, &c.

FLUIDS COMMON TO THE WHOLE BODY.

THE BLOOD.

A red fluid, which circulates in the cavities of the heart, arteries, and veins.

Colour. In the arteries, of a florid hue; in the veins, darker, except in the pulmonary veins.

Blood exposed to the atmosphere spontaneously separates by degrees into two parts, viz. the serum, a yellow and somewhat greenish fluid; and a cake, called also the eror, or crofsamentum, which resembles a red mass, swimming like an island in the serum.
USE. To stimulate the cavities of the heart and vessels to contraction; to generate the heat of the body, and propagate it to every part; to nourish every part; and to supply all the secretions, they being all separated from the blood.

THE LYMPH OF THE LYMPHATIC VESSELS.

A tasteless crystalline liquid, contained in the lymphatic vessels.

It is absorbed from the surface of the body, tela cellulosa, viscera, and cavities of the viscera of the whole body; and conveyed into the thoracic duct.

Use. To return the superfluous nutritious fluid, the vapours of cavities, and substances applied to the skin, to the thoracic duct.

THE VAPOUR OF THE SHEATHS OF THE NERVES.

The aqueous humour contained in the vagina, and between the fibrils, of the nerves.

It is secreted by the arteries of the sheath of the nerves.

Use. To moisten the nervous fibrils.

FLUIDS PROPER TO EACH PART.

IN THE CAVITY OF THE CRANIUM.

1. A vapour, between the membranes of the brain, which prevents morbid adhesions.

An increase of this fluid constitutes the hydrops membranae narum, or hydrocephalus externus.

2. The vapour in the ventricles of the brain. A thin vapour contained in the cavity of the ventricles of the brain, and secreted by the exhalting arteries of their internal membrane, and...
of the choroid plexus. — Its use is to prevent the concretion of the ventricles.

An accumulation of this fluid forms the hydrocephalus internus.

IN THE CAVITY OF THE NOSTRILS.

The mucus of the nostrils. — The mucus secreted by the muciparous glands of the pituitary membrane, lining the septum and concha of the nostrils. — Its use is to preserve the nervous papillæ of the olfactory nerves moist, and to moderate excessive sensibility.

IN THE CAVITY OF THE MOUTH.

The saliva. — A fluid secreted by the salivary glands into the mouth. — The secretory organ is composed of the parotid, submaxillary, and sublingual glands. — Its use is to augment the taste of the food; to mix with, dissolve, and resolve the food into its principles; and to moderate thirst.

IN THE CAVITY OF THE FAUCES.

The mucus of the faucæ. — A mucus secreted by the muciparous glands of the tonsils, pharynx, &c. — Its use is to lubricate the faucæ.

IN THE EYES.

1. The aqueous humour of the eye. — A very limpid water which fills the anterior and posterior chambers of the eye. — It is secreted by the floating vessels of the corpus ciliare, and exhaling vessels of the iris. — Its use is to distend the cornea, retain the crystalline lens and vitreous humour in their places, and to transmit the focus of the rays of light to the crystalline lens.

2. The
2. The crystalline lens. A lentiform, pellucid, cellular body, distended by a very limpid aqueous fluid, enclosed in a membranous capsule, and situated in a depression in the anterior surface of the vitreous humour.—Its use is to transmit and refract the focus of the rays of light to the vitreous humour.

3. The vitreous humour. A pellucid vitriform or glass-like body, which fills the whole bulb of the eye behind the crystalline lens.—It is composed of small cells, distended with a limpid water.—Its use is to expand the bulb, and transmit and moderately augment the focus of the rays of light from the crystalline lens to the retina.

4. The water in the capsule of the crystalline lens. It is secreted by the pellucid branches of the artery of the crystalline lens.—Its use is to prevent the concretion of the crystalline lens with its capsule.

5. The pigment of the iris. The coloured mucus, which covers the anterior and posterior surface of the iris.—Its use is to reflect the rays of light.

6. The pigment of the choroid membrane. The black or brownish mucus, which covers the anterior surface of the choroid membrane, and the interior of the corpus ciliare.

7. The tears. A limpid fluid secreted by the lachrymal gland, and flowing on the surface of the eye.—Its use is to moisten the surface of the eye and eyelids.

8. The juice of Meibomius's glands. An unctuous humour secreted by the sebaceous glands of Meibomius, and lubricating the tarsi of the eyelids.—Its use is to lubricate the tarsi of the eyelids, and involve the saline acridity of the tears.

IN THE CAVITY OF THE EARS.

1. The cerumen, or wax of the ears. A bitter ceraceous fluid secreted by the ceruminous glands of the meatus auditorius externus.
The water of the labyrinth: An insipid water contained in the cavity of the membranous semicircular canals and cochlea. —Its use is to preserve the nervous fibrils of the auditory nerve soft and moist, and to moderate the tremors of sounds.

IN THE NECK.

1. The juice of the thyrpid gland. It is of a yellowish white colour, especially in infants, and its use is not known.

2. The mucus of the oesophagus: which is secreted by the muciparous glands, situated in the cellular membrane. —Its use is to lubricate the cavity of the oesophagus, and prevent the concretion of its sides.

IN THE CAVITY OF THE THORAX.

1. The mucus of the trachea, bronchiae, and vesiculae pulmonales. This fluid is secreted by the muciparous glands situated under the internal membrane of those parts. —Its use is to prevent the surface of the trachea, bronchiae, and vesiculae pulmonales from becoming dry by the continual passing of the air.

2. The vapour in the cavity of the thorax: which exhales from the exhaling vessels of the pleura of the lungs and ribs, into the cavity of the thorax. —It preserves the pleura soft, moist, and flexible; and defends and prevents it from the friction of, and concretion with, the lungs.

Hydrothorax is an accumulation of this fluid, or of a diseased secretion.

3. The vapour or liquor pericardii. Secreted by the arterious exhaling vessels, which open upon the external surface of the heart.
heart, and internal of the pericardium. Its use is to prevent the concretion of the heart with the pericardium, to diminish the friction, and preserve the parts left.

When this fluid, or a dilated one, accumulates in the pericardium, it forms the hydrocordis, or hydropericardium.

4. The juice of the thymus gland. A milky juice secreted by the arteries of this gland; its use is not known.

IN THE BREASTS.

The milk of the breasts. A white, sweetish fluid, secreted by the glandular fabric of the breasts of women. Its use is to be an aliment to new-born children.

IN THE ABDOMEN.

1. The gastric juice. A limpid colourless fluid, secreted by the exhauling vessels of the very numerous arteries, which bedew every part of the stomach. Its use is to digest the food.

2. The pancreatic juice: which is limpid, and secreted by this gland, and conveyed through its excretory duct, into the duodenum. Its use is to assist in the formation of chyle.

3. Bile. A yellowish green, bitter juice, secreted by the glandular substance of the liver, and conveyed by the biliary ducts, in part, into the duodenum, and in part into the gall-bladder: hence cystic and hepatic bile. Its use is to extricate the chyle from the digested mass of food, to stimulate the intestines, and to prevent the abundance of mucus and acidity in the primeæ viae.

4. Chyle. A white fluid, separated from the food in the primeæ viae, and observed some hours after eating in the lacteal vessels of the meletery, and in the thoracic duct. Its use is to form the blood.

5. The
6. The mucus of the prime viar. This is secreted by the muciparous glands situated under the villous coat of the prime viar. Its use is to lubricate the stomach and intestinal canal.

7. The vapour of the cavity of the abdomen. An aqueous vapour, secreted by the exhaling arteries of the peritoneum, which preserves moist, and prevents the concretion of the abdominal viscera.

A collection of this fluid constitutes the ascites abdominalis, or dropfy of the belly.

8. Urine. A saline liquid, of a citrine colour, secreted in the kidneys, and dropping down from them gutta-perg. through the ureters into the cavity of the urinary bladder—Its use is to liberate the body from the superfluous water, &c.

9. The mucus of the bladder. Secreted by the muciparous glands situated under the innermost membrane—Its use is to lubricate and defend the internal and very sensible surface of the urinary bladder.

IN THE PARTS OF GENERATION IN MEN.

1. The mucus of the urethra. Secreted by the muciparous glands situated under the internal membrane. Its use is to lubricate and defend the very sensible surface of the urethra against the acridity of the urine.

2. The smegma of the glans penis. An unctuous humour, secreted by the sebaceous vesicles on the surface of the glans and prepuce. Its use is to lubricate the sensible surface of the glans, and prevent its concretion with the prepuce.

3. The
3. The **vadus of the tunica vaginalis testis**: which exhales from the arteries into the cavity of the tunica vaginalis testis. Its use is to prevent the concretion of the testes with the tunica vaginalis, and preserve them moist.

_Hydr-ocele_ is an accumulation of this fluid.

4. The **liquor of the prostate gland**: A milky juice, separated by the arteries of the prostate gland, and sent through its ducts, _sub coitu_, into the urethra with the semen.—Its use is to serve as a vehicle to the semen.

5. The **semen**: A prolific liquor secreted in the testes, and carried through the epididymis and vas deferens into the vesiculae seminales.—Its use is to be emitted, _sub coitu_, into the female vagina, and there, by its aura, to penetrate to, and impregnate the ovulum in the female ovarium.

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_IN THE PARTS OF GENERATION IN WOMEN._

1. The **smegma of the labia and vulva**: An unctuous juice, secreted by the sebaceous glands, and covering the internal surface of the labia and nymphae.—Its use is to lubricate their sensible surface, and prevent any irritation _post mictum._

2. The **mucus of the vagina**: which is secreted by the muciparous glands under the internal membrane.—Its use is to lubricate the vagina, left it be irritated by friction, _sub coitu_, and to prevent the concretion of its sides.

3. The **liquor of the cavity of the uterus**: Secreted into it by the exhaliting arterial vessels. In the virgin uterus, it is serous and turbid; in the gravid, milky.—Its use is to moisten the cavity, and prevent its concretion.

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_IN THE ARTICULATIONS._

1. The **synovia**: An unctuous fluid, secreted by the internal membrane of the capsular ligaments surrounding the articulations.
tions of the bones: its use is to lubricate the cartilaginous surfaces of the articulatory bones, and facilitate their motions.

2. The juice of the burse mucose. An unctuous and somewhat mucilaginous juice, secreted by the vessels of the internal membrane of the burse mucose—its use is to lubricate the tendons for motion.

THE BONE.

The marrow of bones. An oily substance secreted by the arteries of a very vascular membrane lining the interfaces of the bony lamellæ, and the cavities of bones. In the foetus, the marrow is not oil, but a soft florid fluid.

Inflammation of the membrane which secretes the marrow is sometimes the cause of febra ventosa.

FLUIDS OF THE COMMON INTEGUMENTS.

1. Retumucosum. The mucus situated between the epidermis and cutis of the whole body, and secreted by the arterial vessels of the skin.—Its use is to conglutinate the epidermis to the cutis, to moderate the sense of touch, to moisten the nervous cutaneous papillæ, and give the external colour to the body; hence it is white in Europeans, black in Ethiopians, &c.

2. The oil of the adipose membrane. Secreted by the arteries of the cellular membrane.—Its use is to facilitate muscular motion.

3. Sweat. The aqueous perspirable matter excreted through the exhalant arteries of the skin.—Its use is to keep the skin moist.

A morbid increase of perspiration is termed sudoria, or sudor Aiglicanus.
The tray is to be made of mahogany, of a convenient size, and to have a small hole in one corner, with an ivory plug, to let out the mercury, when necessary. The two uprights are moveable, and cut so as to permit the cross bar to be fixed at any distance from the tray. The uprights and cross bar are only to be affixed occasionally, as when a hand or testis is to be filled with mercury.
THE various parts of the body may be preserved in a healthy state, either to exhibit their form or structure, or to compare them with morbid parts.

GENERAL OBSERVATIONS.

1. When removed from the body, and the useless parts dissected away, the part to be preserved is to be soaked in water, in order to get out the blood.

2. When it is necessary to give parts their natural form, which is lost by macerating, put them into a saturated solution of alum, retaining them by any means in the required form until they become hardened. If it be a hollow part, as the stomach, bladder, &c., fill it with, and immerse it in, the solution.

3. When an opening is to be exhibited, as that of the ureter, the bile-duct, the lacunæ of the urethra, Stenonian duct, Fallopian tube, &c. introduce a bristle. After this manner preserve the uterus and its appendages, cutting open the vagina and cavity of the uterus, the bladder, intestine, stomach, heart in the pericardium, liver, spleen, kidney, &c. &c.

4. All preparations of the brain are best hardened in a saturated solution of corrosive sublimate.

5. The parts are to be suspended in proof spirit by raw silk, in a tie-over bottle, and covered with bladder, taking care to exclude all air. When dry, varnish the bladder with mucilage of gum arabic several times; then put a sheet of thin lead over,
over, and varnish its edges with mucilage; and, lastly, tie another bladder over, and give it a coat of common spirit varnish, in which lamp-black, or other colouring matter, is mixed.

PREPARATIONS OF MORBID PARTS.

All morbid parts should, immediately after their removal from the body, be put into rectified spirit of wine for a day or two, and then preserved in proof spirit. These preparations foul a great quantity of spirit, and should therefore be kept in stopper-glasses, from which the spirit can easily be removed, and fresh put in, until the preparation ceases to foul the spirit, when it may be put into a tie-over bottle.

PREPARATIONS MADE BY MACERATING.

Preparations obtained by this process are very various.

GENERAL OBSERVATIONS.

1. Let the water be frequently changed, until it is no longer coloured with blood, but never after the blood is steeped away.

2. Let the macerating pan be placed in a warm place, to facilitate putrefaction.

3. The macerating pan should never be in a cold place, for the spermaceti-like conversion of the soft parts will be formed, and the bones spoiled.

4. The soft parts surrounding bones are a long time before they detach themselves from the bones.

5. Bones,
5. Bones, when macerated, should be exposed to the sun’s rays, and frequently wetted with clean water, or they may be bleached with the diluted oxygenated muriatic acid.

Bones.

Bones are macerated to be preserved whole, or they are sawed to expose their internal structure.

Bones of the head. Put the whole head, without disturbing the flesh or brain, into the pan. When sufficiently macerated, all the soft parts will come away with the periosteum; then detach the vertebrae, and wash out the brain. Bones are separated from each other by filling the cranium with peas, and putting it into water. The same method is to be adopted with other bones.

Bone in general, for structure. Divide the femur into two halves; the os innominatum, the petrous portion of the temporal bone, the parietal bones, &c.; these, when macerated, will exhibit the compact, the spongy, laminated, and reticular substance of bones.

A FETUS

Cut carefully away the fatty substance enveloping a fetus, but do not cut any of the cartilages. Steep out its blood, and macerate. It should be frequently looked at, and taken out when the flesh is all destroyed, before the cartilages are separated. The following preparations are obtained in this way:

1. The superior extremity, to show its bones, the progress of ossification, and the cartilage to be formed into bone.
2. The lower extremity, to expose the same circumstance.
3. The spine, which forms a beautiful preparation.
4. The pelvis, not less elegant.

Preservation. The above all to be preserved in proof spirit.

CUTICLE.
CUTICLE.

The cuticle of the hand and foot may be separated by maceration: the former is called chirotheca, the latter podatheca. The arm and foot of a large fetus are to be preferred; they are first to be well washed with a soft sponge in soap and water. Bones are unspecified to be removed whole or shot.

Preservation. Suspend them in proof spirit; first tie the part by which they are to be suspended, then put them into the bottle with the spirit, and gently pour some spirit into the cuticle, to distend it like a glove or stocking.

INJECTING INSTRUMENTS.

The celebrated Dutch anatomist, Rynch, first invented the art of injecting animal bodies.

There are three kinds of apparatus used in making injected preparations. The one for the coarse and fine injections, and the minute injection; the other for injecting with quicksilver; and the third, called the oyster syringe, for injecting minute preparations with the minute injection only.

The first consists of a brass syringe made for the purpose, of various sizes, from one carrying six ounces to one sufficiently large to hold two pounds. The point of these syringes is adapted to the pipes into which it is to be affixed. To this syringe belong a stop-cock, and a great variety of pipes.

The instrument for injecting quicksilver consists of a long glass tube, at whose end is fixed, by screwing in, a steel pipe, the end of which is extremely fine.

The oyster syringe is similar to the large syringe, except in size. It is so small, that when the syringe is in the hand, and
full, its piston may be commanded by the thumb of that hand to throw its contents into any preparation in the other hand. The pipe affixed by being screwed to the end of this syringe is nearly as small as that belonging to the quicksilver tube.

These instruments are always to be had at the surgical instrument makers.

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**INJECTIONS.**

The injections employed for anatomical purposes are of four different kinds: coarse, fine, minute, and mercurial.

**COARSE INJECTIONS.**

**Red.** Yellow bees' wax, sixteen ounces—the palest resin, eight ounces—turpentine varnish, six ounces, by measure—finely levigated vermilion, three ounces.

**Yellow.** Yellow bees' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—king's yellow, two ounces and a half.

**White.** Fine virgins' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—best flake white, five ounces and a half.

**Pale blue.** Fine virgin's wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—best flake white, three ounces and a half—fine blue smalt, three ounces and a half.

**Dark blue.** Fine virgins' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—blue verditer, ten ounces and a half.

**Black.** Yellow bees' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—pure lamp black, one ounce.
Green. Yellow bees’ wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—levigated crystallized verdigrise, four ounces and a half—best flake white, one ounce—levigated gamboge, one ounce.

Liquefy the wax, resin, and turpentine varnish over a slow fire, in an earthen pipkin; then add the colouring matter, having previously mixed it in another pipkin, with a very small quantity of the melted composition. Stir the whole well together with a wooden pestle, so that the colouring ingredients may be intimately and smoothly blended; place the whole again over the fire, and, when they have acquired their due heat, the injection will be fit for use.

FINE INJECTIONS.

Brown spirit varnish, white spirit varnish, of each four ounces—turpentine varnish, one ounce.

These are to be put together in an earthen pipkin, over a slow fire, until they have acquired the necessary degree of heat. To make it of a red colour, put one ounce of finely levigated vermilion into another pipkin, and gradually add the heated materials, stirring the whole with a wooden pestle, that the colour may be equally diffused.

One ounce and a quarter of king’s yellow—two ounces of best flake white—one ounce and a half of fine blue smalt, with one ounce and a quarter of best flake white—four ounces of blue verditer—half an ounce of pure lamp-black—are the proportions for the various colours to the quantity of ingredients ordered above.

MINUTE INJECTIONS.

The size, which forms the vehicle to the colouring matter in these injections, is made in the following manner:

Take,
Take, of the finest and most transparent glue, one pound, break it into small pieces, put it into an earthen pot, and pour on it three pints of cold water; let it stand twenty-four hours, stirring it now and then with a stick; then set it over a slow fire for half an hour, or until all the pieces are perfectly dissolved; skim off the froth from the surface, and strain it through a flannel for use.

Ifinglass and the cuttings of parchment make an elegant size for very particular injections; and those who are not very nice may use the best double size of the shops.

Red. Size, one pint—Chinele vermilion, two ounces.

Yellow. Size, one pint—king's yellow, two ounces and a half.

White. Size, one pint—beet flake white, three ounces and a half.

Blue. Size, one pint—fine blue smalt, six ounces.

Green. Size, one pint—levigated crystallized verdigrise, two ounces—beet flake white, levigated gamboge, of each eight scruples.

Black. Size, one pint—lamp-black, one ounce.

GENERAL OBSERVATIONS.

1. All injections are to be heated to such a degree as not to destroy the texture of the vessels they are intended to fill; the best criterion of this degree of heat is dipping the finger into the injection. If the finger can bear the heat, the texture of the vessels will not be hurt.

2. All the coloured materials should be as finely levigated as possible, before they are mixed with the injection.

3. Great care should be taken left the oily ones boil over, or bubble; and that the heat be gentle, otherwise the colour will be altered.
PREPARATIONS MADE WITH COARSE INJECTION.

The blood-veins are mostly filled with coarse injection, and the parts dissected, to show their course; and when the anatomist wishes to exhibit the minute branches, the fine injection is to be thrown in first, and followed by the coarse.

GENERAL OBSERVATIONS.

There are several circumstances to be observed in injecting with the fine and coarse injections, which are applicable to every part into which they are thrown; these are—

1. The part to be injected should be freed from its blood as much as possible, by steeping it for several hours in warm water, and repeatedly changing it.

2. Having emptied the part of its blood, the pipes are to be fixed in their proper veins, and all other vessels to be tied with a ligature.

3. The heat of the water is then to be gradually increased to the same temperature with the injection to be thrown in.

4. The injecting syringe should be steeped in the water with the part to be injected, until wanted.

5. The
5. The injection being finished, and the subject cold, remove the pipes, and tie up the parts they were in. Whenever a vessel is open, by accident or otherwise, be sure to secure it by a ligature, or cover it with a piece of thin and moist bladder, or the injection will always be oozing out.

6. The parts dissected and dried are to be varnished twice with copal or hard varnish, first washing them free from grease with some soap lees, and well drying them again.

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**BLOOD-VESSEL SUBJECT.**

Select an emaciated subject, between the age of two and fourteen years.

*Preparation.* Make an incision through the integuments the whole length of the sternum; then, with a saw, divide the sternum longitudinally into two equal parts; introduce a dissecting knife under the divided bone on each side, separate it from the mediastinum, and lay open the thorax, by bending back the two portions of the sternum and the cartilages of the ribs: an incision is then to be made into the pericardium, and the left ventricle of the heart, and a large pipe introduced into the aorta, and secured by a ligature. The subject is next to be put into warm water, and gradually heated. The time generally required to heat the whole subject is four hours, in a large body of water.

If the veins are to be injected, three more pipes are required: one to be put into the angular vein, at the corner of the orbit; another into a vein as near the fingers as possible; and the third into a vein as near to the toes as possible.

*Injection.* The subject and injection being properly heated, throw the coarse red injection into the heart pipe, which will fill
fill the arterial system; and then the coarse yellow injection into the head pipe first, and next into the pipes of the extremities. The subject, when injected, should be put into cold water, with its face downwards.

Dissection. Open the abdomen by an incision from the sternum to the umbilicus, and from thence to each ilium. Cut away the abdominal viscera, the stomach, spleen, and intestines; leaving the mesenteric vessels as long as possible: dissect away the liver, leaving the vena portae and hepatic artery as long as possible. This done, dissect away the fat and cellular membrane from the vessels; secure the mesenteric vessels in an arborescent form on a piece of pasteboard. The kidneys, urinary bladder, uterus, and its appendages, are to be preserved and dried in their situations. From the thorax are to be removed, the lungs and heart, or the latter may remain. The integuments being carefully dissected from the sternum, it is to be bent back, and kept in that situation, to expose the internal mammary arteries. The dissecting away the skin is next, in order to exhibit the muscles, and expose the arteries and veins. The skin should only be removed from time to time to carry on the dissection, and never more than that covering the part to be dissected; otherwise the parts from which the skin is removed will become dry, and the dissection be spoiled. In dissecting the arteries and veins, the dissector will find no difficulty, if he proceeds cautiously from the larger trunks towards their extremities. The brain is to be removed by sawing away a large portion of the bone on each side of the longitudinal sinus of the dura mater. The cheeks should be pushed out by introducing horse-hair into the mouth.

Drying. When dissected, or before, the subject should be hung up by the head in a frame: one arm is to be placed at a little distance from the side, and the other turned up over the head.
head, with the palm of the hand in front; the legs a little distance from each other; and kept in these postures by pack-thread. Should any muscles obstruct the sight of the arteries, they are to be separated to a proper distance by pieces of wood. This done, expose it to a current of air, in a place where it cannot get wet; and if the weather be moist, remove, from time to time, all moisture, by a soft sponge.

Preservation. Varnish it several times, and keep it in a dry place, and in a proper case, with a glass front and back.

A HEAD, FOR ARTERIES AND VEINS.

Choose an emaciated head of an adult, separated from the body, by a transverse section, about the sixth or seventh vertebra.

Preparation. Put a pipe into each carotid, or, what is better, one pipe with a bifurcation: remove a portion of bone over the longitudinal sinus of the dura mater, about the middle of the parietal bones, and secure a pipe in the longitudinal sinus, pointed towards the occiput. Put the head into warm water, to soak, pressing the blood occasionally out of the external and internal jugulars. Then tie up the jugular veins and vertebral arteries, and all the small vessels.

Injection. Into the carotids throw the red injection, and the yellow, or dark blue, into the pipe in the sinus of the dura mater. The former will fill the arteries, the latter the veins.

Dissection. Follow the course of the larger trunks, dissect out the globes of the eyes, and remove, with a fine saw, the portion of the jaw-bone behind the last molaris, to show the course of the internal carotids. To prepare the whole head, a portion of the cranium must be removed, by sawing on one side of the longitudinal sinus of the dura mater, from the
the frontal sinus to the horizontal spine of the occipital bone, and then sawing horizontally above the ear, from one extremity of the former incision to the other. The dura mater should be removed with a pair of scissors, the brain carefully washed out, and the tentorium and falx preserved. It is better to make a perpendicular section of the head, a little to one side of the sagittal future, through the nose, foramen magnum, and vertebrae; and thus prepare each side. The course of the cervical artery is to be shown by dissecting away the muscles, &c. from between the transverse processes.

Preservation. Varnish it several times, and keep it in a glass case, suspended; or fix it by the neck, and cover it with a glass bell.

AN ARM, FOR ARTERIES AND VEINS.

Remove the superior extremity from the trunk, by separating the clavicle from the sternum, raising it, and passing the knife under it to the articulation, including the greater part of the pectoral muscle. Then cut under the scapula, so as to remove with the arm the clavicle, scapula, and subscapularis muscle.

Preparation. After soaking it in warm water, force out the blood from the veins, by pressing the extremity from the fingers towards the shoulder. Fix a pipe in the axillary artery, and another in the largest vein on the back of the hand; some warm water may be injected into the vein, so as to wash out the blood; and, when pressed out, the axillary vein should be tied. Tie any muscular branches that may be gaping.

Injection. Red injection may be thrown into the artery, and yellow, or dark blue, into the vein.

Dissection. This is very simple; it requires only the removal of
of all the cellular and fatty membrane, and exposing the course of the vessels. Tie up the limb by the clavicle.

Preparation. When varnished, keep it in a cool and dry place.

A LOWER EXTREMITY, FOR ARTERIES AND VEINS.

Having removed the contents of the abdomen, make a section through the symphysis of the pubis, and the ligaments connecting the ilium and acetabulum, so as to remove one side of the pelvis.

Preparation. Fix a pipe in a vein as near the toes as possible, and another in the iliac artery. When the limb has been well soaked in warm water, press out the blood from the veins, or throw in some warm water at the venal pipe; but carefully press it out again, and tie up the iliac vein. Secure all divided vessels.

Injection. Blue injection, or yellow, may be put into the vein, and red into the artery.

Dissection. Expose the course of the artery and veins, particularly the profunda of the thigh.

THE GRAVID UTERUS, FOR ARTERIES AND VEINS.

The gravid uterus, or the uterus soon after it has expelled the fetus, may be injected, to show its large and tortuous vessels. It may be injected whilst in the body; but this is always attended with much difficulty, and never succeeds so well as when removed from the body. Therefore separate the spermatic and hypogastric vessels as far from the uterus as possible, and cut out the uterus with the bladder, vagina, and external parts of generation.

Preparation.
Preparation. Put a pipe in each spermatic artery, and each hypogastric, and also one into each spermatic and hypogastric vein; so that, at least, there will be four pipes for arteries, and four for veins, necessary. Be very careful that all the divided vessels be secured by ligature, which only can ensure success.

Injection. Red and yellow are mostly preferred; the former for the arteries, the latter for the veins. Be careful that the red be thrown into all the arterial pipes, and the yellow into the venal; and, to prevent mistakes, it will be better to have the pipes of the veins different from those of the arteries.

Dissension. Distend the vagina and uterus with horse-hair, either by introducing it through the vagina, or, if the foetus be in it, by a perpendicular section through the anterior parietes, which is to be sewed up again. Then dissect away all loose cellular structure and fat, preserving the round and broad ligaments, and Fallopian tubes. Should the foetus be in the uterus, an incision should be made, as above directed, except the placenta be adhering there, which is known by the great number of vessels, and then on the opposite side, and through the membranes, to remove the child; cut the umbilical cord close to the foetus, and fix a pipe in one umbilical artery, and another in the umbilical vein, the latter carrying arterial blood, should be filled with red injection, and the artery with yellow; the cord is to be laid round the placenta.

Preservation. When well varnished, suspend it in a case, with a glass front and back.

A PLACENTA, FOR ARTERIES AND VEINS.

This is perhaps the easiest preparation to make with coarse injection; and should, therefore, be the first attempt of the student.
Preparation. Fix a large pipe in the vein, and a small one in one of the arteries. The difficulty usually attendant on getting the pipe into the artery is obviated in a great measure by introducing the point of the scissors into these vessels, and flitting them down for about half an inch, then spreading the artery open upon the fore-finger, and keeping it so by pressure with the thumb, by which the pipe may be carried in without difficulty. A ligature should be passed round each pipe with a needle, taking care not to puncture any of the vessels.

Injection. The usual colours are to be selected; but instead of throwing the yellow into the vein, it should be pushed into the artery, for the artery here performs the function of a vein, and vice versa. When there are two placentae there should be different colours used.

Dissection. The spongy substance is to be carefully dissected away from the injected vessels, the placenta soaked in cold water, to get rid of its blood, and then dried, curling the cord around it; and should the membranes not be much torn, they may be distended with curled hair over it.

Preservation. Varnish it well; fix its bottom in a case with a glass top.

THE HEART, IN SITU; WITH THE HEAD, AND ADJACENT VESSELS.

For this purpose choose the head of a young subject, or an adult, whose heart is free from fat. The liver, stomach, spleen, &c. are to be removed from the abdomen, and the aorta divided just as it gives off the celiac artery. The incision into the chest should be carried through the integuments, from the trachea to the ensiform cartilage, the sternum sawed through, and bent one half on each side, from the extremity of the cartilages nearest the ribs; then divide one of the pulmonary veins
Veins as near as possible to the lungs, and remove a portion of bone over the longitudinal sinus of the dura mater.

Preparation. Having well soaked the parts in warm water, and squeezed the blood from the heart and vessels, by the inferior cava and pulmonary vein, put a pipe into the longitudinal sinus of the dura mater, pointed towards the occipital bone, another into the pulmonary vein, a third into the vena azygos, and one into the receptaculum chyli, or thoracic duct. Tie up carefully the aorta and the vena cava inferior, and put a strong ligature around the middle of each arm.

Injection. Three colours are required:—one for the arteries, which should be red; another for the veins, which may be yellow or blue; and the third for the thoracic duct, which should be white, to imitate chyle. Throw the red injection into the pipe in the pulmonary vein, which will fill the left auricle, ventricle, aorta, and all the arteries. The pipe in the head is for the yellow injection: by this will be filled the veins of the head, face, neck, and chest, the right auricle of the heart, the right ventricle, and the pulmonary arteries. Should the vena azygos not be injected, the yellow injection is to be thrown into it. A small quantity of white injection is sufficient for the thoracic duct.

Dissection. Remove the body by a transverse section at the last dorsal vertebra, then amputate the arms at their middle, saw away one side of the bones of the skull, and wash away the brain: then dissect away all the loose cellular membrane and fat, and expose the various parts in the best manner; dissect away the lungs, leaving the pulmonary arteries as long as possible.

Preservation. This is, when well done, a valuable preparation, and deserving of great care. Varnish it well, and preserve it in a square glass case.

A Fœtus.
A FOETUS, TO EXHIBIT THE PECULIARITIES OF ITS CIRCULATION.

For this purpose select a still-born foetus; and, if possible, one that died from a flooding of the mother.

Preparation. Dissect the umbilical vein from the arteries, about four inches from the umbilicus; and fix a pipe in it, taking care not to include the arteries. Throw warm water into this pipe, and wash out the blood, which will flow out by the umbilical arteries. Having drained away as much of the water as possible, tie a ligature very loose on the umbilical arteries.

Injection. The foetus being heated, throw in gently any coloured injection. The water will come away first through the umbilical arteries; and, when the injection appears, make the ligature firm, to prevent its further escape.

Dissection. The peculiarities in the foetal circulation are the umbilical cord, the ductus venosus, the ductus arteriosus, and foramen ovale. When the body is cold, proceed to the dissection; remove the head from the cervical vertebrae, the arms, with the scapulae, and pectoral muscles; the inferior extremity at the articulation with the pelvis, the whole of the parietes of the abdomen, leaving the arteries running to the cord by the sides of the bladder; the anterior part of the thorax, with the sternum, cartilages, and part of the ribs, the integuments and muscles of the back. Next cut away the lungs, and remove the pericardium; keep the diaphragm in its place, and turn up the liver, so as to expose the ductus venosus. Some dissection and care is here necessary. Dissect away the stomach and intestines, and lay out the mesenteric vessels, distend the bladder with air, and cut away any thing that
that may obstruct the view of the vessels. The foramen ovale cannot be exhibited.

Preservation. After having varnished it, hang it in a glass bell, with a hook at its top.

The penis may be injected, to show the two corpora cavernosa, the corpus spongiosum, and glans, with the arteries and veins. For this purpose, any healthy penis will do, but large ones are generally preferred. Having cut through the integuments and soft parts in the pelvis, in the direction the saw is to be passed, saw through the middle of each crista of the pubis, straight down and through the ascending ramus of each ischium, close to their commencement, and thus remove the pubis, with the bladder and external parts of generation.

Preparation. Make an incision into either of the crura of the corpora cavernosa, and into the bulbous part of the urethra, as near to the prostate gland as possible; soak it in hot water, and carefully press out the blood from every part. Introduce a probe along the vena magna ipsius penis, by an incision at its root, to break down its valves; fix a pipe in each of these incisions, and another in each vas deferens, at its entrance into the vesiculae feminales, and secure all the divided vessels.

Injection. Four colours are necessary; those generally preferred are red, yellow, blue, and white. Throw the red into the corpus spongiosum, which will distend the glans; the yellow into the corpus cavernosum pipe; the blue into the vena magna ipsius penis; and the white into the vasa deferentia.

Dissection. Inflate the bladder, dissect away all the soft parts, and keep the penis erect against the symphysis pubis.

Preservation. In a covered box.

TESTICLE.
TESTICLE.

A testicle of an adult should be chosen free from disease, and great care is requisite in removing it from the body. First, enlarge the ring of the oblique muscle, push the testicle through from the scrotum, and separate its cellular connecting substance; then cut the spermatic artery and pampiniform plexus as high as possible, and then the vas deferens.

Preparation. When well soaked, press out the blood from the veins; put a pipe into the spermatic artery, and another into a vein; and secure all other open mouths.

Injection. Red is to be sent into the artery, and yellow or blue into the vein, which is without valves. Then fix the quicksilver tube in the vas deferens, and suspend it in water; this done, fill it with mercury, and in twenty-four hours it may be removed to be dissected.

Dissection. Cut away the tunica vaginalis, and the tunica albuginea, which requires great care; then remove all the cellular and adipose membrane, and dry it on a board previously waxed.

Preservation. In a common preparation glass, on a blue or green paper ground.

THE SYSTEM OF THE VENA PORTÆ.

Remove the liver, spleen, stomach, and intestines all together, of a person whose mesentery is free from fat, cutting away at the root of the mesentery, behind the peritoneum.

Preparation. Cut into a mesenteric vein, as near to the intestine as possible, and secure it with a ligature passed around it with a needle, taking care not to wound any other vein. Inject warm water, and let it again run out by the divided vessels.
vessels. Drain its water off, and secure all the veins, the haemorrhoidal especially.

**Injection.** Throw any colour into the pipe, which will pass into the splenic, mesenteric, and internal haemorrhoidal vein, and into the vena portae.

**Dissolution.** Remove all the soft parts; the stomach, spleen, and intestines; cutting the vessels as long as possible, and dry them in the best manner, either attached to the liver, or deflect away the liver from the vena portae, taking care to preserve some of its ramifications.

**Preservation.** In a covered box.

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**HEART.**

The heart is mostly injected out of the body, to show its common and proper vessels. For this purpose, choose a lean heart. Cut through the thoracic viscera immediately at the top of the thorax; divide the intercostal arteries by drawing the knife down the pleura, over the ribs beyond their origin, separate the vena cava inferior and aorta, in the abdomen, with the cavae hepaticæ; and remove the thoracic viscera, with the portion of the diaphragm surrounding the vessels.

**Preparation.** Soak the blood and coagula out of the cavities of the heart, and press the blood from the coronaries. Put a pipe into the vena cava superior, and another into one of the pulmonary veins. Then tie the lungs at their root, the vena cava inferior, the arteria innominata, the left carotid and subclavian; and pass a ligature, with a slip knot, round the sinus of the aorta, and secure all other open vessels.

**Injection.** The common coloured injections, red and yellow, only are wanted. Throw the former into the pulmonary vein, which will fill the left auricle, ventricle, aorta, and coronary arteries. The yellow, being sent into the superior cava, will distend
Distend the right auricle, coronary veins, right ventricle, and pulmonary artery. In order to fill the coronaries well, the injector must stop two or three times in the course of the process, to squeeze on the injection in them with his nail; then heat the whole again, and throw in more injection. The preparation having cooled, a pipe is to be fixed at the bottom of the aorta, and some red injection, just hot enough to run through the syringe, is to be pushed along the aorta, an assistant throwing cold water on the intercostals, if the injection runs through them.

Dissfection. Cut away the lungs, pericardium, and all the soft parts.

Preservation. Either in a covered box, or under a glass bell.

STOMACH. INTESTINES. BLADDER.

These are best injected with the whole subject, but may be removed and injected separately.

GENERAL OBSERVATIONS.

1. The anatomist can only succeed by having the preparation constantly heated as he is throwing in the injection.
2. The injection should be thrown in very gradually.
3. When injected, the part should be immediately immersed in cold water.

PREPARATIONS WITH MINUTE INJECTION.

BONES.

The vascularity of bones is to be demonstrated, by throwing fine injection into an extremity, cutting out the bone when cold.
yield, separating it from all the soft parts, immersing it in water for a few days, to soak out the blood, and then putting it into a mixture of muriatic acid and water in the proportion of one ounce to a quart, for three or four months, adding about, every month, a drachm of acid. The limb of a rickety child is to be chosen.

**Injection.** Put a pipe into the largest artery of the extremity, and throw gradually the red injection into it, fixing the stop-cock in the pipe.

**A FOETUS.**

Still-born children, when injected with minute injection, afford a number of beautiful preparations.

**Preparation.** No water should be thrown into the vessels. Fix a pipe with a stop-cock into the umbilical vein, and tie the arteries in the ligature.

**Injection.** Red injection is always chosen for this purpose; and throw it in with great care, until the abdomen and skin all over become very tumid. First mucus comes from the nose and mouth, then the meconium from the anus, and often pure sife.

**Dissection.** Cut off the head from the shoulders, the arms below the shoulder joint, and the legs just below the acetabulum; then preserve a small quantity of the integuments around the navel, and remove all the anterior parietes of the abdomen and chest, so as to exhibit the thoracic and abdominal viscera. Cut away the integuments and posterior part of the theca vertebralis, to exhibit the medulla spinalis.

**Preservation.** Soak out the blood, and preserve it in proof spirit, to show the viscera and their vascularity.

From a well-injected foetus may be obtained the following preparations:
1. If the foetus be about seven months old, the membrana pupillaris.

2. If it be male of this age, the testicle in the abdomen, with the gubernaculum.

3. The vascular and radiated fibres of the parietal bones.

4. The vascular membrane, including the teeth.

5. The viscera of the chest separate, if better injected than those of the abdomen, showing the vascularity of the lungs, thymus gland, and heart.

6. The stomach, which is to be inverted, to show its vascular villous coat.

7. The intestines, which are to be separated from the mesentery, and inverted, to show their villous coat.

8. The glandula renales and kidneys together, to exhibit their relative size, and the lobulated structure of the kidney.

9. The uterus and its appendages, to show the long ovaria and plicae of the neck of the uterus and vagina.

10. The external parts of the female organs of generation, to show the hymen.

11. A red portion of the skin, to exhibit its vascularity.

12. The medulla spinalis, to show its vessels, and the cauda equina.

13. The membrana tympani, to exhibit its vascularity.

14. The cavity of the tympanum, to show its vascularity, and that of the periosteum of its bones.

15. The vestibulum and cochlea, to show the membranous semicircular canals of the former, with their ampullae injected, and the vascularity of the zona mollis.

16. The head, to show the natural appearance of the face, the papillæ of the lips, tongue, &c.

17. The hands, to show its natural colour.
Preservation. The above preparations are all to be well soaked from their blood, and preserved in proof spirit of wine.

18. A portion of skin, freed of its adeps, to show its vascularity.

19. The membrana tympani, to show its vessels.

20. The heart, to show the foramen ovale, by distending the cavities with air; and, when dry, cutting away the outermost sides of the auricles, and introducing aistle.

21. Any large muscle, freed from its cellular membrane and fat, and dried, to show the vascularity of the muscle.

Preservation. These are all to be dried, well varnished, and preserved in bottles. Some prefer putting them into spirit of turpentine; but this should be avoided as much as possible, for the turpentine is always oozing in warm weather, and dirtying the glass.

UTERUS.

The object of injecting a uterus with fine injection is to exhibit the vascularity of its internal membrane, which furnishes the catamenia. For this purpose the uterus of a person whose menstruation has not been stopped by age or disease is to be selected.

Preparation. Remove the uterus, by dividing the vessels as long as possible, the round and broad ligaments, and as much as possible of the vagina. Tie a pipe in each hypogastric artery, and secure all the divided vessels.

Injection. Any coloured injection may be chosen, but red looks best.

Dissection. Cut away all the loose cellular membrane, bladder, and rectum, if there be any, from around the vagina, and cut it open along the middle of its superior part; continue this incision on each side of the anterior part of the uterus, so as to exhibit the posterior surface of its cavity.
Preservation. If the injection be successful, which it seldom is more than one time in ten, suspend it by the ligaments, and preserve it in proof spirit.

AN ADULT HEAD.

Separate the head as low as the last cervical vertebra from the shoulders.

Preparation. Put a bifurcated pipe into the carotids. Secure the vertebral arteries and jugular veins, and all the divided parts.

Injection. The red injection is always preferred.

From an adult head injected in this way may be made the following preparations:

1. The upper eyelid, to show the vascularity of Meibomius's glands.

2. The choroid membrane, exhibiting its vascularity.

3. The retina, suspended by the optic nerve, exhibiting its vascularity.

4. A section of the optic nerve, to exhibit the central artery.

5. The whole of the cerebrum, cerebellum, and medulla oblongata, with the pia mater; or,

6. The pia mater, separated from the convolutions of the brain, to exhibit the intergyral processes and the tectum cerebri.

7. One half of the nostrils, to exhibit the vascularity of Schneider's membrane, and that of the membrane lining the antrum of Highmore.

8. The tongue, lying in the jaw, and suspended by the palatum molle, with the posterior fauces cut away, to show the epiglottis and glottis, the uvula and velum pendulum palati, the tongue, its papillae and excretory ducts, and the vascularity of the gums and sublingual glands.

Preservation.
Preservation. The above preparations are to be soaked well in cold water, to get out all the blood, and then preserved in proof spirit.

PREPARATIONS WITH QUICKSILVER.

Mercury cannot be coloured by any substances; it must, therefore, always present the same silver colour.

GENERAL OBSERVATIONS.

1. The parts should always be injected in a proper tray, that the mercury may be easily collected.
2. A lancet, with a curved needle ready-threaded, should be always at hand.
3. A bottle, whose neck is not so wide as to permit the quicksilver tube going to the bottom, when put into it.
4. When injecting, if any circumstance render it necessary for the injector to put aside the tube with the mercury, it should be placed in the bottle, the mercury remaining in it, to be handy and prevent delay.
5. Injecting with mercury is always tedious, and frequently unsuccessful. The parts exposed must be kept moist, by sprinkling them with cold water.

A SUPERIOR EXTREMITY.

To inject the lymphatics of an arm, choose one from a dropical subject, without fat; make an incision into the skin around the wrist, and seek diligently, with a magnifying-glass, for an absorbent, into which the pipe is to be put, when the quicksilver will immediately run. The shoulder should now be placed considerably lower than the hand; and, when the mercury...
mercury runs out at the divided vessels in the axilla, tie them up, and also the lymphatic, into which the pipe was introduced. Then seek for another absorbent. When the mercury ceases to run in a lymphatic, tie the vessel, and seek for another.

Diffusion. Begin at the lymphatics, where the mercury entered, and trace them; removing every thing that obstructs their view, but preserve the glands.

AN INFERIOR EXTREMITY.

The limb for this purpose should also be taken from a drophical person, and the same method adopted as with the superior extremity, seeking as near to the toes as possible for the lymphatics.

A PAROTID GLAND.

Cut down upon the masseter muscle, and seek for the Ste-nonian duct, which is the excretory duct of the parotid. Tie the quicksilver pipe in it, then fix the tube, and pour into it the quicksilver; and, when it ceases to run, remove the tube and pipe, and tie the duct. Be particularly careful, in dissecting away the gland, not to cut it.

Preservation. Dry it on a waxed board, and preserve it on a blue paper and pasteboard, in spirit of turpentine.

LIVER.

The lymphatics running on the peritoneal coat of the liver, and over the gall-bladder, make a beautiful preparation. The liver should be well soaked for several days, and the pipe put into the lymphatics of the suspensory and coronary ligaments, and the mercury forced along them, breaking down the valves with the nail, by pressing on the mercury. Secure the vessels at the portae of the liver, when the mercury gets there, and tie
tie the lymphatics when filled. Should the anatomist’s attempt to force the quicksilver beyond the valves be unsuccessful, he must fix upon the most minute obvious branch, and let it run its proper course.

Preservation. Throw some coarse injection into the cavity hepatica and vena portae, without heating the liver thoroughly; inflate the gall-bladder, and dry the whole. Varnish it, and preserve it in the best manner under a glass bell, or preserve the injected part in proof spirit, without any wax injection.

LUNGS.

The superficial lymphatics of the lungs are to be filled from the part most remote from the root of the lungs.

Preservation. Cut away the part on which the lymphatics are filled. Dry it on a waxed board, varnish it, and preserve it in a bottle, on a green or blue piece of paper; or preserve it in proof spirit, without drying it.

HAND.

Select the hand of an aged female (separated from the arm by a transverse section, three inches above the wrist) that has died of a lingering disease. Soak out the blood in warm water; fix the pipe in the radial artery, then add the tube, and pour into it the mercury. As the mercury appears in the other arteries and veins, take them up and secure them with ligatures. Should the mercury still escape from small branches, put a cord round the arm, and with a piece of wood tighten it, by twirling the wood, taking care not to prevent the mercury passing into the hand. Then suspend the hand in a glass filled with water, and suspend also the tube and quicksilver in the manner represented in the annexed plate, for a day or two, that the mercury may get into the small vessels. When injected, remove
remove the pipe, and tie, by a strong string, the fore-arm; put the hand into water, until putrefaction separates the cuticle.

Preservation. Dry it carefully, and varnish it; then fix the fore-arm in a pedestal of plaster of Paris, and keep this beautiful preparation under a glass bell.

LACTEALS.

Remove the mesentery and intestines, if the former be perfectly free from fat, and let them remain several days in water, which should be frequently changed. Search for an absorbent, on the intestine, into which introduce the quicksilver, which will run on to the glands in the mesentery, where it will stop. When the lacteals are filled, the preparation will be more elegant if red and yellow coarse injection be thrown into the mesenteric arteries and veins.

Preservation. Spread the mesentery on a waxed board, inflate a portion of the intestine, clear away all that is useless; dry and varnish, and preserve it in a glass frame.

CORRODED PREPARATIONS.

These preparations are made by filling the vessels with coarse injection, and corroding the soft parts, so as to exhibit those vessels.

GENERAL OBSERVATIONS.

1. The liquor for corrosion is to consist of three parts of muriatic acid, and one of water.

2. The liquor should be kept in a well glazed earthen vessel, with a top to it, also well glazed.

3. The
3. The part to be corroded should be carefully moved in and out of this liquor, as the slightest force may break the vessels.

4. When corroded, the pulpy flesh is to be carefully washed away, by placing it under a cock of water, the water flowing very slowly; or, in some instances, by squirting it away.

5. When the preparation is freed of its flesh, it should be fixed in the situation it is to remain in, either in a plaster of Paris pedestal, or on a flat surface.

6. If the flesh be not perfectly destroyed, the preparation is to be returned to the corroding liquor for a fortnight or month longer, or until it becomes pulpy.

HEART AND LUNGS.

These viscera, occupying less space in children than adults, are to be preferred. It is of no consequence whether they are fat or lean. The integuments should be cut from the fore part of the neck; and the trachea, jugular veins, and carotid arteries removed, and, with them, the viscera of the thorax, carefully separating the subclavian vessels from the clavicle, without injuring them, and dividing the axillary vessels and the cava inferior and aorta, just below the diaphragm.

Preparation. Soak the whole well, to free it of its blood, and press out all the fluids: fix a pipe in the inferior cava, and another in one of the pulmonary veins, taking care not to injure the others, by tying it. Then secure the carotids, the jugulars, the axillary vessels, the vertebral artery, the intercostals, the aorta, after it has formed its arch, the internal mammarys, and every vessel that can be found.

Injection. Red and yellow are generally preferred, but red and blue are more proper, and more elegant. Throw the blue into the vena cava inferior, which will deftend the right auricle, the superior cava, the jugular veins, and great coronary vein,
the right ventricle, and pulmonary arteries. The red injection will fill the left auricle and pulmonary veins, the aorta, subclavians, carotids, &c.

Preservation. Great care is requisite in freeing the injection from the pulpy flesh. When done, let the apex of the heart be placed immediately in a plaster of Paris pedestal, and cover it with a glass. If the pulmonary vessels are well preserved, it forms a valuable preparation. If one good preparation be obtained in ten trials, it will amply repay the anatomist.

HEART.

A fat heart will do for this purpose. Inject it as directed in page 287, and put it into the corroding liquor.

Preservation. Lay it on some cotton, on a pedestal, and cover it with a glass.

LIVER.

The liver of a child is to be preferred to that of an adult, it occupying much less room: its vessels should be cut long, and with it the portion of the duodenum, perforated by the bile duct.

Preparation. Fix a pipe into the hepatic artery, another into the vena portæ, a third into the ductus communis choledochus, and a fourth in the vena cava hepatica.

Injection. The four injections are the red, yellow, dark blue, and light blue. First, throw the red injection into the hepatic artery, next the dark blue into the vena portæ, then the light blue into the cæve hepaticæ, and lastly, the yellow into the ductus communis choledochus.

Preservation. Remove the pipes as soon as the injection will permit; and, when corroded, fix the trunks in the best manner.
ner possible, upon a proper pedestal, then wash away the flesh, dry it, and cover it with a glass.

**KIDNEY.**

Choose the kidney of an old drunkard. Cut the emulgent vessels close to the aorta and cava, and the ureter, very low; then remove the kidney, with all its surrounding adeps.

**Preparation.** Soak out the blood, and press out all the fluid. Fix a pipe in the emulgent artery, another in the vein, and a third in the ureter; and tie up all the open-mouthed vessels.

**Injection.** Red, blue, and yellow. First throw the yellow into the vein, then the red into the artery, and lastly, the blue into the ureter.

**Preservation.** Under a glass bell. The kidneys of different animals form a beautiful exhibition.
GLOSSARY;

or,

Explanation of Anatomical Terms.

ABDOMEN. The cavity of the belly; from abdo to hide, as including the intestines and other viscerA.

ACETABULUM. The cavity which receives the head of the thigh bone; from acetum vinegar: so called, because it represents the acetabulum or saucer of the ancients, in which vinegar was held for the use of the table.

ACINI. A species of gland; from acinus a grape.

ACROMION. A process of the scapula; from acro extremity, and os the shoulder.

ADENOLOGY. The doctrine of the glands; from ad a gland, and logos a discourse.

AMNION. A membrane that surrounds the fetus, which is soft and shaggy; from amnios a lamb's skin.

AMPHYARTHROSIS. A species of connexion of bones, which admits of an obscure motion; from amphi both, and arthros an articulation.

ANASTOMOSIS. The communication of vessels with one another; from ana through, and soma a mouth.

ANATOMY.
ANATOMY. The dissection of the human body; from ἀνα, and τεμνω to deflect.

Ancon. The elbow; from ἀγκον, from ἀγκαζομαι to embrace, ἀπο τι ἀγκεισθαι τετρω ὀφει το ὄφειν, because the bones meeting, and being there united, are folded one into another.

Anconeus. A muscle; so called from ἀγκον, the elbow.

Anconoid. Process of the cubit; from ἀγκον, the elbow, and είδος shape.

Angiology. The doctrine of the vessels; from ἀγκεισιν a vessel, and λόγος a discourse.

Aorta. Αορτή; from ἀνε air, and τηρεῖν to keep: an artery so called because the ancients supposed that only air was contained in it. It may rather be derived from τηρεῖν to convey, as serving to convey the blood to the rest of the body.

Aponeurōsis. A tendinous expansion; from ἀπό from, and νεῦρον a nerve; from an erroneous supposition of the ancients, that it was formed by an expansion of a nerve.

Aphysis. A process of a bone; from ἀποφεύ to proceed from.

A synonym of process.

Arachnoidēs. A net-like membrane; from ἀράχνη a spider, and είδος likeness.

Artery. From ἀνε air, and τηρεῖν to keep; because the ancients supposed that only air was contained in them.

Arthrodiā. A species of connexion of bones; from ἀρθροῖν to articulate.

Artytēnōidēs. The name of two cartilages of the larynx; also applied to some muscles of the larynx; from ἀποργάνω a funnel, and είδος shape.

Astragalus. A bone of the tarso; so called from its resemblance to a die used in ancient games, from ἀσπαγαλός a cockal or die.

Atlas. The first vertebra of the neck; so called, because it sustains the head; from the fable of Atlas being supposed to have
have supported the world; or from *ωροσ to sustain, because it sustains the head.

Αζύγος. A term applied to parts without a fellow, from *α priv. and ζύγος a yoke, because it has no fellow.

Brachium. The arm; hence of brachii, brachialis externus, &c. from βραχύς short, because in a well-proportioned man it is shorter from the shoulder to the hands than from the hip to the feet.

Brachia. The ramifications of the trachea or windpipe; from βραχύς to pour, because the ancients believed that the fluids were conveyed into the stomach by the bronchia.

Bursa. A bag; from βύρα: generally applied to the bursae mucosae.

Bursalogy. The doctrine of the bursae mucosae; from βύρα a bag, and λόγος a discourse.

Calvária. The top of the cranium; from calvus bald.

Cancelli. Lattice work; generally applied to the reticular substance in bones.

Cardia. The superior opening of the stomach; from καρδία the heart, because it is situated near it.

Carotid. The name of some arteries of the neck and head; from καρω to cause to sleep; for, if tied with a ligature, the animal becomes comatose, or has the appearance of being asleep.

Carpus. Καρπός; the wrist.

Chorion. The external membrane of the fetus in utero. Χορίον, from χωρίον to escape, because it always escapes from the uterus with the fetus.

Choroid.
CHOROID. From χορίος the chorion, and εἰς ὁς likeness; so called on account of the many blood-vessels resembling the chorion.

CLAVICLE. The clavicle or collar-bone, a diminutive of κλᾶσις a key; so called from its resemblance to an ancient key.

CLINOID. Four processes of the sphenoid bone; are so called, from κλίνω a bed, and εἰς ὁς likeness, from their supposed resemblance to a couch.

CLITORIS. A part of the female pudenda, enclosed by the labia majora; from κλίτιον a key; so called from its resemblance to an ancient key.

CLAVICULA. The clavicle or collar-bone, a diminutive of clavis a key; so called from its resemblance to an ancient key.

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CLITORIS. A part of the female pudenda, enclosed by the labia majora; from κλίτιον a key; so called from its resemblance to an ancient key.
**CRIBRIFORM.** From *cribrum* a sieve, it being perforated like a sieve.

**Cricoid.** Annular, round, like a ring; from κρίκος a ring, and εἴδος likeness.

**Crura.** The plural of *crus*, a leg or root; applied to some parts of the body, from their resemblance to a leg or root, as *crura cerebelli*, &c.

**Cuboides.** *A bone of the foot*; from κυβίς a cube, and εἴδος likeness; because it resembles a cube.

**Cuneiform.** *Some bones are so called; from κυνης a wedge, and forma likeness; being shaped like a wedge.*

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**D**

**Dartos.** *A muscle of the scrotum*; from δεισω to excoriate.

**Deltoid.** *A muscle resembling the Greek letter, Δ; from Δ, and εἴδος resemblance.*

**Diaphragm.** *The muscle which separates the thorax from the abdomen; from διαφαρτω to divide.*

**Diarthrosis.** *A movable connexion of bones; from διαφιβω to articulate.*

**Diaphragm.** *From δις twice, and γαστρε a belly; having two bellies.*

**Diploë.** *The spongy substance between the two tables of the skull; from διπλω to double.*

**Duodenum.** *The first portion of the small intestines; so called because the ancients supposed that it did not exceed the breadth of twelve fingers; from δυοδεκα, consisting of twelve.*

**Duræ Mater.** *The outermost membrane of the brain; called dura, because it is much harder than the other membranes, and mater, from the ancients supposing it was the source of all the other membranes.*
EMBRYO. The child in the womb is so called before the fifth month, after which it is termed foetus; from ἑκερω to bud forth.

ENARTHROSIS. An articulation of bones; from ἐν in, and ἀγγεῖον a joint or articulation.

ENTERIC. Belonging to the intestines; from ἐντρῷ an entrail or intestine.

EPIDERMIC. The scarf or outermost skin; from ἐπί upon, and ἄπερ the skin.

EPIDIDYMIS. The small oblong body which lies above the testicles; from ἐπί upon, and δίδυμος a testicle.

EPIGASTRIC. The superior part of the abdomen; from ἐπί upon, and γάστρη the stomach.

EPIGLOTTIS. A cartilage of the larynx so called; from ἐπί upon, and γλῶττις the aperture of the larynx, being situated upon the glottis.

EPHYYSIS. A portion of bone growing upon another bone, but separated from it by cartilage; from ἐπί upon, and φυεῖν to grow.

EPITHTON. The membranous viscus of the abdomen, which covers the intestines, and hangs to the bottom of the stomach; from ἐπιθέω to swim upon.

EPISTROPHÆUS. The second vertebra of the neck; from ἐπιστροφᾶω to turn round, because the head is turned upon it.

ETHMOID. From ἑθυς a sieve, and ἑθὺς resemblance; being perforated like a sieve.

FASCIA. An expansion of a muscle, enclosing others like a band; from σφάκτα a bundle.

FALCIFORM. Shaped like a scythe; from σάκτα a scythe.

FASCICULUS.
FASCICULUS. A little bundle; dim. of fascis a bundle.

FAUCES. The plural of faux the top of the throat.

G

GALACTOPHOROUS. From γάλας milk, and φέρω to carry; conveying the milk.

GANGLION. Γαγγλίον, a knot in the course of a nerve.

GASTROCNEMIUS. The muscle which forms the thick of the leg; from γαστρά a belly, and κονήμων the leg.

GENIO. Names compounded with this word belong to muscles which are attached to the chin, as genio-glossus—genio-hyoideus—genio-pharyngeus, &c.; from γένιον the chin.

GENU. The knee; from γονύ, σαρήν ή eis γονό νοτίαν, because by it the body is bent towards the earth.

GINOLÝMUS. An articulation; from γινεῖλω a hinge.

GLENOID cavity. From γλενός a cavity; and ἴδος resemblance.

GLOMER. A convoluted bundle of vessels; generally applied to the lymphatic glands.

GLOSSO. Names compounded with this word belong to muscles, which are attached to the tongue; as glossio-pharyngeus—glossio-staphylinus, &c.; from γλῶσσα the tongue.

GLOTTIS. The superior opening of the larynx at the bottom of the tongue; from γλωττία the tongue.

GLUTEUS. The name of a muscle; from γλυττός the buttocks.

COMPÓPHOSIS. Γόμφωσις inclination, a species of immovable connexion of bones; from γόμφως a nail, because one bone is fixed in another bone like a nail in a board.

H

HARMÔNIA. A species of immovable connexion of bones; ἀρμονία, from ἀρμός to fit together.

HELIX.
HELIX. The outward circle of the ear; from ἑλικός to turn about.

HEPARK. The liver. Ἑπάρκη, an abdominal viscus.

HYALID. From ὑάλος glass, and εἰδὼς likeness; the capsule of the vitreous humour of the eye is so called, from its transparent and glassy appearance.

HYDROLOGY. The doctrine of the fluids; from ὄξυς a fluid, and ὧδος a discourse.

HYMEN. The membrane situated at the entrance of the virgin vagina; from ὕμην Hymen, the god of marriage.

HYO. Names compounded with this word belong to muscles which are attached to the os hyoides, as hyo-glossus—hyopharyngeus—hyo-thyroides; from ὑόδος the os hyoides.

HYOIDES. A bone of the tongue, so called from its resemblance to the Greek ν; from ν, and ὑόδος resemblance.

HYPOCHONDRIUM. That part of the body which lies under the cartilages of the spurious ribs; from ὑπό under, and ὑόδος a cartilage.

HYPOGASTRIC. The lower region of the fore part of the abdomen; from ὑπό under, and ἔγαστρον the stomach.

ILÉUM. A portion of the small intestines; from ἰλέω to turn; being always convoluted.

ILLIUM. Part of the os innominatum, so called because it supports the Ἄλεια or small intestines.

ISCHIUM. The part of the os innominatum upon which we sit; from ἵσχιος to sustain.

LACTUNA. The excretory duct of the glands of the urethra and vagina; from latus a channel.
LAMBDOIDAL future. So called because it is shaped like the letter λ; from λ, and εἶδος resemblance.

LARYNX. The superior part of the windpipe; ἀρνητὴς the larynx.

MASSETER. A muscle of the face, which assists in the action of chewing; from μασσαμας to chew.

MASTOID. From μασος a breast, and εἶδος likeness; shaped like a nipple or breast.

MEDIASTINUM. The production of the pleura, which divides the thorax into two cavities; from medium the middle, quasi in medio stare.

MESENTERY. The membranes to which the intestines are attached; from μεσος the middle, and ντεμος an intestine, because it is in the middle of the intestines.

MESOCOLON. That part of the mesentery in the middle of the colon; from μεσος the middle, and κολον the colon.

METACARPUS. That part of the hand between the carpus and fingers; from μετα after, and καρπος the wrist.

METATARSUS. That part of the foot between the tarsus and toes; from μετα after, and ταρπος the tarsus.

MYLO. Names compounded with this word belong to muscles which are attached near the grinders, as mylo-hyoides—mylo-pharyngeus, &c.; from μυλα a grinder tooth.

MYOLOGY. The doctrine of the muscles; from μυς a muscle, and κοινός a discourse.

NEUROLOGY. The doctrine of the nerves; from νευρός a nerve, and κοινός a discourse.

ODONTOID
ODONTOID. Tooth-like; om. odos a toothy and sídos resemblance.

CÉSOPHÁGUS. The canal leading from the pharynx to the stomach; from oιω to carry, and φαγω to eat; because it carries the food into the stomach.

OLECRANON. The elbow, or head of the ulna; from ὁδηρν the cubit, and χρανος the head.

OMENTUM. An abdominal viscus; so called from omen a guest; because the tooth-layers prophesied from the inspection of this part.

OMO. Names compounded with this word belong to muscles which are attached to the scapula, as ὀμο-χυοεδος, &c.; from ὀμος the shoulder.

OMOPLÁTA. The scapula or shoulder-blade; from ὀμος the shoulder, and γλωττος broad.

ORGASM. A violent hallucination, attended with turgescence in the parts; from ὀφυως to desire vehemently.

OSTEOLOGY. The doctrine of the bones; from ὀσεος a bone, and λογος a discourse.

PANCRÉAS. A viscus of the abdomen; so called from its fleshly consistence; from μαυ all, and άβρας flesh.

PARENCHÝMA. The substance connecting together the vessels, &c. of the lungs is so called, from μαπεγκως to pour through.

PAROTID GLAND; from μαπα near, and ους the ear; because it is situated near the ear.

PELVIS. A bony cavity shaped like a basoon; from μελως a basoon.

PERICARDIUM. The membrane which surrounds the heart; from μελι around, and καρδια the heart.
PERICRANION. *The membrane which covers the bones of the skull; from περι around, and κρανιον the cranium or head.

PERIOSTEUM. *The membrane which surrounds the bones; from περι around, and στενον a bone.

PERISTALTIC motion of the intestines; from ἑρπετεινω to contract.

PERITONEUM. *The membrane lining the abdomen, and covering its visera; from ἔπητειν to extend around.

PHALANX. *The bones of the fingers and toes are called phalanxes, from their regular situation, like a φαλαξες, or army of soldiers.

PHARYNX. *A membranous bag at the end of the mouth; ἐπο τὸ φαριν, because it conveys the food into the stomach.

PHRENIC or diaphragmatic nerve. *Φρενες the diaphragm; from φρεν the mind, because the ancients supposed it to be the seat of the mind.

PHYSIOLOGY. *That part of natural history which treats of the actions and functions of an animated body; from φυσις nature; and λογος a discourse.

P' A MATER. *The innermost membrane of the brain; so called because it embraces the brain as a good mother folds her child.

PLACENTA. *The after birth; from μακας a cake, and from its resemblance to a cake.

PLATYSMA-MYOIDES. *A muscle of the neck; from μακας broad, μυς a muscle, and μοιδος resemblance.

PLEURA. *The membrane lining the thorax; αμπελια the side.

PLEXUS. *A kind of net-work of vessels or nerves; from πλεξεω to weave together.

PREPUCE, or foreskin of the penis; from πρεπυτο to cut off before, because the eastern nations usually cut it off.
Psoas. A muscle so called; from the loin, being situated in the loins.

Pterygoïd process. From ἄρνη a pen or wing, and ἄνα like a pen or wing.

Pylorus. The lower orifice of the stomach, which opens into the intestines; from πυλόω to guard an entrance, because it guards as it were the entrance of the bowels.

Raphé. A future. Ἐπιφες; from βαπτίζω to few.

Renés. The kidneys, ἀπο τι βυτ, because through them the urine flows.

Retina. The net-like expansion of the optic nerve, on the inner surface of the eye; from rete a net.

Rhomboïdeus. A muscle so called from its shape; from ἱμή a geometrical figure, whose sides are equal but not right angled, and ἰδος a likeness.

Rotula. The knee-pan; a dim. of ῥότα a wheel, from its shape.

Sacrum. A bone so called; from facet sacred, because it was once offered in sacrifices.

Salvatella. A vein of the foot, so called because it was thought the opening it preserved health, and cured melancholy; from σάλβα to preserve.

Sanguis. The blood; ἀπο τι σαίν γυμ, because it preserves the body.

Sartorius. A muscle so called, because tailors cross their legs with it; from sartor a tailor.

Scapha. The depression of the outer ear before the anti-helix; from σκαφή.
a little boat or skiff; from σκάφαιν to dig, because skiffs were formerly only trees made hollow.

**Scaphoides.** A bone of the carpus, so called from its resemblance to a skiff; from σκάφη a skiff, and αὐτὸς a likeness.

**Sclerotic.** A term applied to the outermost or hardest membrane of the eye; from σκληρός to make hard.

**Sella turcica.** Part of the sphenoid is so called from its supposed resemblance to a Turkish saddle.

**Sesamoid bones.** From σεσαμόν an Indian grain, and αὐτὸς a likeness; from their resemblance to the semen fesami.

**Sigmoid.** Parts are so called from their resemblance to the letter Σ; from Σ, the letter Sigma, and αὐτὸς likeness.

**Sphenoid.** From σφένα a wedge, and αὐτὸς likeness; shaped like a wedge.

**Sphincter.** The name of several muscles whose office it is to shut up the aperture around which they are placed; from σφίγγω to shut up.

**Splanchnology.** The doctrine of the viscerā; from σπλαγχνικός an entrail, and λόγος a discourse.

**Symphysis.** A connexion of bones; from συμφύειν to grow together.

**Synarthrosis.** A connexion of bones; from συν with, and αὐτὸς a joint.

**Synchondrosis.** A species of union of bones by means of cartilage; from συν with, and χονδρές a cartilage.

**Syndesmology.** The doctrine of the ligaments; from συνδέομαι a ligament, and λόγος a discourse.

**Syndesmosis.** A species of union of bones by means of ligament; from συνδέομαι a ligament.

**Syneurosis.** A species of connexion of bones by means of membrane; from συν with, and νευρόν a nerve; because membranes,
Branes, ligaments, and tendons, were by the ancients con-
idered as nerves.

**SYSSARCÓSIS.** A *species of connexion of bones by means of muscles*; from συστελλω with, and συστελλω flesh.

**SYSTÔLE.** The contractile motion of the heart and arteries; from συστελλω to contract. 

**TENDON.** From τείνω to extend.

**THECA.** The spinal canal is called *theca vertebralis*; from θηκη, from τεινω to put.

**THORAX.** Ῡως. The breast or chest; from ἱππω to leap, because in it the heart beats.

**THYRO.** Names compounded with this word belong to mus-
cles which are attached to the thyroid cartilage.

**THYROID.** From ἰππος a shield, and ἵδωs likeness; shaped like a shield.

**TRACHEA.** *The windpipe*, so called from its roughness; from τραχύς rough.

**TRAPEZOID.** From τραγείδιον a four-sided figure, and ἵδωs likeness; resembling a trapezium.

**TROCHANTER.** A process of the thigh bone, so called from τρεχω to run, because the muscles inserted in these parts perform the office of running.

**TROCHLEA.** A kind of cartilaginous pulley, through which the tendon of one of the muscles of the eye passes; from τρεχω to run.

**TROCHOIDES.** *A species of articulation of bones*; from τροχος a wheel, and ἵδωs likeness; because one bone moves round upon another, like a wheel upon axle-tree.

**ULNA.**
INDEX.

U

Ulna. A name for the cubit; from uln, the cubit.

Ureter. The canal which conveys the urine from the kidney to the bladder; from ure, urine.

Urethra. The passage through which the urine passes from the bladder; from ure, the urine.

Uvea. The posterior lamina of the iris, so called because in beasts (which the ancients chiefly dissected) it is of the colour of unripe grapes; from uve, an unripe grape.

Uvula. The glandular substance which hangs down from the middle of the soft palate; so called from its resemblance to a grape. A dim. of uve, a grape.

Valves. Little membranes that prevent the return of the blood in the veins and arteries; from valvæ, folding doors.

Vertebrae. The bones of the spine are so called, from verto to turn.

Vomer. A bone of the nose, so called from its resemblance to a ploughshare; from vomo to turn up.

X

Xiphoïd. So called from the resemblance to a sword; from ξιφος a sword, and ειδος likeness.

Zygoma. The cavity under the zygomatic process of the temporal bone; from zygos, a yoke, because it transmits the tendon of the temporal muscle like unto a yoke.
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- Interspinous ligaments
- Interspinal spaces
- Intervertebral joints
- Intervertebral discs
- Intercostales interni
- Intercostales externi
- Intercostales aterum ventriculi
- Intercostales aterum uteri
- Intercostales aterum viscerum

**Hair**
- Hairs
- Hairs, filled with mercury
- Hairs, with fine injection
- Hairs, for arteries and veins

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