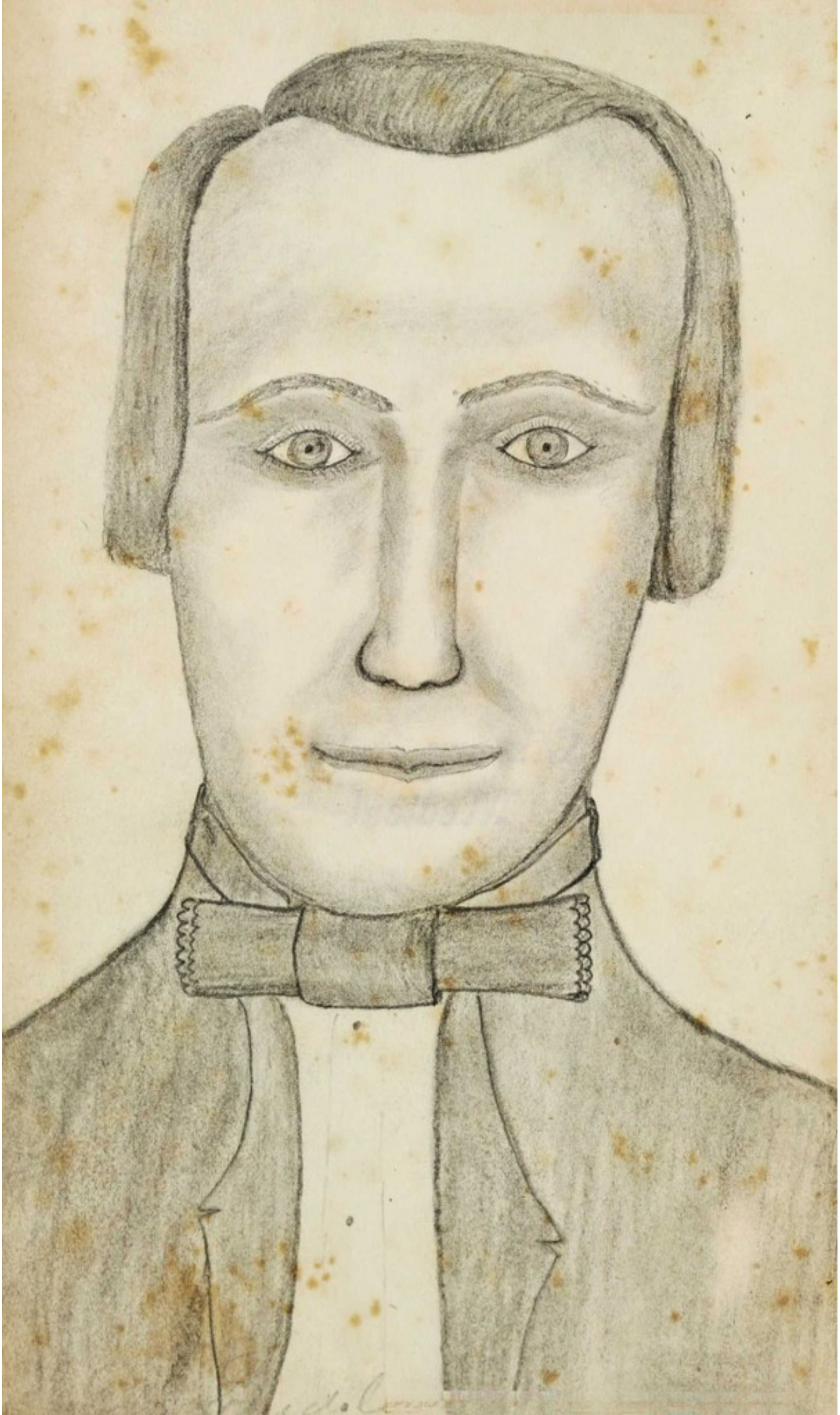
A manual of examinations upon anatomy and physiology, surgery, practice of medicine, chemistry, materia medica, obstetrics, etc : designed for the use of students of medicine throughout the United States / by J.L. Ludlow, M.D.

STUDENT'S MANUAL



THE

STUDENT'S MANUAL.

A

MANUAL OF EXAMINATIONS

UPON

ANATOMY AND PHYSIOLOGY, SURGERY,
PRACTICE OF MEDICINE, CHEMISTRY, MATERIA MEDICA,
OBSTETRICS, ETC.

DESIGNED FOR THE USE OF STUDENTS OF MEDICINE THROUGHOUT THE UNITED STATES.

BY

J. L. LUDLOW, M. D.

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PREFACE.

In offering this volume to Students of Medicine, we claim for it nothing more than its title indicates — "A MANUAL OF EXAMINATIONS."

Our object is, simply, to give at a glance the principal points necessary to guide the Student in the prosecution of his studies, and to revive his recollection of subjects treated upon in more voluminous works.

Philadelphia, June, 1844.

1846

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STUDENT'S MANUAL

OF

EXAMINATIONS.

PART I.

ANATOMY AND PHYSIOLOGY IN GENERAL.

Q. What is Human Anatomy? — *A.* Human Anatomy is that science which teaches the structure of the human body.

Q. What is Physiology? — *A.* Physiology is that science which teaches us the functions of the body, or the uses of its parts.

Q. What is the general division of the component parts of the human body? — *A.* They are divided into solids and fluids.

Q. Enumerate the solids of the body. — *A.* The solids are the bones, cartilages, ligaments, muscles, cellular substance, membranes, vessels, nerves, glands, viscera, adipose substance, &c.

Q. What are bones? — *A.* The most hard and inflexible parts of the body; affording support and protection to all the rest.

Q. What are cartilages? — *A.* The polished, elastic substances covering the ends of bones; and, excepting these, harder than any other parts.

Q. What are ligaments? — *A.* Fine and inelastic flexible bodies connecting bones.

Q. What are membranes? — *A.* Sheets of interwoven fibres.

Q. What are vessels? — *A.* Long, cylindrical, and flexible tubes, dividing and subdividing into smaller branches. They are of three kinds; 1st, arteries; 2d, veins; 3d, lymphatics.

Q. What are nerves? — *A.* Bundles of small white cords, proceeding to or from the brain and spinal marrow.

Q. What are glands? — *A.* Distinct bodies formed by a peculiar arrangement of arteries, veins, lymphatics, and nerves, in a cellular parenchyma. There are two kinds of glands: — conglomerate and conglobate. The conglobate are for a peculiar secretion, as the salivary glands. The conglomerate are appendages of the absorbent system.

Q. What are the viscera? — *A.* Complicated organs, somewhat loosely contained in the cavities of the body; such as the stomach, liver, &c.

Q. Enumerate the fluids of the human body. — *A.* The blood, perspirable matter, urine, sebaceous matter, animal oil, ceruminous matter, saliva, tears, mucus, bile, gastric juice, semen, synovia, pancreatic juice, milk, chyle, &c.

Q. What is blood? — *A.* A fluid which circulates through the veins and arteries, which supplies the body with nutriment, and from which all its other fluids are secreted.

Q. What is the urine? — *A.* A fluid secreted by the kidneys.

Q. What is perspirable matter? — *A.* A fluid exhaled from the minute vessels of the skin.

Q. What is ceruminous matter? — *A.* The cerumen is a fluid secreted by the ceruminous glands of the meatus auditorius externus.

Q. What is sebaceous matter? — *A.* A soapy fluid secreted by the sebaceous glands of the skin.

Q. What is animal oil? — *A.* An oleaginous fluid which occupies the cells of the adipose substance and the internal cavities of the bones, where it is called the medullary substance or marrow.

Q. What is saliva? — *A.* A fluid secreted by the salivary glands.

Q. What are the tears? — *A.* A fluid secreted by the lachrymal gland in each orbit.

Q. What is the bile? — *A.* A fluid secreted by the liver.

Q. What is mucus? — *A.* A fluid secreted by mucous glands, &c.

Q. What is the gastric juice? — *A.* A fluid secreted by the stomach.

Q. What is the semen? — *A.* A fluid secreted by the testes.

Q. What is the synovia? — *A.* A fluid which lubricates the surfaces of joints.

Q. What is the pancreatic fluid? — *A.* A fluid secreted by the pancreas, supposed to be salivary.

Q. By what is milk secreted? — *A.* By the glands of the female breasts.

Q. What is the chyle? — *A.* A milky fluid elaborated in the process of digestion.

Q. What are meant by the terms osteology, osteogeny, syndesmology, chondrology, myology, adenology, bursalogy, angiology, and neurology? — *A.* Osteology treats of the form of perfect bones. Osteogeny, of the growth of bones. Syndesmology, of the ligaments. Chondrology, of cartilages. Myology, of muscles. Adenology, of glands. Splanchnology, of the viscera and organs of sense. Bursalogy, of the bursæ mucosæ. Angiology, of the vessels; and Neurology, of the nerves.

BONES IN GENERAL.

Q. What is a human skeleton? — *A.* The bony framework of the human body.

Q. What is the periosteum? — *A.* A membrane which covers the bones, and from which they in part derive their nourishment.

Q. What is the perichondrium? — *A.* The membrane which invests the cartilages.

Q. What are the uses of the periosteum? — *A.* To strengthen the union of bones with their epiphyses, affords attachments for ligaments and mnscles, permits the muscles to glide smoothly over the bones, and conducts and supports vessels in their passage to the bones.

Q. What is the periosteum internus? — *A.* A delicate membrane which lines the internal cavities of bones.

Q. What is the use of the periosteum internus? — *A.* To form cells to contain the marrow.

Q. What are the general classes of bones? — *A.* They are divided into three classes; viz., the long or cylindrical; the broad or flat; and the thick bones.

Q. What are the epiphyses of bones? — A portion of bone separated from the body of a bone by a cartilage which becomes united to the bone by the ossification of this cartilage.

Q. What is the general structure of epiphyses? — *A.* Spongy.

Q. What are the diaphyses of bones? — *A.* The middle portions of the long bones placed between the epiphyses.

Q. What is the general structure of the diaphyses? — *A.* Internally they are reticulated, exteriorly they are compact.

Q. What are the apophyses of bones? — *A.* Projections, or distinct portions of bones.

Q. How do apophyses differ from epiphyses? — *A.* In being

less easily separable from the bone to which they belong — no layer of cartilages being interposed between them.

Q. What is the intimate structure of all bones? — *A.* They consist of a cellular, reticular, and vascular parenchyma; and of osseous matter deposited in it: their base, therefore, being the same with that of the muscles, nerves, and soft parts of the body.

Q. Are bones vascular? — *A.* Yes; but more especially during the ossific process.

Q. Where do their vessels enter? — *A.* By numerous small foramina all over their external surface.

Q. What is the best demonstration of the vascularity of bones? — *A.* From the tinge which they receive in animals with whose food the madder has been mixed.

Q. What is the medulla of bones? — *A.* An oleaginous fluid deposited in their internal cells.

Q. How is it secreted? — *A.* By minute arteries which ramify upon the sacs of the internal periosteum.

Q. Where do the medullary arteries of bones penetrate them? — *A.* Generally about their middle, by oblique canals.

Q. What is the use of the medulla? — *A.* This is not accurately ascertained. In Soemmering's opinion it tends to render the bones comparatively lighter.

Q. What are foramina? — *A.* Holes perforating the substance of bones, without leaving any long track within their substance.

Q. What are canals? — *A.* Foramina contained within the substance of bones.

Q. What are sinuses? — *A.* Great cavities in bones with small openings.

Q. What are sinuosities? — *A.* Superficial, but broad, irregular depressions.

Q. What are furrows? — *A.* Long, narrow, and superficial canals.

Q. What are notches? — *A.* Cavities in the margin of bones.

Q. What are fossæ? — *A.* Deep and large cavities upon their surface.

Q. What are pits? — *A.* Small though deep depressions.

Q. What are glenoid cavities? — *A.* Smooth, shallow cavities for articulation.

Q. What are cotyloid cavities? — *A.* Deep and smooth ones for articulation.

Q. What are tubercles? — *A.* Small eminences.

Q. What are tuberosities? — *A.* Greater and rough elevations.

Q. What are spines? — *A.* Long projections upon the bone.

Q. What are heads? — *A.* The round tops of bones.

Q. What are necks? — *A.* The narrow portions of bones beneath their heads.

Q. What are processes? — *A.* Short projecting portions of bones.

OSTEOGENY.

Q. What is the name of that division of anatomy which treats of the growth of bones? — *A.* Osteogeny.

Q. How are bones formed? — *A.* By the deposition of ossific matter, either in membranes or cartilages.

Q. What are the constituent parts of bones? — *A.* A cellular and vascular parenchyma, and phosphate of lime with other saline combinations.

Q. What are the phenomena of ossification? — *A.* The arteries of the part about to undergo this process become dilated; though formerly transparent they now assume a red colour; the cartilage itself is not transmuted into bone, but becomes gradually absorbed whilst the ossific matter is deposited in its place.

Q. How does ossification take place in the diaphysis of long bones? — *A.* It begins in the middle, forming flat rings between the external and internal periosteum.

Q. How does ossification take place in the epiphysis of long bones? — *A.* In distinct points, which gradnally unite.

Q. How does ossification take place in the bones of the cranium? — *A.* It assumes the appearance of radii diverging from a centre in several points.

Q. What bones are perfectly formed at birth?—*A.* The small bones of the ear.

Q. What parts of bones are latest ossified? — *A.* The epiphysis.

Q. When does ossification in the epiphysis terminate? — *A.* From the seventh to the fourteenth year.

Q. When are the epiphysis generally completely united to the diaphysis? — *A.* About the twenty-first year.

BONES INDIVIDUALLY.

Trunk.

Q. Into what parts are the bones of the trunk divided? — *A.* Into the spine, thorax, and pelvis.

Spine.

Q. What is the situation of the spine? — *A.* At the posterior part of the trunk.

Q. What is its general form? — *A.* That of two inverted pyramids.

Q. What is the general division of the spine? — *A.* Into the true and false vertebræ.

Q. What is the number of the true vertebræ?—*A.* Twenty-four.

Q. Into what classes are the true vertebræ divided? — *A.* Into those of the neck or cervical, those of the back or dorsal, and those of the loins or lumbar vertebræ.

Q. Of what parts do the vertebræ in general consist? — *A.* Each has a body, a bony ring, and seven processes.

Q. What is the situation and form of the bodies of the vertebræ? — *A.* They are placed anteriorly, and represent a portion of a cylinder cut transversely, which is somewhat round anteriorly, and sloped posteriorly.

Q. What are the names of the vertebral processes? — *A.* Four of them are oblique or articular, consisting of two superior and two inferior; three serve the purpose of muscular attachment, of which two, from their situation, are called transverse, and one spinous.

Q. Where is the ring of the vertebræ situated? — *A.* Immediately behind the body, and within the processes.

Q. What do the rings of the vertebræ when connected form? — *A.* The vertebral canal.

Q. Where are the oblique or articular processes of the vertebræ situated? — *A.* Above and below the posterior part of the body.

Q. Where are the transverse processes situated? — *A.* At the sides of the ring.

Q. Where are the spinous processes situated? — *A.* At the back of the ring.

Q. Where are the notches of the vertebræ situated? — *A.* On each side, between the body and ring, there are four notches, two being situated superiorly, and two inferiorly.

Q. What is the use of these notches? — *A.* When two vertebræ are joined together, these notches form holes which serve to transmit the spinal nerves.

Q. What is the internal structure of the vertebræ? — *A.* They are of a spongy texture.

Q. How are the vertebræ connected?—*A.* They are connected to each other by their bodies, and by their articular processes.

Cervical Vertebræ.

Q. What is the peculiar form of the bodies of the cervical vertebræ? — *A.* They are flattened anteriorly, and are thinner than the other vertebræ, their upper sides are concave from side to side, and their lower hollowed from before backward.

Q. How do the spinous processes of the cervical in general differ from the rest? — *A.* They are more straight, and forked at the extremity.

Q. How do the transverse processes of the cervical differ from the rest? — *A.* They are very short, slightly bifurcated, and perforated perpendicularly at their bases; they are also grooved in the upper side.

Q. How do their oblique processes differ from the rest of the vertebræ? — *A.* They are more oblique, their cartilaginous sides in the upper ones being turned backward and upward, in the inferior ones forward and downward.

Atlas.

Q. What is the name of the first vertebræ? — *A.* It is called the atlas.

Q. What parts common to the other vertebræ are wanting in the atlas? — *A.* It has no body nor spinous process; it is a simple ring.

Q. How does the ring of the atlas differ from those of the rest? — *A.* It is much larger.

Q. What is the name of the anterior and posterior parts of the atlas? — *A.* Anterior and posterior archs.

Q. To what part of the atlas is the tooth-like process of the second vertebræ fixed? — *A.* To the posterior side of its anterior arch.

Q. How do the transverse processes of the atlas differ from those of the rest? — *A.* They are longer, and terminate in an obtuse point.

Q. How do the superior articular processes of the atlas differ from those of the rest? — *A.* They are larger, and form oblong horizontal cavities, of which the anterior extremities are nearest.

Q. How do the inferior articular processes differ from those of the rest? — They are round, broad, and sloped inward.

Q. What is seen immediately behind the superior articular processes of the atlas? — *A.* A long groove.

Q. To what part of the atlas is the transverse ligament of the tooth-like process fixed? — *A.* It is fixed to tuberosities on the inner sides of its anterior arch.

Q. To what part of the atlas are the lateral ligaments fixed? — *A.* They are fixed on the inner side of the arch, external to the transverse ligament.

Dentata.

Q. What is the name of the second cervical vertebræ? — *A.* Vertebra dentata.

Q. How does the body of the dentata differ from those of the rest? — *A.* Its body is narrower and longer, and has upon its upper part a pivot or axis called odontoides or dens.

Q. What are the marks upon this process? — *A.* Two for the transverse ligaments upon its posterior part; one on its apex for the middle straight ligament; one on each side for the moderator ligaments.

Q. How does the spinous process of the dentata differ from those of the rest? — *A.* It is short, broad, and much forked, its lower side is hollowed by an angular cavity, and divided into two lateral parts by a bony line.

Q. How do the transverse processes of this bone differ from the rest? — *A.* They are very short, slightly turned downward, and perforated obliquely.

Q. How do the superior articular processes of this vertebra differ from those of the rest? — *A.* They are very large, a little convex, placed nearly horizontally on each side of the tooth-like process.

Last Cervical Vertebræ.

Q. How does the body of the last cervical vertebra differ from those of the rest? — *A.* It is the largest of this class; its lower side is nearly flat.

Q. How does its spinous process differ from the rest? — *A.* It is larger than any of them.

Q. How does its transverse processes differ? — *A.* They are longer, placed further back, and are less grooved; their foramina also are sometimes double.

Dorsal Vertebræ.

Q. What is peculiar to the bodies of the dorsal vertebræ in general? — *A.* They are most convex anteriorly, their upper and lower surfaces are nearly flat, and on each side there are two little articular surfaces, one above and one below, to receive the heads of the ribs.

Q. How do the spinous processes differ from the rest? — *A.* They are long and sharp superiorly; slightly hollowed inferiorly, and considerably inclined downward.

Q. How do the articular processes differ? — *A.* They are placed almost directly above and below the transverse, and are perpendicular rather than oblique; the sides of the superior ones are slightly convex, and turned backward, those of the inferior the reverse.

Q. How do the transverse processes differ? — *A.* They are directed obliquely backwards and downwards; they are pretty long superiorly, but diminish as they descend, those of the twelfth being very small; the anterior part of their tips are cartilaginous, and receive the tubercles of the ribs; these depressions diminish as they descend, and do not exist in the two last.

Q. How do the great foramina of the dorsal vertebræ differ from those of the rest? — *A.* The rings become rounder and narrower as they descend from the first to the tenth, where they again begin to be more flat.

Q. How are the four first dorsal vertebræ distinguished from the rest of the same class? — *A.* The four first are somewhat flattened anteriorly.

Q. How are the two last dorsal vertebræ distinguished from the rest of the same class? — *A.* In the last two the transverse processes have no articular depression.

Lumbar Vertebræ.

Q. How are the bodies of the lumbar vertebræ distinguished from those of the dorsal and cervical? — *A.* They are much the largest; they are somewhat contracted about the middle, and their edges are prominent.

Q. How are the spinous processes distinguished from those of the rest? — *A.* They are short, straight, and broad on each side, but narrow above and below; that of the last being shorter and narrower than those of the rest.

Q. How are the transverse processes distinguished from the rest? — *A.* They are longer and more slender, being flattened anteriorly and posteriorly; they increase in length from the first to the third, then diminish to the fifth.

Q. How are the articular processes distinguished from the rest? — *A.* The superior ones are concave lengthwise, the inferior convex lengthwise, and nearer each other than the superior, their convex articulating surfaces being turned outward from each other.

Q. What is the shape of the great foramina of the lumbar vertebræ? — *A.* The rings are flattened anteriorly, and angular posteriorly.

Os Sacrum.

Q. What is the situation of the os sacrum? — *A.* It is placed at the posterior and lower part of the trunk, below the true vertebræ.

Q. What is its form? — *A.* It resembles a pyramid with the base upward and apex downward; having an anterior or concave side, a posterior or convex one, and two edges.

Q. Of how many portions does the os sacrum consist in the fœtus? — *A.* Of five; the points of separation between which are marked by prominent lines in the adult.

Q. Where is the canal of the os sacrum situated? — *A.* Immediately behind its body.

Q. What is its form? — *A.* It is triangular.

Q. How many foramina open from the canal of the sacrum anteriorly? — *A.* Four.

Q. How many foramina posteriorly? — *A.* The same number.

Q. What do the anterior foramina transmit? — *A.* The great sacral nerves.

Q. How many articular processes has this bone? — *A.* Two; placed at its base immediately behind its body.

Q. What is the form of the lateral parts of the sacrum? — *A.* They are large and broad superiorly; and form an uneven narrow surface as they descend.

Q. What articular surfaces are seen on the lateral parts? — *A.* They have on each side a large articulating surface for its union with the ossa innominata.

Q. What are the connexions of the os sacrum? — *A.* It is connected laterally to the ossa innominata, superiorly to the last lumbar vertebræ, and inferiorly to the os coccygis.

Os Coccygis.

Q. What is the situation of the os coccygis? — *A.* It is placed immediately below the sacrum.

Q. What is its form? — *A.* It resembles the os sacrum.

Q. Of how many portions does it consist? — *A.* It consists of four or five pieces.

Q. Where are the shoulders of the os coccygis situated? — *A.* At its upper portion.

Bones of the Pelvis.

Q. What is the situation of the pelvis? — *A.* At the lower part of the trunk.

Q. What is its form? — *A.* Like a basin, but very irregular.

Q. Of what bones does the pelvis consist? — *A.* Of the os sacrum posteriorly, os coccygis inferiorly, and ossa innominata at its lateral and anterior parts.

Q. How are the ossa innominata subdivided? — *A.* Each is subdivided into three portions; namely, the os ilium, os pubis, and os ischium; from being separable in young subjects.

Os Ilium.

Q. Where is the os ilium situated? — *A.* At the superior part of the os innominatum.

Q. What is its general form? — *A.* Triangular, with unequally convex and concave sides.

Q. How is it divided? — *A.* Into a crista, anterior and posterior margin; internal and external surface, and base.

Q. What are the various marks upon this bone? — *A.* The crista or upper edge with its internal and external lips, an anterior superior, and posterior superior spinous process, and an anterior inferior and posterior inferior spinous process.

Q. What large notch have we partially upon the posterior portion of this bone? — *A.* The sacro-ischiatic.

Q. What are some of the muscular attachments of this bone? — *A.* At the anterior superior spinous process Poupart's ligament and Sartorius' muscle are attached, at the outer labia the fascia lata, latissimus dorsi and external oblique muscle, and posteriorly the gluteus maximus.

Q. How much does the ilium contribute to the acetabulum? — *A.* Somewhat less than two-fifths.

Q. What muscle is situated in the hollow of the inner side of the ileum? — *A.* The iliacus internus.

Q. What is the appearance of the posterior part of the inner side of this bone? — *A.* There are found two articular surfaces corresponding to those of the sacrum.

Os Ischium.

Q. What is the situation of the os ischium? — *A.* At the lowest part of the os innominatum.

Q. Into what parts is it divided? — *A.* Into a body, a tuberosity, and a ramus.

Q. Where is the spine of the ischium? — *A.* Upon the posterior part of its body.

Q. What is attached to its spinous process? — *A.* The lesser sacro-ischiatic ligament, and the coccygeus internally.

Q. Where is the tuberosity of the ischium? — *A.* At the

lower and posterior part of its body, where the ramus joins it; and it is that part of the bone upon which we rest in sitting.

Q. What muscles arise from the tuberosity of the ischium? — *A.* The quadratus femoris externally; the semimembranosis, semitendinosus, and biceps, about its middle part; the great head of the triceps from its inferior part; and the great sacro-ischiatic ligament is also attached to its inner part.

Q. What is the situation of its ramus? — *A.* It ascends forwards from the tuberosity.

Q. What are the notches of the os ischium? — *A.* By a very considerable notch anteriorly it contributes to form the obturator foramen; a notch posteriorly between the tuberosity and the spine for the obturator muscle; one laterally between the tuberosity and acetabulum for the obturator externus; and one anteriorly at the edge of the acetabulum for ligaments; vessels and fat is also noticed.

Os Pubis.

Q. What is the situation of the os pubis? — *A.* At the anterior part of the pelvis.

Q. Into what parts is the os pubis divided? — *A.* It is divided into a body and ramus.

Q. What is the situation of the body of the os pubis? — *A.* At its upper part.

Q. How much does the os pubis contribute to form the acetabulum? — *A.* One-fifth.

Q. How partially does the os pubis mark the limits of the pelvis? — *A.* By a line on the inner side of its body forming part of the brim of the pelvis.

Q. Where is the spine of the os pubis? — *A.* It is situated about an inch from the angle.

Q. What does its spine give attachment to? — *A.* To Poupart's ligament, and in part to the rectus and pyramidalis abdominis.

Q. To what foramen does the os pubis contribute? — *A.* The obturator foramen.

Q. Where is the angle of the os pubis? — *A.* It is situated anteriorly; formed by the junction of the body and ramus.

Q. Where is its ramus? — *A.* It descends from its angle.

Acetabulum.

Q. How is the acetabulum formed? — *A.* One-fifth is formed by the os pubis, rather more than two-fifths by the os ischium, and less than two-fifths by the os ilium.

Q. What part of the edge of the acetabulum is most prominent? — *A.* The upper part of its brim.

Q. What portion of the acetabulum is without cartilage? — *A.* Between its middle and its inferior notch.

Q. What is situated in that portion of the acetabulum which is uncovered by cartilage? — *A.* A ligament and synovial glands.

Q. Where is the notch of the acetabulum situated? — *A.* Towards its lower part.

Q. What is the use of this notch? — *A.* It transmits certain vessels, &c.

Q. What are the connexions of the os innominatum? — *A.* It is connected posteriorly to the os sacrum; anteriorly to its fellow, forming the symphysis pubis; and laterally and inferiorly to the thigh bone.

Bones of the Thorax.

Q. By what bones is the thorax formed? — *A.* By the dorsal vertebræ posteriorly, the ribs laterally, and sternum anteriorly.

Ribs.

Q. What is the situation of the ribs? — *A.* They are placed transversely and obliquely on each side of the thorax.

Q. What is the general form of the ribs? — *A.* Arched, and of different sizes.

Q. What is their number? — *A.* Twenty-four; twelve on each side.

Q. Into what classes are the ribs generally divided? — *A.* Into two classes; the true and the false ribs.

Q. What is the number of each class? — *A.* The seven superior ribs are called true; the five inferior false.

Q. Into what parts is each rib divided? — *A.* Into the middle part or body, an anterior and a posterior extremity, the external or convex, and the internal or concave side, a superior and an inferior edge.

Q. Where are the heads of the ribs situated? — *A.* Posteriorly, and turned towards the vertebræ.

Q. Where is the neck of the rib? — *A.* Immediately below the head.

Q. Where is the tubercle of the rib situated? — *A.* At a little distance from the head, on the posterior side of the rib.

Q. Where is the angle of the rib situated? — *A.* At a little distance from the tubercle.

Q. What is the difference between the superior and inferior

edge of each rib? — *A.* The superior edge is rounded, and the inferior is sharp.

Q. What is situated in the groove at the lower edge of the rib? — *A.* The intercostal artery, vein, and nerve.

Q. How is the head of the rib marked? — *A.* With two cartilaginous surfaces to articulate with the little cavities formed by the union of the dorsal vertebræ with each other.

Q. How is the tubercle of the rib marked? — *A.* With a cartilaginous surface.

Q. To what is the tubercle of the rib connected? — *A.* To the transverse process of the vertebræ above it.

Q. At what distance is the angle from the tubercle of each rib? — *A.* In the first rib the angle is not distinct from the tubercle; in the second it is at a small distance, and thence continues to increase to the third false rib.

Q. What is the form of the anterior end of the ribs? — *A.* The anterior ends of the true ribs are generally enlarged, those of the inferior false ribs generally diminish, and both have a small concave depression to receive their cartilaginous elongations.

Q. Which of the ribs is the longest? — *A.* They increase in length as they descend to the seventh or eighth.

Q. What is the relative elevation of the ends of the ribs? — *A.* The anterior extremity of each rib is lower than the posterior.

Q. Is the anterior or posterior parts of the ribs most crooked? — *A.* The back part of each rib is most curved.

Q. Which of the ribs are most contorted? — *A.* The third false rib and those immediately above it.

Q. How does the first rib differ from the rest? — *A.* In being placed horizontally, its head being connected to only one vertebra, having no groove in its lower edge, and by its being connected immediately to the sternum.

Q. How do the eleventh and twelfth ribs differ from the rest? — *A.* Each of their heads are connected to only one vertebra, there is no connection to the transverse processes, and no groove on their inferior edge.

Q. Which of the ribs have the shortest cartilages? — *A.* The superior ribs.

Q. Which have the longest cartilages? — *A.* The last true, and the first false rib.

Q. What is the direction of the cartilages of the ribs? — *A.* They all bend forward, inward, and upward.

Q. How many of the ribs are directly connected with the sternum? — *A.* The seven true ribs by their cartilages.

Q. How many of the ribs are connected by their cartilages merely to the cartilages of others? — *A.* The three superior false ribs.

Q. How many of the ribs are unconnected by their cartilages either to the sternum or to other cartilages? — *A.* The two inferior false ribs; and on this account have been termed by some floating ribs.

Sternum.

Q. Where is the situation of the sternum? — *A.* At the anterior and middle part of the thorax.

Q. What is its form and of how many parts does it consist? — *A.* It is oblong and in three pieces.

Q. What are the marks upon its superior portion? — *A.* At the superior edge internally we have a hollow for the trachea at the superior angles, depressions to articulate with the clavicles; there are lateral depressions for articulating with the first rib, and part of the cartilage of the second.

Q. What are the marks upon the second bone? — *A.* On the outside of the second bone, the pectoral muscle is attached to the inner side, the mediastinum and the triangularis sterni are attached. There are depressions upon the edges for the cartilages of some of the ribs.

Q. What are the marks upon the third portion? — *A.* A depression for a part of the cartilage of the seventh rib.

Q. What is the structure of the sternum? — *A.* Cellular.

HEAD AND ITS SUTURES.

Q. How are the bones of the head divided?—*A.* Into those belonging to the cranium and those belonging to the face.

Q. What is the general structure of the bones of the cranium? — *A.* They consist of two tables or bony plates, and an intermediate diploe.

Q. Which of its tables is thickest? — *A.* The external table.

Q. What is the diploe of the bones of the cranium? — *A.* It is of a cellular structure, like the epiphyses of the long bones.

Q. What is the name of the membrane covering the cranium? — *A.* Pericranium.

Q. Enumerate the bones of the cranium? — *A.* They are eight in number: the os frontis, two ossa parietalia, two ossa temporum, os occipitis, os sphenoides, and os æthmoides.

Q. What bones are proper to the cranium? — *A.* Five: two parietal, two temporal, and the occipital.

Q. What bones are common to the cranium and face? — *A.* Three; os frontis, sphenoid, and æthmoid.

Q. What bones are proper to the face? — *A.* There are fourteen: two ossa nasi, two ossa lachrymalia, two ossa malarum, two ossa maxillaria superiora, two ossa palati, two ossa turbinata inferiora, vomer, and os maxillare inferior.

Q. What is the situation of the os frontis? — *A.* In the anterior part of the cranium.

Q. Where are the parietal bones? — *A.* In the upper and lateral parts of the cranium.

Q. Where are the temporal bones? — *A.* In the lower and lateral parts, and partly in the base of the cranium.

Q. Where is the os occipitis? — *A.* In the base and back of the cranium.

Q. In what part of the cranium is the os sphenoides? — *A.* In the middle of the base, and partly on the sides.

Q. Where is the os æthmoides? — In the middle of the forepart of the base of the cranium.

Q. Where are the ossa nasi? — *A.* In the arch of the nose.

Q. Where are the ossa lachrymalia, or ossa unguis? — *A.* In the anterior part of the nasal sides of the orbits.

Q. Where are the ossa malarum? — *A.* In the upper part of the face.

Q. Where are the ossa maxillaria superiora? — *A.* In the middle of the face, constituting the upper jaw.

Q. Where are the ossa palati situated? — *A.* In the back of the orbits, nares, and palate.

Q. Where are the ossa turbinata inferiora? — *A.* In the lower part of the sides of the nares.

Q. Where is the vomer situated? — *A.* In the middle of the nares.

Q. What are the sutures of the cranium? — *A.* The sutures formed by the union of the bones of the cranium, are five in number: the coronal, the sagittal, the lambdoidal, and the two squamous.

Q. What sutures connect the bones of the cranium and face? — *A.* The sphenoidal, æthmoidal, transverse, and the two zygomatic sutures.

Q. What are the sutures of the face? — *A.* They are sixteen in number: one perpendicular nasal, two lateral nasal, two lachrymal, two transverse nasal, two external orbital, one mystachial, one transverse palatine, one longitudinal palatine, two maxillo palatine.

Q. Where are these various sutures situated? — *A.* The

coronal suture connects the frontal and parietal bones together; the sagittal connects the two parietal bones; the lambdoidal connects the parietal and the occipital bones; the squamous connects the squamous portion of the temporal to the parietal bones; the sphenoidal sutures surround the sphenoid bone; the æthmoid the æthmoid bone; the transverse suture connects the facial and cranial bones; the zygomatic sutures connects the zygomatic process of the temporal and malar bones.

Q. What are the locations of the other principal sutures? — *A.* We have the perpendicular nasal suture connecting the two nasal bones; the lateral nasal suture connecting the nasal bones to the maxillary; the lachrymal connecting the lachrymal bones to the ossa maxillaria superior; the transverse nasal connecting the ossa turbinata inferior to the ossa maxillaria superior; the suture at the junction of the two superior maxillary bones beneath the anterior aperture of the nostrils; the transverse palatine connecting the palatine processes of the palati bones to the superior maxillary; the longitudinal palatine connecting the palatine processes of the maxillary and palati bones of the two sides together; the maxillo-palatine connecting the palate bones to the bulbs of the superior maxillary bones.

Q. What other connections are there about the face? — *A.* That of the vomer with the os sphenoides, and the palatine and superior maxillary bones, and those of the teeth to the two maxillary bones.

BONES OF THE HEAD.

Os Frontis.

Q. What is the situation of the os frontis? — *A.* At the anterior part of the cranium, and superior part of the face.

Q. Describe the os frontis? — *A.* It is concave internally and convex externally, resembling, in appearance, a shell.

Q. What are the elevations of the os frontis? — *A.* Two internal angular processes at the insides of the orbits; a nasal process between these; two superciliary ridges forming arches, the inner ends of which rest on the internal angular processes, and the outer ends upon the two external angular processes at the outer edge of each orbit; a temporal process and ridge immediately behind the external angular process; two orbitar plates, or processes, which run back from the superciliary ridges; two bumps of the frontal sinuses, which are placed immediately above the internal angular processes and eminences, some way above the middle of the superciliary ridges, which

were the points of its ossification: — all these elevations are situated externally, except the orbital plates, which project internally, where also the spine, ascending from the root of the nose to the middle of the semicircular edge of the bone, may be seen.

Q. Where are the various attachments for muscles? — *A.* To the internal angular process internally the trochlearis is fastened, externally the corrugator supercilii; to the temporal ridges, the origin of the temporalis and its aponeurosis; to its spine, the falx cerebri.

Q. What are situated above its orbital plates? — *A.* The anterior lobes of the brain.

Q. What are the depressions of the os frontis? — *A.* They are its orbital depressions in the orbital plates; its lachrymal depressions situated on the same plates, and behind its external angular processes; its depressions for the pulleys of the trochleares on the inside of its internal angular processes; its æthmoidal fissure between its orbital plates; its temporal depressions behind its processes of the same name; the great concavity of the internal side of the bone; and a furrow along its spine.

Q. What are situated in its lachrymal depressions? — *A.* The lachrymal glands.

Q. What is situated in its æthmoidal fissure? — *A.* The cribriform plate of the æthmoid bone.

Q. What are situated in its temporal depressions? — *A.* The temporal muscles.

Q. What is situated in the furrow of its spine? — *A.* The anterior part of the longitudinal sinus: a great vein of the dura mater.

Q. What are the foramina of the os frontis, and what do they transmit? — *A.* Externally, two called superciliary, which transmit twigs of the ophthalmic nerve, artery, and vein. Internally, one called cæcum, at the root of the spine, through which an artery and vein sometimes pass to the nose.

Q. In the fœtal state is this bone complete? — No: it is divided into two equal parts; it contains no sinuses, and the orbital plates and superciliary ridges are deficient.

Q. What are the connexions of this bone? — *A.* It is connected superiorly to the parietal bones by the coronal suture; posteriorly and inferiorly to the sphenoid bone by the sphenoidal suture; and inferiorly to the bones of the face by the transverse suture.

Q. What are the uses of this bone? — *A.* It constitutes the

forehead and upper part of the face; it supports and defends the anterior lobes of the brain; and forms a great part of the orbits.

Ossa Parietalia.

Q. What are the situations of the ossa parietalia? — *A.* They are situated at the superior and lateral parts of the skull.

Q. Describe them? — *A.* They are quadrangular, concave internally, and convex externally.

Q. What are the elevations and depressions? — *A.* We have a semicircular ridge nearly midway up the bone, and still higher the fœtal point of ossification. The depressions are their concave internal surface, a furrow on the inside of the upper edge, and one on the inside of the posterior angle.

Q. What muscles are attached to and what parts occupy the various ridges and depressions? — *A.* To the temporal ridge the temporal muscle is attached. In the furrow in the inside of the upper edge we have a part of the longitudinal sinus. In the furrow at the inside of the posterior inferior angle a part of the lateral sinus is located. In the furrow at the anterior inferior angle the anterior branch of the middle artery of the dura mater runs.

Q. Where is the parietal foramen situated, and what passes through it? — *A.* It is generally at the upper edge near the posterior superior angle, transmitting an artery to the dura mater and a vein to the longitudinal sinus.

Q. What are the connexions of these bones? — *A.* To each other by the sagittal suture, to the os frontis by the coronal suture, to the ossa temporum by the squamous suture, to the os occipitis by the lambdoidal suture, and by their anterior inferior angles with the os sphenoides.

Q. What are the uses of this bone? — *A.* It constitutes the upper and lateral part of the skull, and protects the middle lobes of the brain.

Ossa Temporum.

Q. What are the situations of the ossa temporum? — *A.* At the lower part of the sides and base of the cranium.

Q. How are they divided? — *A.* Into three portions, the squamous, the petrous, and the mastoid.

Q. What are the situations and general form of the different portions of these bones? — *A.* The most superior portions are termed squamous; externally they are smooth with semicircular

edges. The mastoid portions are posterior, irregularly thick, and spongy, The petrous portions are inferior and internal, and are very irregular.

Q. What are the elevations of the ossa temporum? — *A.* They are the mastoid processes, projecting downward from the portion of that name; the zygomatic processes standing outwards and forwards from the squamous portion, and having a smooth tubercle placed at the anterior inferior part of its base; the styloid processes projecting downwards and forwards from the petrous portion; the vaginal processes placed between the mastoid, styloid, and zygomatic; and the ridge internally on the upper part of the petrous portion.

Q. What is the internal structure of the mastoid processes? — *A.* They are cellular.

Q. What muscles are attached to them? — *A.* The sterno-cleido-mastoideus, and the trachelo-mastoideus.

Q. What is attached to the upper edge of the zygomatic process? — *A.* The aponeurosis of the temporal muscle.

Q. What is attached to the lower edge of that process? — *A.* A part of the masseter muscle.

Q. What passes under that process? — *A.* The temporal muscle.

Q. What is the use of the tubercle situated at its base? — *A.* It constitutes a part of the joint of the lower jaw.

Q. What is attached to the styloid process? — *A.* The stylo-hyoides, the stylo-glosssus, and the stylo-pharyngeus muscles: a ligament to the os hyoides, and the lateral ligament of the lower jaw, are also attached to the styloid process.

Q. What is attached to the auditory process? — *A.* The cartilage of the meatus auditorius externus.

Q. What is attached to the edge of its petrous portion? — *A.* Part of the tentorium; a duplicature of the dura mater.

Q. What are the depressions of the ossa temporum? — *A.* They are the glenoid cavity, for the articulation of the lower jaw; the fissura glasseri, traversing the middle of that depression; a fossa, behind the mastoid process; a thimble-like cavity, internal to its styloid process, constituting part of the jugular foramen; a depression before its zygomatic process, called the temporal; a furrow on the inside of its mammillary portion; a furrow above, and another below the posterior surface of its petrous portion.

Q. What is situated in the articular cavity of the bone? — *A.* Anteriorly the condyle of the jaw, and posteriorly a part of the parotid gland.

Q. What passes through the fissura glasseri? — *A.* The laxator tympani major, and chorda tympani.

Q. To what does the groove behind the mastoid process give attachment? — *A.* The origin of the digastricus muscle.

Q. What does the jugular foramen transmit? — *A.* Posteriorly the jugular vein, and anteriorly the par vagum or pneumogastric nerve, the glosso-pharyngeal nerve, and the accessary nerve of Willis.

Q. What is lodged in the temporal depression? — *A.* The temporal muscle.

Q. What is situated in the furrow on the inside of its mastoid portion? — *A.* Part of the lateral sinus.

Q. What is situated in the furrows at the upper and lower edges of the posterior surface of its petrous portion? — *A.* The superior and inferior petrosal sinuses.

Q. What are the foramina of the ossa temporum, and where are they situated? — *A.* Externally, the meatus auditorius externus, placed between the styloid and mastoid processes. The carotid foramina at the base of the petrous portion. The stylo-mastoid between the styloid and mastoid processes. The bony Eustachian canal at the external side of the petrous portion. The tensor tympani canal just before the last. The foramina mastoideum behind the mastoid process. Internally, the meatus auditorius internus on the posterior surface of the petrous portion, the opening of the aqueduct of the cochlea immediately below the meatus. The opening of the aqueduct of the vestibule in the posterior surface of the petrous portion.

Q. What pass through these various foramina? — *A.* Through the stylo-mastoid the portio dura passes out and an artery enters. The carotid canal transmits the carotid artery and the beginning of the intercostal nerve. The mastoid foramen transmits an artery to the dura mater and a vein to the lateral sinus. The meatus auditorius internus transmits the portio dura and mollis. The Fallopian aqueduct transmits the continuation of the facial nerve. The small foramen in the superior surface of the petrous portion transmits the vidian nerve to join the portio dura.

Q. What is the fœtal state of these bones? — *A.* There exists no meatus auditorius externus, but merely bony rings, and the styloid processes unformed.

Q. What are the connexions of these bones? — *A.* They are connected anteriorly to the sphenoid bone, superiorly to the parietal, posteriorly to the occipital, and to the lower jaw by ginglymus.

Q. What are the uses of these bones? — *A.* They constitute

the inferior lateral parts of the cranium, support on each side the middle lobes of the brain, transmit several vessels and nerves, and contain the organ of hearing.

Os Occipitis.

Q. What is the situation of the os occipitis? — *A.* It is situated in the inferior and posterior part of the cranium.

Q. What is its form? — *A.* Convex externally and concave internally, and irregularly rhomboidal in shape.

Q. What are the elevations and depressions of the os occipitis? — *A.* They are first the condyles; a protuberance external to each of the edges of the great foramen; a longitudinal ridge in the posterior part of the bone; a superior and inferior transverse ridge; a spine in the middle of the superior transverse and the internal crucial spine. The depressions are below each superior transverse ridge; one below each side of this ridge; one on the outside of each condyle besides furrows in various portions of the bone, &c.

Q. With what are its condyles connected? — *A.* With the oblique processes of the atlas.

Q. To what do these several prominences and depressions externally give origin and insertion? — *A.* To muscles and ligaments.

Q. To what internally? — *A.* To the internal crucial ridge the posterior part of the falx cerebri is attached; to the lateral portions, the tentorium; to the inferior portion, the falx cerebelli.

Q. What are situated above and below the internal lateral crucial ridges? — *A.* Above, the posterior lobes of the cerebrum are placed, and below, the lobes of the cerebellum.

Q. What is situated in the great depression of the superior surface of the cuneiform process? — *A.* The medulla oblongata.

Q. What are situated in the small furrows on each side of that great depression? — *A.* The inferior petrosal sinuses.

Q. What are the foramina of this bone, and what do they transmit? — *A.* The foramen magnum transmitting the medulla spinalis, the nervi accessorii, the vertebral arteries, and sometimes veins; the posterior condyloid foramen transmitting the cervical nerves and lateral sinus. The anterior condyloid transmitting the ninth pair of nerves to the tongue.

Q. What is the fœtal state of this bone? — *A.* The cuneiform process, the two sides of the great foramen, and all the bone posterior to it, are easily in the fœtal state separable into four portions.

Q. What are the connexions of this bone? — *A.* It is con-

nected anteriorly to the sphenoid bone; inferiorly to the atlas; laterally to the temporal bones; and superiorly to the parietal bones.

Q. What are the uses of this bone? — *A.* It forms the posterior and a part of the inferior portion of the cranium; it contains and defends the posterior lobes of the cerebrum, the cerebellum, and medulla oblongata; and gives exit to the spinal marrow.

Os Sphenoides.

Q. What is the situation of the os sphenoides? — *A.* It passes from one temple to the other, across the middle of the base of the cranium.

Q. What are its general divisions? — *A.* It is divided into a body situated in the middle, an ala on each side of it; and two pterygoid portions at its inferior part.

Q. What are the elevations of this bone? — *A.* They are the processes azygos, standing forward and downward from its body; the posterior clinoid processes, one on each side placed anterior to these; the transverse spinous processes, which are lateral continuations of the anterior clinoid; the æthmoidal process, projecting anteriorly between the two last; the orbital process, portions of the ala turned towards the orbits; the temporal processes, portions of the alæ turned towards the temples; the spinous processes, which are posterior parts of the alæ; the styliform processes, which project downward from the points of the spinous; the external pterygoid plate, which is the outer part of the pterygoid portions; and the internal pterygoid plate, surmounted by a hook-like process, forming the inner part of the pterygoid portions.

Q. What is attached to its processus azygos? — *A.* The vomer.

Q. What is attached to the internal side of its external pterygoid plate? — *A.* The pterygoideus externus.

Q. What passes over the hook-like process of its internal pterygoid plate? — *A.* The tendon of the tensor palati.

Q. What are the depressions of the os sphenoides? — *A.* One on each side of its processus azygos; one between its clynoid process, called the sella turcica; a furrow on each side of that; depressions on its orbitar processes; depressions on its temporal processes; a furrow on the anterior edge of the last; a depression between the temporal process and the pterygoid portion of the bone; the great superior concavities of the alæ; a furrow internal to the base of the pterygoid portions; a

small cavity behind the base of the internal pterygoid process; and the fossa pterygoidea between the pterygoid processes.

Q. What are the depressions on each side of the processus azygos? — *A.* They constitute a portion of the nares.

Q. What is situated in the sella turcica? — *A.* The pituitary gland.

Q. What are situated in the furrows at its sides? — *A.* The carotid arteries.

Q. What is situated in its temporal depression? — *A.* The temporal muscle.

Q. What passes in the furrow on the anterior edge of its temporal depression? — *A.* A nerve from the superior maxillary to the temporal muscle.

Q. What is placed in the depression between the temporal and the pterygoid processes of the bone? — *A.* The pterygoideus externus muscle.

Q. What rests upon the internal cavity of each ala? — *A.* A middle lobe of the brain.

Q. What passes in the furrow internal to the base of the pterygoid portion of the bone? — *A.* An artery, vein, and nerve pass to the nares.

Q. What is situated in the cavity behind the base of the internal pterygoid process? — *A.* Part of the Eustachian tube.

Q. What is situated in the fossa pterygoidea? — *A.* The pterygoideus internus muscle.

Q. What are the foramina of this bone, and what do they transmit? — *A.* Anteriorly we have the openings of its sinuses on each side of the processus azygos. The foramina optica transmitting the optic nerves and ophthalmic arteries. The foramina lacera transmitting the third, fourth, first branch of fifth and sixth pairs of nerves. The foramina rotunda transmitting the second branch of the fifth or the superior maxillary. The foramina ovalia transmitting the third branch of the fifth pair. The foramina spinosa transmitting the arteria meningea media to the dura mater. The foramina vidia transmitting an artery and vein to the nose, and the vidian nerve enters the cranium.

Q. What is the condition of this bone in the fœtal state? — *A.* In the fœtus this bone has no sinuses, and is separable from its alæ.

Q. What are the connexions of this bone? — *A.* It is connected to the os frontis, os æthmoides, ossa malarum, ossa palati, ossa maxillaria, and to the vomer; posteriorly to the os occipitis; and laterally to the ossa parietalia.

Q. What are the uses of this bone? — *A.* It forms some of the

sides, and a considerable portion of the base of the cranium; it supports the middle lobes of the brain; it forms a part of the orbits; it transmits numerous vessels and nerves, &c.

Os Æthmoides.

Q. What is the situation of the os æthmoides?—*A.* It is situated in the middle of the anterior part of the base of the cranium.

Q. What is its general form?—*A.* It is somewhat cubical.

Q. Of what portions does it consist?—*A.* Of a cribriform lamella, a nasal lamella, two ossa plana, cellulæ, and two ossa turbinata.

Q. What is the situation of each of these portions?—*A.* The cribriform lamella is situated horizontally in the base of the cranium; the nasal lamella passes perpendicularly downward from the middle of it; the ossa turbinata are situated at a little distance from the nasal lamella; the cellulæ are immediately external to the ossa turbinata; and the ossa plana are the most external of all.

Q. What is the name of the process which rises from the cribriform lamellæ; and to what does it give attachment?—*A.* Crista galli, and it gives attachment to the falx cerebri.

Q. For what are the foramina in the cribriform plate?—*A.* For the transmission of the olfactory nerves.

Q. For what are the foramina in the ossa turbinata superior?—*A.* For the expansion of the olfactory nerves.

Q. What are the foramina of the ossa plana; and what do they transmit?—*A.* They are the foramina orbitaria interna, the anterior of which transmits the nasal twig of the first branch of the fifth pair of nerves, and a small branch of the ophthalmic artery; and the posterior a branch of the same artery.

Q. What are the connexions of this bone?—*A.* It is joined to the os frontis, ossa nasi, ossa maxillaria superiora, ossa palati, and the os sphenoides, by the æthmoidal suture; and to the vomer, by schindylesis.

Q. What is the fœtal state of this bone?—*A.* In a fœtus of nine months, the crista galli and nasal lamella not being ossified, the bone consists of two portions.

Q. What are its uses?—*A.* It supports the anterior lobes of the brain; gives attachment to the falx; transmits the olfactory nerves; and forms part of the septum nasi.

Os Nasi.

Q. What is the situation of the os nasi?—*A.* The os nasi is placed in the arch of the nose.

Q. What is the form of this bone? — *A.* It is somewhat convex externally, concave internally, narrow at its upper part, narrower still in the middle, and broadest at the base; its root and anterior edge is thickest, the latter projecting inward to join the septum; its outer edges superiorly are overlapped by the maxillary bones, and inferiorly overlap them; its lower edges are thin and irregular.

Q. What are its connexions? — *A.* It is connected superiorly to the frontal bone; anteriorly to its fellow; externally to the superior maxillary bone; posteriorly to the septum narium; and inferiorly to the cartilages of the nose.

Q. What is its fœtal state? — *A.* In the fœtus it is proportionally shorter than in the adult.

Q. What is its use? — *A.* It covers and defends the nares.

Os Lachrymale.

Q. What is the situation of the os lachrymale; or, as it is sometimes called, the os unguis? — *A.* It is placed at the anterior edge of the inner side of the orbit.

Q. What is the form of this bone? — *A.* Its external side consists of a flat posterior surface and an anterior groove; its internal surface is exactly the reverse.

Q. What is situated in its groove? — *A.* The lachrymal sac.

Q. What rests upon its flat surface? — *A.* The ball of the eye rests in part on it.

Q. What cavities do its inner surfaces cover? — *A.* The æthmoidal cells.

Q. What are its connexions? — *A.* It is joined to the os frontis, os æthmoides, and os maxillare, by the lachrymal sutures.

Q. What is its fœtal state? — *A.* It considerably resembles that of the adult.

Q. What is its use? — *A.* It forms part of the groove for the lachrymal sac and duct, and also the anterior part of the inner side of the orbit.

Ossa Malarum.

Q. What are the situations of the ossa malarum? — *A.* They form the prominence of the cheeks.

Q. What is the general form of these bones? — *A.* They are irregular in shape.

Q. What are the elevations and depressions of these bones? — *A.* The maxillary processes; the inferior orbitar processes; the internal orbitar processes; the external orbitar processes,

and the zygomatic processes; the orbital depressions and the temporal.

Q. What are lodged in the depressions? — *A.* The orbitar depression contains part of the ball of the eye, and the temporal depression part of the temporal muscle.

Q. What are the foramina? — *A.* They have but one foramen, placed below the middle of their upper edges.

Q. What does this foramen transmit? — *A.* A nervous twig.

Q. What is the fœtal state of these bones? — *A.* They are fully ossified in the fœtus at nine months.

Q. What are their connexions? — *A.* They are connected at their posterior inferior angles to the os temporis; at their superior orbitar process to the os frontis; at their internal orbitar process to the orbital process of the sphenoid bone; to the orbitar process of the os maxillare; and at their anterior edges to the same bone.

Q. What are their uses? — *A.* They form the prominence of the cheek and part of the orbit, protect the temporal muscles, and give attachment to its aponeurosis.

Os Maxillare Superius.

Q. What is the situation of the os maxillare superius? — *A.* It is placed at the anterior inferior part of the upper maxilla.

Q. What is the general form of this bone? — *A.* It is very irregular.

Q. What are the elevations and depressions of these bones? — *A.* The alveolar processes for the teeth; the palatine processes forming the floor of the nares and arch of the palate; the spinous process joined to the lower edge of the septum narium; the nasal processes; the bulbous processes; the orbitar and malar processes; the depressions are the palatine, the nasal; a depression between the alveolar and malar processes; the temporal depressions; the orbital depressions, and the lachrymal depressions.

Q. What are the foramina of these bones, and what do they transmit? — *A.* The infra-orbital transmitting a branch of the second branch of the fifth pair of nerves, and a branch of the internal maxillary artery; the foramina incisiva transmitting an artery, vein, and nerve; the spheno-maxillary fissures transmitting twigs of arteries, veins, and nerves; the opening of the antrum maxillare between the turbinated bones; the palatine foramina transmitting an artery and nerve.

Q. What are the connexions of these bones? — *A.* To the os frontis; os unguis; ossa nasi; ossa malarum; the

æthmoid bone; the ossa palatum; the vomer; the teeth; to the inferior turbinated bones; and to each other.

Ossa Palatum.

Q. What is the situation of the os palati? — *A.* It is placed at the posterior part of the orbit, nares, and palate.

Q. What are its general divisions? — *A.* Into its palatine, pterygoid, nasal, and orbitar processes.

Q. What are the situations of these various divisions? — *A.* The palatine is placed at the posterior arch of the palate; the nasal lamellæ posterior and external to the former; the pterygoid processes ascends from the outer edge of the palatine portions; the orbitar processes, the posterior one connected to the base of the sphenoid bone, and the anterior one at the back of the lower side of the orbit.

Q. What are the elevations and depressions of the ossa palatum? — *A.* The spinous process and a transverse ridge on the inside of the nasal portion; a depression for the nares; a palatine depression and three depressions upon the pterygoid portions.

Q. What are the foramina? — *A.* The palatine and some other small ones.

Q. What are the articulations of these bones? — *A.* To the superior maxillary; to the pterygoid processes of the sphenoid bone; to the æthmoid bone; to the inferior turbinated bone; to the vomer, and to its fellow.

Q. What is attached to the upper edge of the spinous process? — *A.* Part of the edge of the vomer.

Q. What is attached to the posterior end of the spinous process? — *A.* The azygos uvulæ.

Q. What is attached to the posterior semicircular edge of the palatine portion? — *A.* The velum pendulum palati.

Q. What is attached to the transverse ridge on the inside of the nasal lamella? — *A.* The posterior end of the inferior turbinated bone.

Q. What is the fœtal state of this bone? — *A.* In a nine months' fœtus its form is considerably perfect.

Q. What are the uses of the os palati? — *A.* It forms part of the orbits, nares, and palate, and of the sphenoid, æthmoidal, and maxillary sinuses.

Os Turbinatum Inferius.

Q. What is the situation of the inferior turbinated bone? — *A.* It is placed on the inner side of the nares.

Q. What is the form of the inferior turbinated bone? — *A.*

That of a scroll, forming by its processes a part of the lachrymal duct and a partial covering to the antrum Highmorianum.

Q. What is its fœtal state? — *A.* In the fœtus it considerably resembles its adult state.

Q. What are its connexions? — *A.* It is joined to the os lachrymale, os maxillare, and os palati, by the transverse nasal suture.

Q. What is the use of this bone? — *A.* Its use is to give expansion to nerves, and partly to form the antrum and lachrymal duct.

Vomer.

Q. What is the situation of the vomer? — *A.* It is placed in the middle of the nares, and forms the posterior inferior part of the septums.

Q. What is the form of the vomer? — *A.* It is irregular in shape, and resembles in a slight degree a ploughshare.

Q. What is its consistence? — *A.* That of two lamellæ with a diploic structure between them.

Q. What is its fœtal state? — *A.* In a fœtus of nine months its lamellæ are separated by cartilage.

Q. What are its connexions? — *A.* It is connected by its anterior edge to the cartilage of the septum; to the spinous processes of the maxillary and palate bones; by its upper edge to the nasal lamellæ of the æthmoid, and processus azygos of the sphenoid bone.

Q. What are its uses? — *A.* Its chief uses are to divide the nares, and permit the expansion of the olfactory nerve.

Os Maxillare Inferius.

Q. What is the situation of the os maxillare inferius? — *A.* It is placed at the lower part of the face.

Q. What are its general divisions? — *A.* It is divided into the chin, limited by the two anterior foramina; the sides, extending backward from the foramina; the angles, in which the sides terminate; and the rami, which ascend from the angles.

Q. What are its elevations? — *A.* They are the condyloid process, which is the posterior of the two arising from each ramus; the coronoid process, which is the anterior one; a protuberance on the outer, and another on the inner side of each angle; a ridge passing externally, and another internally, from the base of the coronoid process to the commencement of the chin; a protuberance immediately behind the symphysis of the jaw; and another on each side the base of the chin.

Q. What is attached to its coronoid processes? — *A.* The temporal muscles.

Q. What is attached to the outer sides of its angles? — *A.* The masseter muscles.

Q. What is attached to the inner sides of its angles? — *A.* The internal pterygoid muscles.

Q. What is attached to the line which passes internally from the base of the coronoid process to the commencement of the chin? — *A.* The mylo-hoideus muscle.

Q. What is attached to the line which passes externally from the base of the coronoid process to the commencement of the chin? — *A.* The buccinator muscle.

Q. What is attached to the protuberance immediately behind the symphysis of the jaw? — *A.* The frenum of the tongue superiorly, the genio-hyoidei inferiorly, and the genio-glossi between these.

Q. What is attached to the projections on the anterior part of the base of the chin? — *A.* The depressores anguli oris et labii inferioris.

Q. What are the depressions of the maxilla inferior? — *A.* There is one depression immediately before each condyloid process; another on each side of the anterior surface of the chin; and two on the base of the chin.

Q. What is fixed to the depression before the condyloid process of the jaw? — *A.* The pterygoideus externus muscle.

Q. What is attached to the depressions upon the anterior surface of the chin? — *A.* The depressores and levatores labii inferiores muscles.

Q. What is attached to the depressions on the base of the chin? — *A.* The digastric muscles.

Q. What are the foramina of the inferior maxillary bone, and what do they transmit? — *A.* Two foramina on each side called mental, and transmit the inferior maxillary artery and vein; a branch of the third branch of the fifth pair of nerves to the teeth and chin; a small foramen on the inside of the posterior foramen, transmitting a nervous twig to the sublingual gland, and the mylo-hyoideus muscle.

Q. What is the fœtal state of this bone? — *A.* In the fœtal state it is divided in two at the chin by a thin cartilage, hence this part has been called its symphysis, and in the upper jaw the rudiments of the first set of teeth are distinctly formed.

Q. What are its connexions? — *A.* It is articulated by its condyloid processes to the temporal bone.

Q. What are its uses? — *A.* It is useful in mastication, deglutition, and speech.

Os Hyoides.

Q. What is the situation of the os hyoides? — *A.* It is placed horizontally between the root of the tongue and upper part of the larynx.

Q. How is it divided? — *A.* Into a body, two cornua, and two appendices.

Q. What is the form of the body? — *A.* Horizontally it is somewhat oblong; convex anteriorly, and concave posteriorly.

Q. What muscles, ligaments, and membranes, are attached to the body of the os hyoides? — *A.* The genio-hyoides and the bassio-glossi; the mylo-hyoidei and stylo-hyoidei, and the sterno-hyoidei and coraco-hyoidei; and the membranes and ligaments of the tongue, epiglottis, and thyroid cartilages, are fixed to its upper edge.

Q. What is the situation of the cornua of the os hyoides? — *A.* They are placed outward and backward from the body.

Q. What is the form of the cornua? — *A.* They have two flat sides, which slope from above downwards; they diminish as they proceed backwards, and terminate in round tubercles.

Q. What muscles, ligaments, and membranes are attached to the cornua of the os hyoides? — *A.* The cerato-glossus arises from the external surface of each cornu, and the hyo-thyroideus from its under edge. The membranes of the tongue and larynx adhere to its posterior side, and from the tubercle at the end of each a ligament proceeds to the cornua of the os hyoides.

Q. What is the situation of the appendices of the os hyoides? — *A.* They project upwards from the junction of the body with the cornua.

Q. What are fixed to the appendices? — *A.* The stylo-hyoidei alteri, the condro-glossi, and a ligament to the os hyoides.

Q. What is the fœtal state of this bone? — *A.* Except a point in the middle of its body, it is wholly cartilaginous in the fœtal state.

Q. What are its connexions? — *A.* It is connected to the styloid processes and thyroid cartilage by ligaments.

Q. What are the uses of this bone? — *A.* It forms a solid point for the insertion and action of the muscles of the organ of speech and deglutition.

BONES OF THE UPPER EXTREMITIES.

Q. How are the bones of the upper extremity divided? — *A.* Into those of the shoulder, the arm, the forearm, and the hand.

Bones of the Shoulder.

Q. Of how many bones does the shoulder consist? — *A.* Of two; the scapula and clavicle.

Scapula.

Q. What is the situation of the scapula? — *A.* It is placed laterally at the upper and posterior part of the thorax from about the first to the seventh rib.

Q. What is its general form? — *A.* It is somewhat triangular.

Q. What parts of the scapula are generally enumerated? — *A.* Its regions are an external or posterior and convex side; an internal or anterior concave side; three edges, of which one is named the basis and two costa; a superior and an inferior; three angles, one anterior called the neck, one superior, and one inferior.

Q. What are the situations of the various parts of this bone? — *A.* The base, or longest and thinest edge is turned towards the spine. The superior costa is transverse between the superior point of the base and the neck of the bone. The notch is at the anterior part of the superior costa. The inferior costa is placed between the inferior point of the base and the neck.

Q. What passes through the notch? — *A.* The supra scapular vessels and nerves.

Q. Which edge of the scapula is the thickest? — *A.* Its inferior edge or costa.

Q. How is the neck of the scapula terminated? — *A.* By a glenoid cavity.

Q. What process proceeds from the neck of the scapula? — *A.* The coracoid process.

Q. What is attached to the tuberosity of the coracoid process? — *A.* The coraco-clavicular and coraco-acromial ligaments.

Q. What muscles arise from the tip of the coracoid process? — *A.* Three; namely, the pectoralis minor internally; the coraco-brachialis; and the short head of the biceps.

Q. What muscle arises from above the glenoid cavity? — *A.* The long head of the biceps.

Q. What is the appearance of the dorsum of the scapula? — *A.* Unequally convex.

Q. What process arises from the dorsum of the scapula? — *A.* The spine of the scapula, which divides the dorsum of the scapula into two portions.

Q. What muscles are attached to the spine of the scapula? — *A.* To the superior side the trapezius muscle is attached, and from the inferior edge the deltoid muscle arises.

Q. In what process does the spine of the scapula terminate? — *A.* The acromion process.

Q. What is the form of the acromion?—*A.* It is broad and flat.

Q. What is attached to the upper edge of the acromion near its apex? — *A.* The scapular end of the clavicle.

Q. What muscle arises from the inferior and anterior edges of the acromion? — *A.* The deltoid.

Q. Into what cavities does the spine divide the dorsum of the scapula? — *A.* Into the supra-spinal and infra-spinal fossæ.

Q. What muscles are situated in the two fossa? — *A.* The supra and infra-spinatus muscles.

Q. What arises from the groove, below the infra-spinal fossa, on the inferior costa of the scapula? — *A.* The teres minor.

Q. What muscle arises from the flat surface on the outside of the inferior angle of the scapula? — *A.* The teres major.

Q. What muscle passes over the inferior angle of this bone?— *A.* The latissimus dorsi.

Q. What is the appearance of the inner side of the scapula? — *A.* It is irregularly concave.

Q. What muscle is situated on the inner side of the scapula?— *A.* The subscapularis.

Q. What is the general structure of the scapula? — *A.* The thicker parts of the bone possess a diploe; the thin parts have none, and are transparent.

Q. What are the connexions of the scapula? — *A.* It is connected to the clavicle by the acromion, and to the os humeri by its glenoid cavity.

Clavicle.

Q. What is the situation of the clavicle? — *A.* It is placed transversely and somewhat obliquely at the upper and anterior part of the thorax, between the scapula and sternum.

Q. What is its general form? — *A.* It has a considerable resemblance to an italic *f*.

Q. Into what parts is it divided? — *A.* It is divided into a body, and an internal or sternal and an external or scapular extremity.

Q. What is the form of the sternal end of the clavicle? — *A.* It is somewhat triangular.

Q. What is attached to the posterior angle of the sternal end? — *A.* The inter-clavicular ligament.

Q. With what is the tubercle at the posterior part near the humeral end connected? — *A.* It is connected by a strong ligament to the coracoid process of the scapula.

Q. What is the form of the scapular end of the clavicle? — *A.* It is flat and broad.

Q. What muscles arise from this bone and are inserted into it? — *A.* From the anterior edge of the scapular end the deltoid arises. In the posterior edge of the scapular end the trapezius is inserted. From the anterior edge of the inner half the pectoralis major arises, and in the inferior side of the clavicle the subclavius is inserted.

Q. What is the structure of the clavicle? — *A.* The extremities are cellular; while its middle having thick sides possess a narrow cavity, filled with bony filaments.

Q. What are the connexions of the clavicle? — *A.* It is connected internally to the first bone of the sternum, and externally to the acromion.

Os Humeri.

Q. What is the situation of the os humeri? — *A.* It is placed under the acromion, along the side of the thorax.

Q. What is its general form? — *A.* It is irregularly cylindrical.

Q. Into what parts is it divided? — *A.* Into a body, and a superior and inferior extremity.

Q. What is the form and direction of the head of the os humeri? — *A.* It is formed by a round, smooth head, and inclines obliquely inward.

Q. Where are the tuberosities situated, and how are they distinguished? — *A.* Externally and inferior to the head of the bone. The one is called the internal or small, and the other the external or great tuberosity.

Q. What muscles are inserted into these tuberosities? — *A.* Into the internal tuberosity the subscapularis muscle is inserted, and into the great tuberosity the supra-spinatus, infra-spinatus, and teres minor muscles are inserted.

Q. What is situated between these tuberosities? — A very considerable groove.

Q. What passes through this groove? — *A.* The tendon of the long head of the biceps.

Q. What is called the neck of the humerus? — *A.* The slight circular depression immediately below its head.

Q. What arises from the posterior part of the neck? — *A.* The internal head of the triceps.

Q. What is inserted into the ridge external to the groove? — *A.* The pectoralis major muscle.

Q. What is inserted into the ridge internal to the groove? — *A.* The latissimus dorsi and teres major muscles.

Q. What is inserted into the great muscular depression on the outer side of the middle of the os humeri? — *A.* The deltoid muscle.

Q. What is inserted into the ridge on the inner side of the middle of the os humeri? — *A.* The coraco-brachialis.

Q. At what part, and in what direction, does the medullary artery of this bone enter? — *A.* It enters about the middle of the anterior side of the bone, and slants downward.

Q. What is the form of the lower part of the os humeri? — *A.* The lower extremity becomes gradually flatter and broader than the rest of this bone; having also an outer and an inner edge which terminate in two processes.

Q. What are the names of these two processes? — *A.* The outer and inner condyles.

Q. Which of the condyles is the largest? — *A.* The inner one, which is also the most projecting.

Q. What muscles generally arise from the external condyle? — *A.* The two extensors and supinators of the hands.

Q. What muscles arise from the internal condyle? — *A.* The flexors and pronators of the hands.

Q. Where is the trochlea of the os humeri situated? — *A.* Between and somewhat below the two condyles.

Q. What is the form of the trochlea? — *A.* It is an oblique, pulley-like articular surface, and a small round articular head is placed between it and the outer condyle.

Q. What is the form of the os humeri immediately above the trochlea? — *A.* Above these parts there are two slight depressions anteriorly, and a very considerable one posteriorly.

Q. To what are the depressions above the trochlea adapted? — *A.* The posterior one receives the olecranon when the arm is extended; the inner anterior one receives the coronoid process of the ulna; and the outer anterior one receives the round head of the radius in the flexions of the forearm.

Q. What is the particular situation of the os humeri? — *A.* In its natural situation the hemispherical head of this bone is turned inwards and backwards; the great tuberosity outward and forward; the groove between the two tuberosities directly forward; the external condyle forward and outward; and the internal condyle backward and inward.

Q. What is the structure of the os humeri? — *A.* The extremities are cellular; but the middle has a tubular cavity, and several bony filaments passing across it.

Q. What are the connexions of the os humeri? — *A.* It is

connected superiorly with the glenoid cavity of the scapula; and inferiorly with the ulna by its trochlea; and with the radius by its little round head.

Bones of the Forearm.

Q. Of how many bones does the forearm consist? — *A.* Of two; the ulna and radius.

Q. What is the situation of the ulna? — *A.* On the inner side of the forearm.

Q. What is its form? — *A.* Cylindrical, and in its circumference irregularly triangular.

Q. How is it divided? — *A.* Into a body and two extremities.

Q. What are its chief eminences? — *A.* The olecranon and coronoid processes.

Q. What is the situation of the olecranon? — *A.* It forms the upper extremity of this bone.

Q. What muscle is inserted into it? — *A.* The triceps extensor cubiti.

Q. Where is the coronoid process? — *A.* On the anterior part of the bone somewhat lower than the olecranon.

Q. What muscle is inserted into it? — *A.* The brachialis internus.

Q. Where is the olecranon lodged when the forearm is extended? — *A.* It is lodged in the posterior depression of the inferior end of the humerus.

Q. Where is the coronoid process lodged during the flexion of the forearm? — *A.* It is lodged in the anterior and inner depression of the lower end of the humerus.

Q. What is the use of the triangular surface on the posterior part of the olecranon? — *A.* It forms the part of the elbow on which we rest.

Q. What is lodged in the fossa external to the triangular surface? — *A.* The anconeus muscle.

Q. Where is the greater sigmoid cavity of the ulna? — *A.* It is in the articular surface formed between the olecranon and coronoid processes, and is used as an articulation with the trochlea of the os humeri.

Q. Where is the lesser sigmoid cavity? — *A.* It is situated on the outside of the root of the coronoid process, and receives the round head of the radius.

Q. What is the form of the body of the ulna? — *A.* It is triangular.

Q. What is attached to the outer sharp edge of the ulna? — *A.* The interosseous ligament.

Q. What is the situation of the canal for the medullary artery of the ulna? — *A.* It is placed about the middle of the anterior part of the bone, and slants upward.

Q. What is the form of the inferior extremity of the ulna? — *A.* It has a small head externally, and a styloid process internally.

Q. What is attached to the styloid process? — *A.* A ligament from the os pisiforme.

Q. What passes in the groove on the anterior side of the termination of the ulna? — *A.* The ulna artery and nerve.

Q. What passes in the groove on the posterior side of its termination? — *A.* The tendon of the extensor carpi ulnaris.

Q. What is the structure of the ulna? — *A.* Its structure resembles that of the os humeri.

Q. What are the connexions of the ulna? — *A.* It is connected superiorly with the pulley of the os humeri; laterally with the two extremities of the radius, and with the hand inferiorly.

Radius.

Q. What is the situation and form of this bone? — *A.* It is on the outer side of the forearm and of a cylindrical form.

Q. What are the relative lengths of the radius and ulna? — *A.* The radius is the shortest.

Q. How is the radius divided? — *A.* Into a head, body, and basis.

Q. Describe this bone. — *A.* It is slightly triangular in shape; the upper part of its head is concave and its circumference is cylindrical. It articulates laterally with the lesser sigmoid cavity of the ulna. On the anterior inner side we have its tuberosity just below the neck; there is a sharp edge on the inner side for attachment of the interosseous ligament. About the middle of the bone the medullary artery enters. The lower end is the largest, and has grooves passing over and under it for the flexor and extensor tendons, and a small process of bone called styloid at the outer inferior side.

Q. What is received into the depression on the inner side of the radius? — *A.* The inferior head of the ulna.

Q. What is attached to the styloid process? — *A.* A ligament connecting it to the trapezium.

Q. What is the structure of the radius? — *A.* It resembles that of the other long bones,

Q. What are its connexions? — *A.* It is joined superiorly to the os humeri, laterally to both ends of the ulna, and inferiorly to the bones of the carpus.

Bones of the Hand.

Q. How are the bones of the hand classed? — *A.* Into the carpus, metacarpus, and phalanges.

Carpus.

Q. Describe the carpus. — *A.* It forms the wrist, and consists of eight bones arranged in two rows, and is of a quadrangular form, convex externally and concave internally.

Q. What are the names of the carpal bones? — *A.* Those of the upper row are the os scaphoides, os lunare, os cuneiform, os pisiforme; those of the lower row are the os trapezium, os trapezoides, os magnum, and os unciforme.

Q. What are the situations and general forms of each of the bones of the first row? — *A.* The os scaphoides is the most external bone of the first row, and is convex superiorly and concave inferiorly, and is oblong in shape. The os lunare is the second bone of the first row, and is convex superiorly and concave inferiorly, and its two surfaces are roughened. The os cuneiform is the third bone of the first row, the upper surface is convex; it has a small plane on its anterior surface for the os pisiforme and articular facets for the lunare and unciforme. The os pisiforme is the fourth bone, and placed on the anterior side of the cuneiform; it is the smallest bone of the wrist.

Q. What are the situations and general forms of each of the bones of the second row? — *A.* The os trapezium is the first external bone of this row; it is irregular in shape, and has an oblong eminence on its inner surface for the carpal ligament — a groove for a tendon; the upper side articulates with the os scaphoides; the lower side articulates with the first metacarpal bone, with the thumb and with the os trapezoides. The os trapezoides is the second bone of the row, and articulates superiorly with the os scaphoides, inferiorly with the base of the first metacarpal bone, on the radial side with the trapezium, and on the ulna side with the os magnum. The magnum is the third bone, and articulates superiorly with the scaphoides and lunare, inferiorly with the second metacarpal bone; on the radial side, to the os trapezoides, and on the ulna side to the os unciforme. The os unciforme is the fourth bone, there is a hook-like process on its anterior surface; the posterior surface is rough, the radial side is double, corresponding to the os magnum; the superior side corresponds to the inferior one of the os cuneiform,

and the inferior side is double for the articulation with the last bones of the metacarpus.

Q. What is the structure of the carpal bones? — *A.* Spongy.

Metacarpus.

Q. What is the situation of the metacarpus? — *A.* Immediately below the carpus, and consists of five bones.

Q. What is the general form and division of the metacarpal bones? — *A.* They are long bones; thicker at the extremities than at the middle, and are divided into a body and two extremities.

Q. What is the form of the bodies and extremities? — *A.* The bodies are contracted and triangular, posteriorly convex, and anteriorly they are marked with a sharp edge on the sides; the extremities are rounded and flattened, with eminences on the sides.

Q. Which is the longest of the metacarpal bones? — *A.* The second, which supports the forefinger.

Q. What is their structure? — *A.* They resemble the long bones.

Q. What are their connexions? — *A.* They are connected superiorly to the bones of the carpus; laterally to each other by their bases; and inferiorly to the first bones of the fingers.

Bones of the Fingers.

Q. How many bones compose each finger and thumb? — *A.* There are three for each finger and two for the thumb, called first, second, and third phalanges.

Q. Describe the phalanges. — *A.* They vary in length, and are rounded on the upper side and flat on the lower, and their heads present various surfaces, for articulation with each other and with the carpal bones; the third phalanges are the smaller of the three.

BONES OF THE LOWER EXTREMITIES.

Q. How are the bones of each lower extremity divided? — *A.* Into the os femoris; the tibia; fibula; patella; the tarsus; metatarsus; and phalanges of the toes.

Os Femoris.

Q. Where is the os femoris situated? — *A.* Between the trunk and the leg.

Q. How is it divided ? — *A.* Into a body and two extremities.

Q. What are the peculiarities of the superior extremity of the bone ? — *A.* It had a head or spherical portion and two trochanters — the great and small. The head is supported upon a neck projecting inwards and upwards at an angle of 35°. The trochanters are tuberosities at the base of the neck, of various heights.

Q. What is peculiar to the head of the bone ? — *A.* It is the articular portion, and has a small fossa near its centre for the attachment of the ligamentum teres.

Q. What muscles are inserted in the greater trochanter ? — *A.* Externally the tendon of the gluteus maximus covers it. The gluteus minimus is attached to the anterior muscular mark, and posteriorly the quadratus femoris is inserted. The gluteus medius, the pyriformis, the obturator internus, and the gemini also find places for attachment in the sharp superior edge ; while in the deep fossa along side the tendon of the obturator externus plays.

Q. What is the form of the body of the os femoris ? — *A.* It is cylindrical.

Q. What is attached to the trochanter minor ? — *A.* The iliacus internus and psoas muscles.

Q. Where is the linea aspera ? — *A.* It is the rough prominent line passing along the posterior part of the os femoris.

Q. What muscles are attached to the linea aspera ? — *A.* At its commencement the gluteus maximus is inserted, at its middle the triceps is inserted, and the short head of the biceps arises.

Q. What are the peculiarities of the two ridges which pass externally and internally from the linea aspera ? — *A.* To the outer ridge the vastus externus is attached, and to the inner ridge the vastus internus and the aponeurosis of the great head of the triceps is attached, and over the internal ridge the femoral vessels pass.

Q. What is inserted into the tuberosity which terminates the inner ridge of the linea aspera ? — *A.* The tendon of the great head of the triceps.

Q. What is the situation and direction of the canal of the medullary artery ? — *A.* About the middle of the linea aspera, and slants upwards.

Q. What is the form of the lower extremity of the os femoris ? — *A.* It is broad and thick ; formed by two large protuberances projecting downward and backward.

Q. What are the names of these protuberances ? — *A.* The condyles of the os femoris.

Q. How would you distinguish the inner from the outer condyle? — *A.* The inner one projects most inferiorly and posteriorly, while the outer one projects anteriorly.

Q. What is situated between the two condyles posteriorly? — *A.* A deep notch.

Q. What is transmitted through this notch? — *A.* The vessels from the thigh.

Q. What ligaments are attached to the inner side of this notch? — *A.* The crucial ligaments.

Q. Where is the pulley of the os femoris situated? — *A.* The junction of the condyles anteriorly forms a pulley-like surface on which the patella rests.

Q. What are attached to the small tuberosities immediately above the back of the condyles? — *A.* The heads of the gastrocnemius.

Q. What is the structure of the os femoris? — *A.* Its structure resembles that of the other long bones.

Bones of the Leg.

Q. Of what bones does the leg consist? — *A.* It consists of three bones; namely, the tibia, fibula, and patella.

Tibia.

Q. How is the tibia situated? — *A.* It is placed on the inner side of the leg.

Q. What is its general form? — *A.* Its circumference is irregularly triangular; and larger above than below.

Q. How is it divided? — *A.* Into a body; an upper and a lower extremity.

Q. What is peculiar to the head of this bone? — *A.* It is thick and expanded, and has two broad articular surfaces, the one external, the other internal; the internal one is oblong and depressed, and the external one rounder.

Q. What are attached to the tuberosities at the head of the bone? — *A.* To the tuberosities between the superior articular surfaces the cervical ligaments are fastened, and to the tuberosity behind the inner part of the head of the tibia the semimembranosus muscle is attached, and to the tuberosity behind the outer part of the head of the tibia the head of the fibula articulates. To the tuberosity on the fore part of the bone, the ligament of the patella is fixed.

Q. What is the form of the body of the tibia? — *A.* It presents three distinct surfaces and edges.

Q. What is attached to the inner edge of the tibia? — *A.* The interosseous ligament.

Q. What is the situation and direction of the canal of the medullary artery? — *A.* It is situated somewhat above the middle of the posterior side of the bone, and slants downward.

Q. What is the form of the lower part of the tibia? — *A.* It is much smaller than the upper part.

Q. What is the use of the notch on the outside of the lower end of the tibia? — *A.* It is a longitudinal depression for the end of the fibula.

Q. What is the name and use of the process on the inside of the lower end of the tibia? — *A.* It is called its malleolus internus, and gives attachment to a strong ligament.

Q. How is the trochlea which receives the astragalus formed? — *A.* By the lower end of the tibia and its malleolus internus, together with the lower end of the fibula or malleolus externus.

Q. What are the connexions of the tibia? — *A.* It is joined superiorly to the os femoris and patella; laterally to the fibula, both above and below; and inferiorly to the astragalus.

Patella.

Q. What is the situation of the patella? — *A.* It is situated directly above the anterior tuberosity of the tibia.

Q. What is its general form? — *A.* Oval and thick.

Q. How is it divided? — *A.* Into a basis, an apex, and two sides.

Q. What are attached to the patella? — *A.* Superiorly the conjoined tendons of the vasti, rectus femoris, and cruralis are fastened, and below the ligament of the patella.

Q. What is the appearance of its inner or posterior side? — *A.* It is somewhat concave, and divided into two by a middle ridge.

Q. Which of its depressions is the deepest? — *A.* The most external one.

Q. What is the structure of this bone? — *A.* It is of a spongy structure.

Q. What are its connexions? — *A.* It is connected to the anterior tuberosity of the tibia by a strong ligament, and is articulated with the pulley and condyles of the femur.

Fibula.

Q. What is the situation of the fibula? — *A.* On the outside of the leg.

Q. What is its form? — *A.* Long, slender, and triangular.

Q. How is it divided? — *A.* Into a body; and an upper and lower extremity.

Q. What is the form of the two ends of the bone? — *A.* The upper end is obliquely flattened, and has a small articular plane internally, and externally there is a small tuberosity; the lower end is broader, flatter, and more oblong than the superior one.

Q. What are attached to the two ends? — *A.* To the upper end into the tuberosity the tendon of the biceps is inserted and the external lateral ligament, and it is also articulated to the tibia. To the inferior extremity of the bone, ligaments are attached to strengthen its attachment with the astragalus, &c.

Q. To what part of the body of the fibula is the interosseous ligament fixed? — *A.* To the inner side.

Q. What is the situation and direction of the canal of the medullary artery of this bone? — *A.* It is placed about the middle of the posterior side of the bone, and slants downwards.

Q. What are the connexions of this bone? — *A.* It is connected laterally to the tibia both above and below, and inferiorly to the astragalus.

Bones of the Foot.

Q. How are the bones of the foot divided? — *A.* Into three classes; namely, those of the tarsus, metatarsus, and toes.

Tarsus.

Q. What is the situation of the tarsus? — *A.* At the posterior part of the foot.

Q. Of what bones does the tarsus consist? — *A.* It consists of seven bones; namely, the astragalus; os calcis; os scaphoides; os cuboides; and the three ossa cuneiformia — the internum, medium, and externum.

Q. Which is the superior bone of the tarsus? — *A.* The astragalus, which, with the bones of the leg, forms the ankle joint.

Q. Describe the astragalus. — *A.* It is very irregular; it has a body or posterior portion; an anterior portion or apophysis; the superior portion resembles a pulley; the inferior surface has two articular facets divided by a groove.

Q. With what does this bone articulate? — *A.* With the os calcis, the os naviculare, and with the tibia and fibula.

Q. What is the situation of the os calcis? — *A.* It is placed at the posterior and inferior part of the tarsus, and forms the heel.

Q. What is the appearance of the os calcis? — *A.* It is irre-

gularly oblong. The superior surface is divided by a groove, posteriorly it is broad, convex, and rough ; on its lower surface it is narrow and rough ; anteriorly it has a concave articular surface, and on the inner side it is concave.

Q. What is attached to its rough portion at its posterior end? — *A.* The tendo-Achilles.

Q. What is attached to its anterior side? — *A.* The os cuboides.

Q. What is the situation of the os scaphoides? — *A.* It is placed immediately before the astragalus.

Q. What is its form? — *A.* It somewhat resembles a small boat ; and has an anterior and a posterior cartilaginous surface, an oval circumference, and an inferior tuberosity.

Q. What are attached to its various surfaces? — *A.* To the inferior concave side the head of the astragalus is fixed ; to the anterior convex side the three ossa cuneiformia are attached ; and to the tuberosity is fixed a portion of the tendons of the abductor pollicis and tibialis anticus muscles.

Q. What is the situation of the os cuboides? — *A.* It is situated before the os calcis on the outside of the os naviculare.

Q. Describe it. — *A.* It has six irregular sides, the inferior one is rough and has a well-marked groove upon it ; the posterior and anterior surfaces are articular ; the inner side has a round cartilaginous surface, and the remainder is rough ; the outside is irregular, short, and narrow, and the upper side is flat and rough.

Q. What are the articulations of this bone? — *A.* Anteriorly to the os calcis, to the fourth and fifth matatarsal bones, and to the os cuneiforme externum by the inner side, and to the cartilaginous surface, the os cuneiforme externum is attached.

Q. What is the situation of the ossa cuneiformia? — *A.* Before the os scaphoides, and internal to the os cuboides.

Q. What is the relative size of the ossa cuneiformia? — *A.* The internal is the largest, and the external is the least.

Q. How are they divided? — *A.* Each cuneiforme bone has a base superiorly, an apex inferiorly, and a posterior, an anterior, an external, and an internal side.

Q. What is the form of the os cuneiforme internus? — *A.* It somewhat resembles a wedge contorted and bent, and has its base turned downward.

Q. What is the form of the os cuneiforme medium? — *A.* It more resembles a wedge, and has its base turned upward.

Q. What is the form of the os cuneiforme externum? — *A.* It also resembles a wedge, and has its base turned upward.

Metatarsus.

Q. What is the situation of the metatarsus? — *A.* At the middle part of the foot.

Q. Of how many bones does the metatarsus consist? — *A.* Of five bones; one supporting each toe.

Q. What is the form of the metatarsal bones, and how may they be divided? — *A.* They are long and slender, and flattened on each side, and are divided into a body, basis, and head.

Q. Describe them. — *A.* The bases are wedged-shape; their bodies are long, slender, and flattened, and the heads are convex and smooth, and flattened laterally.

Q. Which is the largest of the metatarsal bones? — *A.* The first one.

Q. What is peculiar to the fifth metatarsal bone? — *A.* It is distinguished by a rough projection from its base, to which is attached the peroneus brevis.

Q. What are the connexions of the metatarsal bones? — *A.* They are joined to the tarsus, and to each other posteriorly, and to the first phalanges of the toes anteriorly.

Bones of the Toes.

Q. What is the number of the bones of the toes? — *A.* The five toes are formed by fourteen bones; three belonging to each of the four lesser toes, and two to the great toe.

Q. How are they arranged? — *A.* They are arranged precisely as the fingers.

Q. What is the form of the first bone of the great toe? — *A.* It somewhat resembles the second bone of the thumb. Its base is considerably hollow, and its head resembles a pulley.

Q. What is the form of the second bone of the great toe? — *A.* It resembles the last of the thumb, but is much larger, and its anterior edges more unequal.

Q. What is the form of the first bones of the other toes? — *A.* The first bones of the other toes are the largest, but are shorter, narrower, and more convex than those of the fingers.

Q. What is the form of the second bones of the toes? — *A.* They are very short, and almost of the same oblong form.

Q. What is the form of the third bones of the toes? — *A.* They nearly resemble those of the fingers.

Q. What is the form and situation of the sesamoid bones? — *A.* They are small oval bones, chiefly found under the first joint of the great toe.

OF ARTICULATIONS IN GENERAL.

Q. What are the articulations of bones? — *A.* The connexion of bones with each other are called articulations, which are divided into three classes.

Q. What are the general classes of articulations? — *A.* The general classes of articulations are symphysis, synarthrosis, and diarthrosis.

Q. What is symphysis? — *A.* Symphysis expresses the substance connecting bones.

Q. What is synarthrosis? — *A.* The immoveable connexion of bones.

Q. What is diarthrosis? — *A.* The moveable connexion of bones.

CHONDROLOGY.

OF CARTILAGES.

Q. What are cartilages? — *A.* They are white, elastic, smooth, and very compact substances; in density next to bone.

Q. How many kinds of cartilages are there? — *A.* Four kinds, viz., 1st, diarthroidal, or those covering the heads of bones and forming joints; 2d, synarthroidal, or those placed between bones, as in the pubis, and forming a union of parts; 3. Interarticular, or those in some joints between bones, as in the joint of the lower jaw to prevent too great friction, &c.; 4th, those which supply the place of bone, as in the larynx, trachea, and parts of the chest.

SYNDESMOLOGY, OR FIBRO-CARTILAGINOUS SYSTEM.

LIGAMENTS OF THE HEAD AND TRUNK.

Q. What are ligaments? — *A.* Strong, flexible substances, usually connecting those bones together, which form moveable joints.

Q. How many kinds of ligaments are there? — *A.* There are two kinds; 1st, the capsular; 2d, the connecting ligaments.

Q. Describe capsular ligaments. — *A.* They surround joints on all sides, and form sacs to retain the synovial membrane, and form a union of the bones.

Q. What are connecting ligaments? — *A.* They are firmer and

more fibrous than the capsular, and strengthen the union of bones, as in the case of the lateral, crucial and round ligaments, &c.

Q. What other kinds of ligamentous substances are there?— *A.* Some answering the purposes of bones, others strengthening the union of bones, not moving on each other; these two kinds may be found about the pelvis. A third kind are the elastic ligaments; they exist about the vertebræ, in some animals they are very common; of this nature is the ligamentum nuchæ in the neck of grazing animals.

Q. What are the ligaments of the lower jaw? — *A.* There are two on each side; a capsular and a lateral ligament.

Q. What are the situations of the ligaments of the lower jaw? — *A.* The capsular arises from the articular surface of the temporal bone, and is fixed around the condyloid process of the jaw. The lateral ligaments arise from the styloid process of the temporal bone, and are inserted inside of the angle of the lower jaw.

Q. What are the ligaments of the vertebræ in general? — *A.* For the union of the vertebræ there are seven kinds of ligaments; namely, the common anterior ligament, common posterior, crucial or intervertebral, the capsules of the oblique processes, intertransverse, flava, and interspinous.

Q. What is the situation of the common anterior ligament of the vertebræ? — *A.* It arises from the fore part of the first vertebra, and covers the anterior part of the whole spinal column as far down as the os sacrum.

Q. What is the situation of the common posterior ligament? — *A.* It arises from the anterior part of the foramen magnum, and covers the posterior part of the bodies of the vertebræ to the termination of the os sacrum.

Q. Where are the crucial or intervertebral ligaments? — *A.* They cross each other obliquely from the edge of one vertebra to that of another.

Q. Where are the capsules of the oblique processes? — *A.* They arise from the edge of one oblique process and surround that of another.

Q. What is the situation of the intertransverse ligaments? — *A.* They pass between the transverse processes of the vertebræ.

Q. Where are the ligamenta flava? — *A.* They connect the bony arches of the vertebræ.

Q. Where is the interspinous ligaments? — *A.* They connect the spinous processes of the vertebræ.

Q. What are the ligaments peculiar to the cervical vertebræ? — *A.* The ligamentum nuchæ common to all the vertebræ of

the neck, and arising from the spine of the occiput, and attached to the spines of all the cervical vertebræ. The transverse ligament passing from a small tuberosity behind the anterior arch of the atlas, and enclosing the tooth-like process of the dentatus.

Q. What are the ligaments from the first vertebra to the occiput? — *A.* Those of the anterior and posterior arches of the atlas and the capsular ligaments for the condyles.

Q. What are the ligaments of the second vertebra? — *A.* 1st. The perpendicular, arising from the tip of the tooth-like process, and inserted into the edge of the foramen magnum. 2d. The lateral, arising from the sides of the processus dentatus and inserted into the occiput before the condyles, and also into the atlas.

Q. What are the ligaments between the ribs and the vertebræ? — *A.* Between the rib and the vertebra proper, we have the anterior ligament arising from the margin of the head of the rib and diverging towards the spine, is fastened by its superior fibres to the vertebra above, by its inferior fibres to the vertebra below, and by its middle fibres to the intervertebral substance; the interarticular ligament passes from the ridge on the head of the rib to a line in the intervertebral substance. There are also synovial membranes at this junction.

Q. What are the proper ligaments of the sternum? — *A.* There are two; viz., the common membrane of the sternum, and the ligaments of the xiphoid cartilage.

Q. What are the ligaments of the pelvis? — *A.* The anterior and posterior coccygeal ligaments; the ilio-lumbar ligaments arising from the transverse process of the last lumbar vertebra, and from its inferior oblique process, and inserted into the crista of the ilium at its back part; the sacro-iliac junction formed by the corresponding surfaces of the sacrum and ilium incrusted by their own cartilage; the sacro-spinous ligament arising from the posterior superior spinous process of the ilium and inserted into the third and fourth transverse processes of the sacrum.

Q. What is the situation of Poupart's ligament? — *A.* It arises from the anterior superior spinous process of the ilium, and is inserted into the angle of the pubis. Some of its fibres are inserted into the pubis before it reaches the angle.

Q. What other ligaments are there? — *A.* The posterior sacro-ischiatic, arising from the posterior inferior spine of the ilium from the margin of the sacrum and from the coccyx, and passes down to be inserted into the tuberosity of the ischium;

the anterior sacro-sciatic ligament arises from the sacrum and coccyx, and is inserted into the spine of the ischium.

Q. What are the articulations of the pubis? — *A.* Between the bodies of the two ossa pubis, there exists a junction by fibro-cartilaginous matter. There is also the anterior pubic ligament, consisting of indistinct fibres of cartilage passing from one bone to the other. The sub-pubic ligament passes from the margin of the ends of the pubis of the one side to a corresponding line on the other, &c.

LIGAMENTS OF THE UPPER EXTREMITY.

Q. What is the sterno-clavicular articulation? — *A.* The two surfaces of the sternum and clavicle are covered with cartilages, and the joint is invested with a thick fibrous capsule. We have also an interclavicular ligament extending from one clavicle to the other, and an interarticular fibro-cartilage, separating the bones from each other. There are two synovial capsules in this joint, one on each side of the interarticular cartilage.

Q. Of what does the costo-clavicular ligament consist? — *A.* Of short fasciculi of ligamentous fibres, called the rhomboid ligament, arising from the upper surface of the cartilage of the rib, and is implanted into the roughness on the inferior face of the clavicle near its sternal end.

Q. What are the ligaments connecting the clavicle and scapula? — *A.* The capsular, the conoid, and the trapezoid.

Q. What is the situation of the capsular ligament? — *A.* It arises around the sternal end of the clavicle, and is fixed round the articular surface of the acromion.

Q. Where is the conoid ligament? — *A.* The conoid or coraco-clavicular ligament arises pointed from the root of the coracoid process, and is inserted into the inferior side of this end of the clavicle.

Q. Describe the situation of the trapezoid ligament. — *A.* It differs in form from the last, but has nearly the same origin and insertion.

Q. What are the ligaments proper to the scapula? — *A.* The anterior and posterior.

Q. Describe the anterior. — *A.* It arises from the upper edge of the acromion, and is inserted into that of the coracoid process; it is also called coraco-acromial ligament.

Q. What is the situation of the proper posterior ligament? — *A.* It arises from the root of the coracoid process, and passes over the notch to the superior costa of the bone.

Q. What are the ligaments connecting the scapula and humerus? — *A.* The capsular and the upper part of the tendon of the biceps.

Q. Describe the capsular ligament. — *A.* It arises from the margin of the glenoid cavity, and is inserted round the neck of the humerus.

Q. What is the situation of the tendon of the biceps muscle? — *A.* It arises from the upper edge of the glenoid cavity, passes through the joint, and being fixed in its groove by a strong sheath, it contributes to strengthen the shoulder joint.

Q. What are the ligaments proper to the humerus? — *A.* The external and internal intermuscular.

Q. Describe the external intermuscular ligament. — *A.* It arises from the external condyle, and is inserted into the middle of the outside of the bone.

Q. What is the situation of the internal intermuscular? — *A.* It arises from the internal condyle, and is inserted into the middle of the inside of the bone.

Q. What are the ligaments connecting the humerus to the radius and ulna? — *A.* The capsular, and the external and internal lateral.

Q. What is the situation of the capsular ligament? — *A.* It arises round the trochlea of the humerus, and is inserted around the heads of the radius and ulna.

Q. Describe the external lateral ligament. — *A.* It arises from the external condyle of the humerus, and is inserted into the outside of the neck of the radius.

Q. Where is the internal lateral ligament? — *A.* It arises from the internal condyle, and is inserted into the inner side of the coronoid process of the ulna.

Q. What are the ligaments connecting the radius and ulna? — *A.* The coronary, the oblique, the interosseous, and the sacciforme.

Q. Describe the coronary ligament. — *A.* It arises from the ulna, and surrounds the head of the radius.

Q. Where is the oblique ligament? — *A.* It arises from the base of the coronoid process of the ulna, and is inserted into the tubercle of the radius.

Q. What is the situation of the interosseous ligament? — *A.* It is attached to the acute edges of these bones, turned towards each other.

Q. Describe the situation of the sacciforme ligament. — *A.* It unites in a distinct articulation the lower ends of the radius and ulna.

Q. What are the ligaments from the radius and ulna to the

carpus ? — *A.* The capsular, the external, and the internal lateral; between the end of the ulna and the os naviculare, a triangular, interarticular cartilage is placed.

Q. Describe the capsular ligament. — *A.* It arises around the lower articular surfaces of the radius and ulna, and is inserted round the three first bones of the carpus.

Q. Where is the external lateral ligament ? — *A.* It arises from the styloid process of the radius, and is inserted into the outside of the os scaphoides.

Q. What is the situation of the internal lateral ligament ? — — *A.* It arises from the styloid process of the ulna, and is inserted into the outside of the os cuneiforme and os unciforme.

Q. What are the ligaments of the carpus ? — *A.* The capsular, the transverse, the posterior annular, and the vaginal.

Q. Describe the capsular ligament. — *A.* It surrounds and connects all the carpal bones.

Q. What is the situation of the transverse ? — *A.* It passes from bone to bone, and ties them together.

Q. Describe the posterior annular ligament. — *A.* It binds down the tendons of the extensor muscles to the back of the carpus.

Q. Where is the anterior annular ? — *A.* It arises from the os pisiforme, and os unciforme, and is inserted into the trapezium, under which pass the flexor tendons.

Q. Describe the vaginal ligaments. — *A.* They proceed from within the anterior annular and sheathe the flexor tendons.

Q. What are the ligaments of the bases of the metacarpal bones ? — *A.* The capsular, the lateral, the dorsal, and the palmar.

Q. Describe the capsular ligaments. — *A.* They are derived from that of the carpus, which includes the bases of these bones.

Q. Where are the lateral ligaments ? — *A.* They are situated on each side of the articulations.

Q. A. Describe the dorsal ligaments. — *A.* They are transverse ligaments, connecting the bases of these bones, on the back of the hands.

Q. What is the situation of the palmar ligaments ? — *A.* They connect the bases of the metacarpal bones in the palm.

Q. What are the ligaments of the heads of the metacarpal bones ? — *A.* The capsular, lateral, and transverse.

Q. What are the ligaments of the joints of the fingers ? — *A.* They are at each joint capsular and lateral.

LIGAMENTS OF THE LOWER EXTREMITY.

Q. What are the ligaments connecting the os innominatum

and the femur? — *A.* There are two, viz., a capsular and a round ligament.

Q. What is the situation of the capsular ligament? — *A.* It arises from the margin of the acetabulum, and is inserted around the root of the neck of the femur.

Q. Describe the round ligament. — *A.* It arises from the small depression in the head of the femur, and is inserted into the middle of the acetabulum.

Q. What are the ligaments which connect the femur with the tibia and fibula? — *A.* The capsular, popliteal, internal lateral, external lateral, anterior crucial, and posterior crucial.

Q. Describe the capsular ligament. — *A.* It passes from the edges of the articular surface of the femur to those of the tibia, being attached also to the patella.

Q. Where is the popliteal ligament? — *A.* It arises from the external condyle of the femur, and, passing in the posterior part of the capsule, is expanded upon the internal side of the joint.

Q. What is the situation of the external lateral ligament? — *A.* It arises from the external condyle, and is inserted into the head of the fibula. It generally divides itself into two portions.

Q. Describe the internal lateral ligament. — *A.* It arises from the internal condyle, and is inserted into the inside of the head of the tibia.

Q. Where is the posterior crucial? — *A.* It arises from the inside of the notch, between the condyles of the femur, and is inserted into the posterior part of the rough ridge on the top of the tibia.

Q. Describe the anterior crucial. — *A.* It arises from the outside of the notch, between the condyles of the femur, and is inserted into the middle of the ridge on the top of the tibia.

Q. What are the ligaments of the patella? — *A.* The anterior ligament and the alar ligaments.

Q. Describe the anterior ligament. — *A.* It arises from the inferior point of the patella, and is inserted into the anterior tuberosity of the tibia.

Q. Where are the alar ligaments? — *A.* They proceed on each side from the inner side of the capsular, and are inserted into the sides of the patella.

Q. What are the ligaments connecting the tibia and fibula? — *A.* The capsular, the interosseous, and the transverse.

Q. What is the situation of the capsular ligament? — *A.* It connects the upper extremities of the tibia and fibula.

Q. Describe the interosseous ligament. — *A.* It connects

the outer edge of the tibia to a ridge on the inner side of the fibula.

Q. Where are the transverse ligaments? — *A.* They connect the lower end of the fibula to that of the tibia, anteriorly and posteriorly.

Q. What are the ligaments connecting the tibia and fibula to the tarsus? — *A.* The capsular, the deltoid, and the anterior, middle, and posterior ligaments of the fibula.

Q. Describe the capsular ligament. — *A.* It surrounds the junction of the tibia and fibula with the astragalus.

Q. Where is the deltoid ligament? — *A.* It arises from the internal malleolus, and is inserted into the astragalus and naviculare.

Q. What is the situation of the anterior ligament? — *A.* It arises from the external malleolus, and is inserted into the outside of the astragalus.

Q. Where is the middle ligament? — *A.* It arises from the tip of the external malleolus, and is inserted into the outside of the os calcis.

Q. Describe the posterior ligament. — *A.* It arises from the back part of the external malleolus, and is inserted into the back part of the astragalus.

Q. What are the ligaments of the tarsus? — *A.* The capsular, the transverse, the plantar, and a ligament at the internal side of the foot.

Q. What is the office of the capsular ligament? — *A.* It includes all the tarsal and the heads of the metatarsal bones.

Q. What is the use of the transverse ligaments? — *A.* They pass from one to another, and tie the individual bones together.

Q. Where is the plantar ligament situated? — *A.* On the outside of the sole of the foot.

Q. Where is the internal ligament? — *A.* It passes from the lower part of the os calcis to the lower part of the os naviculare, supporting the astragalus.

Q. What are the ligaments of the bases of the metatarsal bones? — *A.* The capsular, the lateral, the dorsal, and the plantar.

Q. What are the capsular ligaments derived from? — *A.* From that of the tarsus, which includes the bases of these bones.

Q. Where are the lateral ligaments situated? — *A.* On each side of the articulations.

Q. Where are the dorsal ligaments? — *A.* They are trans-

verse ligaments connecting these bones on the back of the foot.

Q. What is the situation of the plantar ligament? — *A.* It connects the metatarsal bones in the sole of the foot.

Q. What are the ligaments of the head of the metatarsal bones? — *A.* The capsular, lateral, and transverse.

Q. What are the ligaments of the joints of the toes?—*A.* The capsular and lateral.

Q. How are the tendons of the foot and toes kept in their situations? — *A.* By ligamentous bands.

INTEGUMENTS OF THE BODY.

Q. Of what do the integuments of the body consist? — *A.* Of the cellular and adipose substances and the derm.

Q. What is the cellular substance? — *A.* A tissue of lamellæ and fine soft fibres, so interwoven as to produce cells, communicating with each other.

Q. Where is this tissue found? — *A.* All over the body.

Q. Are there bloodvessels in it? — *A.* Yes; but in a natural state very few of them convey red blood.

Q. How have anatomists divided this tissue? — *A.* Into the external, or that next to the skin; and the internal, or that which dips in between vessels, muscles, &c.

Q. What are its uses? — *A.* To separate organs, and by its elasticity allows parts to move smoothly, the one upon the other.

Q. Is there not a peculiar serosity exhaled from the cellular tissue? — *A.* Yes.

Adipose Substance.

Q. Where is this situated? — *A.* It is closely adherent to the skin, and in the condensed cellular substance next to the muscles, between the interstices of muscles, &c.

Q. What parts are free from it? — *A.* The eyelids, interior of the cranium, the nose, ears, scrotum, penis, &c.

Q. What is its structure? — *A.* It is a yellow oleaginous fluid, contained in distinct cells, having no communication with each other.

Q. What is its use? — *A.* It is a reservoir of nourishment, prevents pressure, &c.

Derma.

Q. Of what does this consist? — *A.* Of the skin, its sebaceous organs, the nails, and the hair.

Q. Where is this placed? — *A.* Over the whole surface of the body.

Q. How does this terminate at the orifices of the canals which go to the interior of the body? — *A.* Very gradually, it is converted and almost imperceptibly into mucous membrane.

Q. Does not the surface of the skin change by climate and exposure? — *A.* Yes.

Q. How is the internal surface of the skin connected to adjacent parts? — *A.* By cellular substance.

Division of the Derma.

Q. Of what parts does the skin consist? — *A.* It consists of three parts, namely, the cuticle, rete mucosum and cutis; having in most parts the adipose substance situated under them.

Q. What is the relative situation of the cuticle, rete mucosum, and cutis? — *A.* The cuticle is the most external; immediately under it lies the rete mucosum, covering the cutis, which is the most internal, and by much the most thick.

Cutis Vera.

Q. What is the structure of the cutis? — *A.* It consists of a close intermixture of fibres, plentifully supplied with bloodvessels and nerves; it is thickest in the palms of the hands and soles of the feet.

Q. What are the papillæ of the skin? — *A.* They are numerous small eminences on its external surface, in which the capillary filaments of the cutaneous nerves terminate in radiated pencils; they are most prominent on the palms of the hands and soles of the feet, and on the fingers and toes.

Q. In what form are they arranged? — *A.* In double rows, which are regularly placed as parallel, crooked, waving, or spiral lines; on the red part of the lips, they resemble fine hairs or villi.

Q. Where is the sense of touch the most acute? — *A.* It is more particularly acute at the ends of the fingers.

Q. Where are the sebaceous follicles situated? — *A.* They exist in the substance of the skin, and open on its surface.

Q. Where are they most conspicuous? — *A.* About the nose, cheeks, ears, armpits, groins, and genitals.

Q. What is their use? — *A.* They secrete an unctuous fluid, which protects the skin from the effects of heat and friction.

Q. What are the other openings in the cutis? — *A.* They are for the hairs, and others very minute called pores, which are the terminations of the exhalent vessels.

Rete Mucosum.

Q. What is the rete mucosum? — *A.* It is a delicate substance situated everywhere between the cuticle and cutis, surrounding the papillæ of the cutis, and lying in the interstices between them.

Q. What is its colour? — *A.* It is white in the Europeans and Northern Asiatics, but black or brown in the Indians, Africans, and others; and is the seat of colour generally.

Cuticle.

Q. What is the cuticle? — *A.* It is a delicate transparent membrane, covering the rete mucosum and cutis; it is thickest in the palms of the hands, and soles of the feet; it dips in betwixt every minute fold of the cutis, and into every aperture on its surface.

Q. What is its structure? — *A.* It does not appear to be organized, nor does it possess any sensibility.

Nails.

Q. Of what are the nails a continuation? — *A.* They are considered as a continuation of the cuticle; they appear as if implanted under a fold of the cutis, and adhere to a similar doubling of the cuticle.

Q. What is their structure? — *A.* They resemble horn.

Q. How are the nails formed? — *A.* They grow from the surface of the true skin, on which they lie, and their fibres shoot forward from their roots.

Hairs.

Q. Where are the bulbs of the hair situated? — *A.* The hairs grow from roots, called bulbs, which are situated in the cutis; they are small pulpy bodies, invested by a membrane.

Q. How do the hairs pass from the cutis? — *A.* They proceed betwixt the papillæ, and pierce the cuticle.

Q. What is the structure of the hair? — *A.* Each hair appears to be a bundle of minute filaments, covered by a membrane.

MYOLOGY.

Q. What are muscles? — *A.* They are fleshy bodies, composed of bundles of parallel contractile fibres, with tendinous extremities.

Q. What is their general appearance? — *A.* The middle portion of them is generally their principal part. It is of a red colour, softer and thicker than the other parts.

Q. What general names do muscles derive from the arrangement of their fibres? — *A.* If the fibres run longitudinally the muscle is termed simple; if they diverge from a tendinous centre they are named radiated; and when they have a feathery arrangement upon their tendons, they are called penniform; several of these united, are called complex penniform, &c.

Q. Whence are the particular names of the muscles in general derived? — *A.* They generally derive their names, either from their use as levators or depressors; from their form, as trapezius, rhomboideus, &c.; from their situation, as occipito-frontalis, pectoralis, &c.; or from their points of attachment, as sterno-costalis, sterno-cleido, mastoideus, &c.

Q. What are the tendons? — *A.* They are generally placed at the extremities of muscles, and are of a silvery hue, firm, compact, and incapable of contraction.

Q. What is the origin and insertion of a muscle? — *A.* The least moveable point of attachment is called the origin, and the most moveable, the insertion.

MUSCLES OF THE ABDOMEN.

Q. What is the origin, insertion, and use of the obliquus externus? — *A.* Origin, from the eight or nine inferior ribs, by muscular and fleshy digitations. Insertion, in the ensiform cartilage, linea alba pubis, Poupart's ligament, and two anterior thirds of the crest of the ilium. Its use is to bend the body, compress the abdomen, &c.

Q. What is the origin, insertion, and use of the obliquus internus? — *A.* Origin, from the fascia lumborum, the crest of the ilium and external third of Poupart's ligament. Insertion, in the cartilages of the seven inferior ribs, ensiform cartilage, and whole length of the linea alba, and to the symphysis and upper edge of the pubis and linea innominata. Use, to bend the body.

Q. Where is the cremaster muscle? — *A.* Origin, internal surface of external third of Poupart's ligament and lower edge of obliquus internus, and sometimes from the transversalis. Insertion, into the tunica vaginalis, testis, and scrotum. Use, to form an envelope for the cord.

Q. What is the origin, insertion, and use of the transversalis? — *A.* Origin, from the fascia lumborum, crest of the ilium, iliac third of Poupart's ligament, seven lower ribs. Insertion, along

with the obliquus internus, into the linea alba, upper edge of pubis and linea innominata. Use, to compress the abdomen.

Q. What is the origin, insertion, and use of the rectus? — *A.* Origin, upper and anterior part of the pubis. Insertion, into the ensiform cartilage and costo-xiphoid ligament, to cartilage of sixth rib, and to cartilage of fifth rib. Use, to depress the trunk, or to elevate the pubis and compress the abdomen.

Q. What is the origin, insertion, and use of the pyramidalis? — *A.* Origin, pubis. Insertion, in the linea alba, half way to the umbilicus. Use, to assist the rectus.

Q. What is the origin, insertion, and use of the greater muscle of the diaphragm? — *A.* Origin, posterior surface of the xiphoid cartilage, internal surface of cartilages of last true and all the false ribs, from external ligamentum arcuatum, and from the convex edge of the true ligament. Insertion, cordiform tendon.

Q. What is the origin, insertion, and use of the lesser muscle of the diaphragm? — *A.* Origin, right crus, from the fore part of the bodies of the four first lumbar vertebræ. Insertion, posterior border of the cordiform tendon.

Q. What is the origin, insertion, and use of the quadratus lumborum? — *A.* Origin, posterior fourth of spine of the ilium and ilio-lumbar ligament. Insertion, into extremity of transverse processes of the four first lumbar vertebræ and last dorsal, and also from the posterior half of last rib. Use, to bend the trunk to one side, or forward.

Q. What is the origin, insertion, and use of the psoas muscles? — *A.* Origin, from the sides of the bodies of the lumbar and lower dorsal vertebræ, and from their transverse processes. Insertion, into the cavity of the pelvis, back part of the lesser trochanter and ridge below it. Use, to bend the loins.

Q. What is the origin, insertion, and use of the iliacus internus? — *A.* Origin, transverse process of the last lumbar vertebra, from three anterior fourths of crest of ilium, anterior spinous processes, brim of acetabulum, iliac fossa and fascia. Insertion, with the psoas muscles into the anterior and inner surface of the femur, below lesser trochanter. Use, to bend the thigh.

Male Perinæum.

Q. What is the origin, insertion, and use of the sphincter ani? — *A.* Origin, from the tip of the os coccygis, and surrounds the anus. Insertion, into perineum, transverse perinei and acceleratores urinæ. Use, is to close the anus, and pull down the bulb of the urethra.

Q. What is the origin, insertion, and use of the sphincter ani internus? — *A.* It encircles the lower extremity of the rectum close to the mucous membrane, and its use is like the preceding.

Q. What is the origin, insertion, and use of the erector penis? — *A.* Origin, inner surface of the tuber ischii, and from the insertion of the great sacro-sciatic ligament. Insertion, fibrous membrane of the corpus cavernosum or crus penis. Use, to erect the penis.

Q. What is the origin, insertion, and use of the accelerator urinæ or ejaculator seminis? — *A.* Origin, it arises from the sphincter ani, the membranous part of the urethra and crus penis; and insertion, into the middle of the bulb, and completely incloses it. Use, to compress the bulb.

Q. What is the origin, insertion, and use of the transversus perinei? — *A.* Origin, inside of the tuberosity of the ischium. Insertion, central point of the perineum. Use, to dilate the bulb while it draws up the verge of the anus.

Q. What is the origin, insertion, and use of the levator ani? — *A.* Origin, posterior part of symphysis pubis, obturator fascia, ilium, inner surface of ischium, and spinous process. Insertion, the anterior fibres into central point of perineum, and front of rectum; the middle fibres into side of rectum, and the posterior fibres into the back of rectum, and tendinous raphe from rectum to os coccygis, and into last bones of os coccygis. Use, to elevate the anus.

Q. What is the origin, insertion, and use of the compressor urethræ? — *A.* Origin, by a tendon from inside of symphysis pubis, an eighth of an inch above lower edge of the arch. Insertion, below membranous portion of urethra into a narrow tendinous line, which becomes lost in the central point of the perineum. Use, to compress the urethra.

Q. What is the origin, insertion, and use of the coccygeus muscle? — *A.* Origin, inner surface of the spine of the ischium. Insertion, extremity of the sacrum and side of coccyx. Use, to strengthen the coccyx and pull it forward.

Back.

Q. What is the origin, insertion, and use of the trapezius? — *A.* Origin, internal third of superior transverse ridge of the occipital bone, ligamentum nuchæ, spinous process of last cervical and the dorsal vertebræ. Insertion, external third of clavicle and acromion process, and upper edge and spine of sca-

pula. Use, to pull the scapula upward and backward, or backward and downward.

Q. What is the origin, insertion, and use of the latissimus dorsi? — *A.* Origin, six inferior dorsal spines, by the fascia lumborum, back of sacrum, posterior third of the crest of the ilium, and three or four last ribs. Insertion, inner or posterior edge of the bicipital groove. Use, to move the arm backward and downward, and to rotate the humerus.

Q. What is the origin, insertion, and use of the serratus inferior posticus? — *A.* Origin, two last dorsal and two upper lumbar spines. Insertion, lower edge of four inferior ribs, anterior to angles. Use, to draw the ribs down and antagonizes the diaphragm and the serratus superior posticus.

Q. What is the origin, insertion, and use of the rhomboideus minor? — *A.* Origin, from lower part of ligamentum nuchæ and last cervical spinous process. Insertion, base of scapula opposite to and above the spine.

Q. What is the origin, insertion, and use of the rhomboideus major? — *A.* Origin, from four or five superior dorsal spines. Insertion, base of scapula, from the spine to inferior angle. Use, of both of these, to draw the scapula up and back.

Q. What is the origin, insertion, and use of the serratus superior posticus? — *A.* Origin, ligamentum nuchæ, and from two or three dorsal spines. Insertion, second, third, and fourth ribs, external to angles. Use, to draw the ribs up.

Q. What is the origin, insertion, and use of the levator anguli scapulæ? — *A.* Origin, posterior tubercles and transverse processes of four or five superior cervical vertebræ. Insertion, base of scapula, between spine and superior angle. Use, draws the scapula up.

Q. What is the origin, insertion, and use of the splenius capitis and colli? — *A.* Origin, from the spines of the five inferior cervical and four superior dorsal. Insertion, into the mastoid process and part of os occipitis, and from the transverse processes of two superior cervical vertebræ. Use, to draw the head and neck back.

Q. What is the origin, insertion, and use of the sacro-lumbalis and longissimus dorsi? — *A.* Origin, they have a common origin from the back of the pelvis, lumbar vertebræ, and extend to top of the thorax. Insertion, into all the ribs near their angles, into all the dorsal vertebræ, and into the ribs between the angles and tubercles. Use, to keep the spine erect and draw down the ribs.

Q. What is the origin, insertion, and use of the spinalis

dorsi? — *A.* Origin, two superior lumbar and three inferior dorsal spines. Insertion, nine superior dorsal spines. Use, to keep the spine erect.

Q. What is the origin, insertion, and use of the musculi accessorii? — *A.* Origin, superior edge of each rib. Insertion, tendons of sacro-lumbalis. Use, to assist the sacro-lumbalis, &c.

Q. What is the origin, insertion, and use of the cervicalis descendens? — *A.* Origin, by four or five tendons, from as many superior ribs between their tubercles and angles. Insertion, transverse processes of the fourth, fifth, and sixth cervical vertebræ. Use, to draw the neck back.

Q. What is the origin, insertion, and use of the transversalis cervicis? — *A.* Origin, from the transverse processes of five or six superior dorsal vertebræ. Insertion, into transverse processes of the three or four inferior cervical vertebræ. Use, to draw the head back.

Q. What is the origin, insertion, and use of the trachelo mastoideus? — *A.* Origin, from transverse processes of three or four superior dorsal vertebræ, and as many inferior cervical. Insertion, inner and back part of mastoid process. Use, to draw the head back.

Q. What is the origin, insertion, and use of the complexus? — *A.* Origin, transverse and oblique processes of three or four inferior cervical, and five, or six superior dorsal vertebræ. Insertion, occipital bone between the two transverse ridges close to its fellow. Use, to draw the head back.

Q. What is the origin, insertion, and use of the semi-spinalis colli? — *A.* Origin, from the transverse processes of the six upper vertebræ of the back. Insertion, into the sides of the spinous processes of the five middle cervical vertebræ. Use, to extend the neck obliquely.

Q. What is the origin, insertion, and use of the semi-spinalis dorsi? — *A.* Origin, by five or six tendons from the transverse processes of the dorsal vertebræ, from five to eleven. Insertion, by five or six tendons, into the extremity of the two inferior cervical and three or four superior dorsal vertebræ. Use, to draw the spine obliquely back.

Q. What is the origin, insertion, and use of the multifidus spinæ? — *A.* Origin, the first arises from the spine of the dentatus, and is inserted into the transverse process of the third, and so on to the last, which arises from the spine of the last lumbar vertebra, and is inserted into the false transverse process of the sacrum. Use, to twist the spine back and keep it erect.

Q. What is the origin, insertion, and use of the rectus capitis posticus major? — *A.* Origin, spinous process of the second vertebra. Insertion, inferior transverse occipital ridge. Use, to turn the head and draw it back.

Q. What is the origin, insertion, and use of the rectus capitis posticus minor? — *A.* Origin, posterior part of atlas. Insertion, occipital bone behind foramen magnum. Use, to draw the head back.

Q. What is the origin, insertion, and use of the obliquus capitis superior? — *A.* Origin, upper part of transverse process of atlas. Insertion, occipital bone between its transverse ridges just behind the mastoid process. Use, to draw the head back.

Q. What is the origin, insertion, and use of the obliquus capitis inferior? — *A.* Origin, spinous process of second vertebra. Insertion, extremity of transverse process of atlas. Use, to rotate the first vertebra in the second.

Q. What is the origin, insertion, and use of the interspinalis, intertransversarii and levatores costarum? — *A.* They are described by name. The use of the first to draw the spinous processes together, and keep the spine erect. The second draw the transverse processes together and bend the spine laterally; the third elevate the ribs.

Thorax.

Q. What is the origin, insertion, and use of the pectoralis major? — *A.* Origin, sternal half of the clavicle, anterior surface of sternum and cartilages of the third, fourth, fifth, and sixth true ribs, and from the aponeurosis common to it and external oblique. Insertion, anterior edge of occipital groove and fascia of the arm. Use, to draw the arm inwards and forwards, and to depress it when raised.

Q. What is the origin, insertion, and use of the pectoralis minor? — *A.* Origin, external surface and upper edge of the third, fourth, and fifth ribs, and sometimes from the second, Insertion, inner and upper surface of the coracoid process. Use, to draw the scapula in and down.

Q. What is the origin, insertion, and use of the subclavius? — *A.* Cartilage of the first rib. Insertion, external half of inferior surface of the clavicle. Use, draws the clavicle down.

Q. What is the origin, insertion, and use of the serratus magnus? — *A.* Origin, eight or nine superior ribs. Insertion, base of the scapula. Use, to draw the scapula forward.

Q. What is the origin, insertion, and use of the intercostales? — *A.* Origin, eleven external, inferior edge of each rib com-

mencing at transverse processes of vertebræ. Insertion, external lip of superior edge of the ribs beneath the costal extremity of cartilage. Origin, eleven internal, from the sternum from inner lip and lower edge of each cartilage and rib to the angle. Insertion, inner lip of superior edge of cartilage, and rib beneath. Use, to draw the ribs together.

Q. What is the origin, insertion, and use of the triangularis sterni? — *A.* Origin, posterior surface and edge of lower part of sternum and xiphoid cartilage? — Insertion, cartilages of fourth, fifth, and sixth ribs. Use, to depress the ribs, and diminish the cavity of the thorax.

Muscles of the Neck.

Q. What is the origin, insertion, and use of the platysma myoides? — *A.* Origin, cellular membrane covering upper part of deltoid and pectoral muscle, and also from the clavicle. Insertion, into the chin, fascia along side of the lower jaw, and fascia along the parotid gland. Use, to elevate the skin of the neck.

Q. What is the origin, insertion, and use of the sterno-cleido mastoideus? — *A.* Origin, upper and anterior part of the first bone of the sternum and sternal end of clavicle. Insertion, upper part of mastoid process and external third of superior transverse ridge of occipital bone. Use, to draw the chin towards the sternum.

Q. What is the origin, insertion, and use of the sterno-hyoideus? — *A.* Origin, posterior surface of the first bone of the sternum, cartilage of first rib, sternal end of clavicle and sterno-clavicular capsule. Insertion, lower border of body of the os hyoides. Use, to draw the os hyoides towards the sternum.

Q. What is the origin, insertion, and use of the sterno-thyroideus? — *A.* Origin, posterior surface of sternum and cartilage of second rib. Insertion, obliquely into the side of thyroid cartilage. Use, to draw this cartilage to the sternum.

Q. What is the origin, insertion, and use of the thyreo-hyoideus? — *A.* Origin, obliquely from side of thyroid cartilage. Insertion, into part of the base and nearly all the cornu of os hyoides. Use, to approximate the os hyoides and thyroid cartilage.

Q. What is the origin, insertion, and use of the omo-hyoideus? — *A.* Superior costa of scapula, from ligament covering the notch on the scapula, sometimes from coracoid process, and the acromial end of clavicle. Insertion, into lower border of os hyoides at junction of body and cornu. Use, to draw the os hyoides down.

Q. What is the origin, insertion, and use of the digastricus? — *A.* Origin, groove in temporal bone internal to mastoid process. Insertion, rough depression on inner side of base of jaw close to symphysis. Use, to draw the os hyoides up when its extremities are fixed, and to throw the head back and open the mouth, when the lower jaw is fixed upon a body of same height.

Q. What is the origin, insertion, and use of the mylo-hyoideus? — *A.* Origin, oblique line on inner surface of side of lower jaw. Insertion, base of os hyoides, and tendinous line between that bone and chin. Use, to draw the os hyoides up and protect the tongue.

Q. What is the origin, insertion, and use of the stylo-hyoideus? — *A.* Origin, outer side of styloid process near its base. Insertion, cornu and body of the os hyoides and fascia connecting digastric tendon to this bone. Use, to draw os hyoides up and back.

Q. What is the origin, insertion, and use of the stylo-glossus? — *A.* Origin, styloid process near its point and stylo-maxillary ligament. Insertion, side of tongue. Use, to draw the tongue back.

Q. What is the origin, insertion, and use of the stylo-pharyngeus? — *A.* Origin, back part of root of styloid process. Insertion, side of pharynx, cornu of os hyoides and thyroid cartilage. Use, to draw the larynx and pharynx up.

Q. What is the origin, insertion, and use of the genio-hyoideus? — *A.* Origin, inner side of chin above the digastric. Insertion, base of os hyoides. Use, to draw the os hyoides up and forward.

Q. What is the origin, insertion, and use of the longus colli? — *A.* Origin, bodies of three superior dorsal and four inferior cervical vertebræ, intervertebral ligaments from the head of first rib and anterior tubercles of transverse processes of four last cervical vertebræ. Insertion, fore part of bodies of all cervical vertebræ. Use, to bend the neck forward and to one side.

Q. What is the origin, insertion, and use of the rectus capitis anticus major? — *A.* Origin, anterior tubercles of transverse processes of four last cervical vertebræ. Insertion, into the cuneiform process of os occipitis. Use, to bend the head forward.

Q. What is the origin, insertion, and use of the rectus capitis anticus minor? — *A.* Origin, transverse process of atlas. Insertion, condyloid process of os occipitis. Use, to bend the head forward.

Q. What is the origin, insertion, and use of the rectus capitis lateralis? — *A.* Origin, transverse process of atlas. Insertion, outside of condyle of occiput. Use, to pull the head to one side.

Q. What is the origin, insertion, and use of the scalenus anticus? — *A.* Origin, transverse processes of fourth, fifth, and sixth cervical vertebræ. Insertion, upper surface of first rib near its cartilage.

Q. What is the origin, insertion, and use of the scalenus medius? — *A.* Origin, from transverse processes of all the cervical vertebræ. Insertion, upper part of first rib, from middle to tubercle.

Q. What is the origin, insertion, and use of the scalenus posticus? — *A.* Origin, transverse processes of fifth and sixth cervical vertebræ. Insertion, upper edge of second rib, just beyond the tubercle. Use, of these three muscles, to elevate the ribs and bend the neck to one side.

MUSCLES OF THE FACE.

Q. What is the origin, insertion, and use of the occipito frontalis? — *A.* Origin, two external thirds of superior transverse edge of occipital bone, external and posterior part of mastoid process. Insertion, integuments and muscles of eyebrows. Use, to pull the skin of neck and head back and forward, and throws the forehead into wrinkles, and elevate the supercilia.

Q. What is the origin, insertion, and use of the compressor naris? — *A.* Origin, canine fossa in superior maxilla. Insertion, into its fellow of opposite side, on dorsum of nose, and lower part os nasi. Use, to compress and dilate the nostrils.

Q. What is the origin, insertion. and use of the orbicularis palpebrarum? — *A.* Origin, internal angular process of os frontis and upper edge of tendo-occuli. Insertion, nasal process of superior maxilla and inferior edge of tendo-occuli. Use, by contraction of the upper and lower halves of the muscle, brings the eyelids together.

Q. What is the origin, insertion, and use of the corrugator supercilii? — *A.* Origin, internal angular process of os frontis. Insertion, middle of eyebrow. Use, to draw the eyebrow and skin of forehead in vertical wrinkles, and to draw them over the eye.

Q. What is the origin, insertion, and use of the levator labii superioris et alæ nasi? — *A.* Origin, first upper extremity of nasal process of superior maxilla, second edge of orbit. Inser-

tion, alæ nasi, upper lip, and orbicularis oris. Use, to draw the upper lip and ala nasi upwards.

Q. What is the origin, insertion, and use of the levator anguli oris? — *A.* Origin, anterior part of superior maxilla, between the foramen, infra-orbitarum, and first small grinder. Insertion, into corner of mouth. Use, to raise angle of mouth.

Q. What is the origin, insertion, and use of the zygomaticus minor? — *A.* Origin, upper part of malar bone. Insertion, upper lip, near commissure. Use, next muscle.

Q. What is the origin, insertion, and use of the zygomaticus major? — *A.* Origin, lower part of malar bone, and angle of the mouth. Use, of two last muscles, to draw the corner of mouth towards the cheek bone.

Q. What is the origin, insertion, and use of the depressor labii superioris et alæ nasi? — *A.* Origin, alveoli of canine and incisor teeth. Insertion, integuments of upper lip, and cartilage of septum and alæ nasi. Use, to depress upper lip and alæ nasi.

Q. What is the origin, insertion, and use of the depressor anguli oris? — *A.* Origin, base of lower jaw on side of chin. Insertion, apex inserted into corner of the mouth. Use, to draw the corner of the mouth down.

Q. What is the origin, insertion, and use of the depressor labii inferioris? — *A.* Origin, from base of lower jaw on side of chin. Insertion, into whole side of lower lip. Use, to draw the lip down.

Q. What is the origin, insertion, and use of the levator menti et labia inferioris? — *A.* Origin, alveoli of incisor teeth. Insertion, into lower lip. Use, elevates the lower lip.

Q. What is the origin, insertion, and use of the buccinator? — *A.* Origin, from root of coronoid process of lower jaw, back part of upper jaw, and roots of alveolar processes of upper and lower jaw, as far as dentes bicuspides. Insertion, into corner of mouth, and contiguous parts of upper and lower lips. Use, to draw the corners of the mouth directly back.

Q. What is the origin, insertion, and use of the orbicularis oris? — *A.* It surrounds the mouth. Use, to antagonise the other muscles of the mouth.

Q. What is the origin, insertion, and use of the masseter? — *A.* Origin, anterior portion, superior maxilla at junction of malar bone and inferior edge of it. Insertion, outer surface of angle of lower jaw. Origin, posterior portion, edge of malar bone and zygoma. Insertion, external side of angle and ramus of lower jaw. Use, when both portions act, they close the

jaws, when the external portion draws the jaw forward, internal alone draws it back.

Q. What is the origin, insertion, and use of the temporalis? — *A.* Origin, all beneath semicircular ridge on parietal bone, temporal fossa and fascia. Insertion, coronoid process of inferior maxilla to last molar teeth. Use, to pull the lower jaw directly up.

Q. What is the origin, insertion, and use of the pterygoideus internus? — *A.* Origin, inner side of external pterygoid plate and pterygoid process of palate bone. Insertion, inner side of angle of jaw, and rough surface below. Use, to close the jaw.

Q. What is the origin, insertion, and use of the pterygoideus externus? — *A.* Origin, outer side of external pterygoid plate, from great wing of sphenoid bone and back part of tuberosity of superior maxilla. Insertion, anterior and internal part of neck, of lower jaw and interarticular cartilage. Use, when the two muscles act together they draw the jaw forward, but if alternately, they produce a grinding motion.

MUSCLES OF UPPER EXTREMITY.

Q. What is the origin, insertion, and use of the deltoides? — *A.* Origin, lower edge of spine of scapula, anterior edge of acromion, and external third of clavicle. Insertion, rough surface on outer side of humerus. Use, to raise the os humeri.

Q. What is the origin, insertion, and use of the supra-spinalis? — *A.* Origin, all above the spine of scapula and fascia covering this muscle. Insertion, upper and fore part of great tuberosity of humerus. Use, to raise the arm and turn it out.

Q. What is the origin, insertion, and use of the infra-spinalis? — *A.* Origin, inferior surface of spine of scapula and dorsum, and from aponeurosis of this muscle. Use, to roll the os humeri outward and back.

Q. What is the origin, insertion, and use of the teres minor? — *A.* Origin, from the fossa and margin of inferior costa, from the space from the cervix of the bone to within an inch of its angle. Insertion, inferior depression in great tuberosity of humerus. Use, to draw os humeri down and back, and rotate it out.

Q. What is the origin, insertion, and use of the teres major? — *A.* Origin, rough flat surface on inferior angle of scapula below infra-spinatus. Insertion, inner edge of bicipital groove. Use, to roll the humerus inwards, and draw it back and down.

Q. What is the origin, insertion, and use of the subscapu-

laris? — *A.* Origin, all the surface and circumference of subscapular fossa? — Insertion, small tubercle of humerus. Use, to roll the bone in, and draw it down.

Muscles of Arm.

Q. What is the origin, insertion, and use of the biceps? — *A.* Origin, short head from coracoid process; long head, upper part of glenoid cavity of scapula. Insertion, back part of tubercle of radius. Use, to flex the forearm.

Q. What is the origin, insertion, and use of the coraco-brachialis? — *A.* Origin, point of coracoid process and tendon of short head of biceps. Insertion, internal side of humerus, about the middle, and ridge leading to internal condyle. Use, to draw the arm up and forward.

Q. What is the origin, insertion, and use of the brachialis internus? — *A.* Origin, centre of humerus by two fleshy slips on either side of insertion of deltoid and from forepart of bone to condyle. Insertion, coronoid process of ulna and rough surface beneath that process. Use, to flex the forearm and strengthen the elbow joint.

Q. What is the origin, insertion, and use of the triceps extensor cubiti? — *A.* Origin, long head, from lower part of neck of scapula and anterior portion of inferior costa; second head, below insertion of teres minor ridge on outer side of humerus and behind the ridge, intermuscular ligament and external condyle; third head, below insertion of teres major ridge to internal condyle, and internal intermuscular ligament. Insertion, olecranon process of ulna. Use, to extend the forearm.

Q. What is the origin, insertion, and use of the anconeus? — *A.* Origin, external condyle, posterior and inferior part. Insertion, external surface of olecranon, and superior fifth of posterior surface of ulna. Use, to extend the forearm.

MUSCLES OF THE FOREARM.

Q. What is the origin, insertion, and use of the pronator radii teres? — *A.* Origin, anterior part of internal condyle, fascia of forearm, and intermuscular septa and coronoid process of ulna. Insertion, outer and back part of radius about centre. Use, to roll the hand in.

Q. What is the origin, insertion, and use of the flexor carpi radialis? — *A.* Origin, inner condyle and intermuscular septa. Insertion, base of metacarpal bone of index finger. Use, to bend the hand and draw it to the radius.

Q. What is the origin, insertion, and use of the palmaris longus? — *A.* Origin, inner condyle and fascia of forearm. Insertion, near root of thumb in annular ligament and palmar aponeurosis. Use, to bend the hand and to make tense the palmar aponeurosis.

Q. What is the origin, insertion, and use of the flexor carpi ulnaris? — *A.* Origin, inner condyle, inner side of olecranon process, inner edge of ulna and fascia of forearm. Insertion, pisiforme bone and base of fifth metacarpal bone. Use, to bend the hand and draw it to the ulna.

Q. What is the origin, insertion, and use of the flexor digitorum sublimus perforatus? — *A.* Origin, inner condyle and lateral ligament, condyloid process, and radius below its tubercle. Insertion, anterior part of second phalanx. Use, to bend the second phalanges on the first, and to clench the hand and bend it on the forearm.

Q. What is the origin, insertion, and use of the flexor digitorum profundus perforans? — *A.* Origin, three superior portions of anterior surface of ulna, internal half of interosseous ligament, and from radius below tubercle. Insertion, last phalanx of each finger. Use, to bend the last phalanges of the fingers, and may flex the arm and hand like the preceding muscle.

Q. What is the origin, insertion, and use of the flexor longus pollicis? — *A.* Origin, fore part of radius below tubercle within two inches of carpus, and from coronoid process. Insertion, last phalanx of thumb. Use, to bend the last joint of thumb.

Q. What is the origin, insertion, and use of the pronator quadratus? — *A.* Origin, inferior fifth of anterior surface of ulna. Insertion, anterior part of inferior fourth of radius. Use, to rotate the radius inwards.

Q. What is the origin, insertion, and use of the supinator radii longus? — *A.* Origin, external ridge of humerus from below deltoid to within two inches of outer condyle, and from intermuscular ligament. Insertion, rough surface on outside of radius near styloid process. Use, to roll the radius outwards.

Q. What is the origin, insertion, and use of the extensor carpi radialis longior? — *A.* Origin, ridge of humerus between supinator longus and external condyle. Insertion, back part of carpal end of metacarpal bone of index finger. Use, to extend the hand.

Q. What is the origin, insertion, and use of the extensor carpi radialis brevior? — *A.* Origin, inferior and posterior part of external condyle and lateral ligament. Insertion, carpal extremity of the third metacarpal bone. Use, to extend the hand.

Q. What is the origin, insertion, and use of the extensor carpi ulnaris? — *A.* Origin, external condyle, fascia, and intermuscular septa, and from the ulna. Insertion, carpal end of the fifth metacarpal bone. Use, to extend the hand.

Q. What is the origin, insertion, and use of the extensor digitorum communis? — *A.* Origin, external condyle, fascia, and intermuscular process, and from the ulna. Insertion, phalanges of four fingers. Use, to extend all the joints of the fingers.

Q. What is the origin, insertion, and use of the supinator radii brevis? — *A.* Origin, external condyle, lateral and coronary ligaments, ridge on outer side of ulna. Insertion, upper third of external and anterior surface of this bone, above its tubercle to insertion of pronator teres. Use, to rotate the radius out.

Q. What is the origin, insertion, and use of the extensor ossis metacarpi pollicis manus? — *A.* Origin, middle of posterior part of ulna below anconeus, interosseous ligament, posterior surface of radius below supinator radii brevis. Insertion, os trapezium and metacarpal bone of thumb. Use, to extend metacarpal bone of thumb.

Q. What is the origin, insertion, and use of the extensor minor pollicis manus? — *A.* Origin, back of ulna below its middle from interosseous ligament and radius. Insertion, posterior part of first phalanx, and often of second. Use, to extend the first phalanx.

Q. What is the origin, insertion, and use of the extensor major pollicis manus? — *A.* Origin, posterior surface of ulna, above its centre and interosseous membrane. Insertion, posterior part of last phalanx. Use, to extend the phalanx.

Q. What is the origin, insertion, and use of the indicator? — *A.* Origin, middle of posterior surface of ulna, interosseous membrane. Insertion, second and third phalanges.

Muscles of Hand.

Q. What is the origin, insertion, and use of the palmaris brevis? — *A.* Origin, annular ligament and palmar fascia. Insertion, integuments on inner side of palm of hand. Use, to contract the skin of the hand.

Q. What is the origin, insertion, and use of the lumbricales? — *A.* Origin, outer side of the tendons of the flexor profundus, near carpus and a little beyond the annular ligament. Insertion, middle of first phalanx into tendinous expansion covering back of each finger. Use, to bend the first phalanges.

Q. What is the origin, insertion, and use of the abductor pollicis manus? — *A.* Origin, anterior part of annular ligament, os naviculare and trapezius. Insertion, outside of base of first phalanx and into both phalanges. Use, to draw the thumb from the forefingers.

Q. What is the origin, insertion, and use of the opponeus pollicis? — *A.* Origin, annular ligament and os trapezium. Insertion, anterior extremity of metacarpal bone of thumb. Use, to draw the metacarpal bone inwards.

Q. What is the origin, insertion, and use of the flexor brevis pollicis manus? — *A.* Origin, external head from inside of annular ligament, and trapezium and scaphoid bones. Insertion, external sesamoid and base of first phalanx of thumb. Second head: Origin, from os magnum and base of metacarpal bone of middle finger. Insertion, internal sesamoid bone and base of first phalanx. Use, to bend the first phalanx of the thumb.

Q. What is the origin, insertion, and use of the adductor pollicis manus? — *A.* Origin, three-fourths of anterior surface of third metacarpal bone. Insertion, inner side of root of first phalanx of thumb. Use, to pull the thumb towards the fingers.

Q. What is the origin, insertion, and use of the abductor indicis manus? — *A.* Origin, metacarpal bones of forefinger and half of that of the thumb. Insertion, outer side of base of first phalanx. Use, to draw the forefinger from the others.

Q. What is the origin, insertion, and use of the abductor minimi digiti manus? — *A.* Origin, annular ligament and pisiforme bone. Insertion, ulnar side of first phalanx. Use, to draw the little finger from the rest.

Q. What is the origin, insertion, and use of the flexor bevis minimi digiti manus? — *A.* Origin, annular ligament and os unciforme. Insertion, base of first phalanx of little finger. Use, to bend the little finger.

Q. What is the origin, insertion, and use of the adductor metacarpi minimi digiti? — *A.* Origin, internal to the last and overlapped by it. Insertion, all the metacarpal bone of this finger. Use, to bring the metacarpal bone of little finger to wrist.

Q. What is the origin, insertion, and use of the prior indicis? — *A.* Origin, from base and side of the first digital metacarpal bone. Insertion, into radial side of first phalanx. Use, to draw the forefinger to the thumb.

Q. What is the origin, insertion, and use of the posterior

indicis? — *A.* Origin, from base and ulnar side of the first digital metacarpal bone. Insertion, in ulnar side of first phalanx of forefinger. Use, to draw the forefinger to the others.

Q. What is the origin, insertion, and use of the prior annularis? — *A.* From the base and radial side of metacarpal bone of third finger. Insertion, radial side of first phalanx of third finger. Use, to draw that finger towards the thumb.

Q. What is the origin, insertion, and use of the interosseous digiti auricularis? — *A.* Origin, radial side and base of metacarpal bone of little finger. Insertion, into radial side of first phalanx of same finger. Use, to draw the little finger to the others.

Q. What is the origin, insertion, and use of the prior medii? — *A.* Origin, opposed roots and sides of the metacarpal bones of the fore and middle finger. Insertion, into radial side of first phalanx of middle fingers. Use, to draw the middle finger to the thumb.

Q. What is the origin, insertion, and use of the posterior medii? — *A.* Origin, from the opposite sides and roots of the metacarpal bones of middle and ring finger. Insertion, into ulnar side of first phalanx of middle finger. Use, to draw the middle finger towards the little.

Q. What is the origin, insertion, and use of the posterior annularis? — *A.* Origin, from opposed sides and roots of the metacarpal bones of ring and little finger. Insertion, into ulnar side of first phalanx of ring finger. Use, to draw the ring to the little finger.

INFERIOR EXTREMITY.

Muscles of the Thigh.

Q. What is the origin, insertion, and use of the tensor vaginæ femoris? — *A.* Origin, anterior superior spinous process of ilium. Insertion, duplicature of fascia lata on outside of thigh. Use, rotate the foot inward, and make tense the fascia.

Q. What is the origin, insertion, and use of the Sartorius? — *A.* Origin, anterior superior spinous process of ilium. Insertion, upper end of tibia. Use, to bend the leg and draw it obliquely in.

Q. What is the origin, insertion, and use of the rectus femoris? — *A.* Origin, from anterior inferior spinous process of ilium and from acetabulum. Insertion, upper edge of patella. Use, to extend the leg.

Q. What is the origin, insertion, and use of the vastus ex-

ternus? — *A.* Origin, just below the trochanter major, outer edge of linea aspera, and upper half of line running to external condyle. Insertion, external edge of tendon of rectus, and from external and upper part of patella. Use, to extend the leg.

Q. What is the origin, insertion, and use of the vastus internus? — *A.* Origin, just on level with trochanter minor, inner edge of linea aspera, and from line leading to internal condyle. Insertion, inner edge of tendon of rectus, and edge of patella. Use, to extend the leg.

Q. What is the origin, insertion, and use of the cruræus? — *A.* Origin, anterior and external part of femur, as far as linea aspera. Insertion, posterior face of tendon of rectus, and upper surface of patella. Use, to extend the leg.

Q. What is the origin, insertion, and use of the gracilis? — *A.* Origin, lower half of symphysis and inner edge of descending ramus of pubis. Insertion, superior part of internal surface of tibia. Use, to flex the leg.

Q. What is the origin, insertion, and use of the pectineus? — *A.* Origin, linea innominata, or the horizontal portion of pubis. Insertion, into linea aspera below the trochanter minor. Use, to draw the thigh inwards and forwards.

Q. What is the origin, insertion, and use of the adductor longus? — *A.* Origin, anterior surface of pubis between spine and symphysis. Insertion, middle third of linea aspera.

Q. What is the origin, insertion, and use of the adductor brevis? — *A.* Origin, anterior inferior surface of pubis, between symphysis and thyroid foramen. Insertion, superior third of internal root of linea aspera, below lesser trochanter.

Q. What is the origin, insertion, and use of the adductor magnus? — *A.* Origin, anterior surface of descending ramus of pubis, ramus of ischium, and external border of tuberosity of ischium. Insertion, rough ridge, leading from great trochanter to linea aspera, linea aspera and internal condyle of femur. Use, the combined use of these three muscles is to draw the thigh inwards, and are sometimes called the triceps adductor femoris.

Q. What is the origin, insertion, and use of the glutæus maximus? — *A.* Origin, posterior third of spine of ilium, side of sacrum below it, side of os coccygis, and large sacro-sciatic ligament. Insertion, rough edge leading from trochanter to linea aspera, upper third of linea aspera, and fascia lata. Use, to draw the thigh back and keep the trunk erect.

Q. What is the origin, insertion, and use of the glutæus medius? — *A.* Origin, all spine of ilium except posterior part,

and from dorsum between spine and semicircular ridge, extending from anterior superior spine to sciatic notch, and from lunated edge of the os ilium, and inner part of fascia femoris which covers it. Insertion, upper and outer part of great trochanter. Use, to draw the thigh back and out.

Q. What is the origin, insertion, and use of the glutæus minimus? — *A.* Origin, inferior semicircular ridge or dorsum of ilium, rough surface between it and edge of acetabulum. Insertion, upper and anterior part of great trochanter. Use, to abduct the thigh and rotate the limb inwards.

Q. What is the origin, insertion, and use of the pyriformis? — *A.* Origin, anterior surface of second, third, and fourth divisions of sacrum, and from the great sciatic ligament and upper and back part of ilium. Insertion, upper part of digital fossa at root of trochanter. Use, to rotate the limb in.

Q. What is the origin, insertion, and use of the gemini? — *A.* Origin, the upper one from the posterior part of the root of the spine of ischium. The lower one from the upper back part of tuberosity. Insertion, together at posterior part of the root of trochanter major. Use, to rotate the limb inwards.

Q. What is the origin, insertion, and use of the obturator internus? — *A.* Origin, fleshy from the pelvic margin of foramen thyroideum from the membrane covering the base, except where the vessels pass out, plane of ischium, below linea innominata. Insertion, digital fossa of great trochanter. Use, to rotate the limb outwards.

Q. What is the origin, insertion, and use of the quadratus femoris? — *A.* Origin, external surface of tuber ischii. Insertion, inferior and superior part of great trochanter and the line between the two trochanters. Use, to rotate the limb outward.

Q. What is the origin, insertion, and use of the obturator externus? — *A.* Origin, inferior surface of obturator ligament. Insertion, lower part of digital fossa. Use, to rotate the thigh out.

Q. What is the origin, insertion, and use of the biceps flexor cruris? — *A.* Origin, long head, outer and back part of tuber ischii; short head, linea aspera below insertion of glutæus maximus, within two inches of external condyle. Insertion, head of fibula. Use, to flex the leg on the thigh.

Q. What is the origin, insertion, and use of the semi-tendinosus? — *A.* Origin, great tuberosity of ischium within the biceps, and continues within its tendon three inches. Insertion, anterior angle of tibia below tubercle. Use, to flex the leg on thigh.

Q. What is the origin, insertion, and use of the semi-mem

branosus ? — *A.* Origin, upper and outer part of tuber ischii there divides and is — Inserted, the first process into external condyle of femur; second process into posterior part of heads of tibia and fibula, third into the head of tibia. Use, to flex the leg on the thigh.

Muscles of the Leg.

Q. What is the origin, insertion, and use of the tibialis anticus ? — *A.* Origin, head of tibia, outer surface, spine, interosseous ligament, and from internal face of fascia of the leg. Insertion, inner side of great cuneiform bone, and base of first metatarsal. Use, to bend the foot and present the sole obliquely in.

Q. What is the origin, insertion, and use of the extensor longus digitorum pedis ? — *A.* External part of head of tibia, and fibula, three-fourths of this bone, part of interosseous ligament, fascia of leg, and intermuscular septa. Insertion, last phalanx of each of four external toes. Use, to extend the toes, and bend the foot.

Q. What is the origin, insertion, and use of the peroneus tertius ? — *A.* Origin, anterior angle of fibula at the lower half. Insertion, base of metatarsal bone of little toe. Use, to bend the foot.

Q. What is the origin, insertion, and use of the extensor proprius pollicis pedis ? — *A.* Origin, inner edge of middle third of fibula, interosseous ligament, lower part of tibia. Insertion, into the base of the first and second phalanx of great toe. Use, to extend the great toe.

Q. What is the origin, insertion, and use of the peronæus longus ? — *A.* Origin, around the head of the fibula, adjacent surface of tibia, upper half of external angle of fibula, fascia, and intermuscular septa. Insertion, outer side of metatarsal bone of great toe, and sesamoid bone, internal cuneiform and base of second metatarsal bone. Use, to extend the foot, and to incline the sole obliquely inwards.

Q. What is the origin, insertion, and use of the peronæus brevis ? — *A.* Origin, outer and back part of lower half of fibula, and intermuscular septa. Insertion, base of metatarsal bone of little toe, and into the os cuboides. Use, to extend the foot, and present the sole obliquely down.

Triceps Suræ. — *Q.* What is the origin, insertion, and use of the gastrocnemius ? — *A.* Origin, internal head from upper and back part of internal condyle of femur and oblique ridge above it, the external from above the external condyle. Insertion, lower and back part of os calcis.

Q. What is the origin, insertion, and use of the soleus ? — *A.*

Origin, external head from back part of head and superior third of fibula; internal head from middle third of tibia, and unites with the above muscle to form the tendo-Achillis. Insertion, lower and back part of os calcis. Use, this muscle with the preceding extends the foot, and is all important in walking.

Q. What is the origin, insertion, and use of the plantaris? — *A.* Origin, back part of femur above external condyle and posterior ligament of knee. Insertion, posterior part of os calcis anterior to tendo-Achillis. Use, to extend the foot.

Q. What is the origin, insertion, and use of the popliteus? — *A.* Origin, depression on outer condyle. Insertion, triangular surface on superior fifth of posterior surface of tibia.

Q. What is the origin, insertion, and use of the flexor longus digitorum pedis perforans? — *A.* Origin, posterior flat surface of tibia within three inches of ankle, from fascia and intermuscular septa. Insertion, last phalanx of four lesser toes. Use, to flex the small toes and extend the foot.

Q. What is the origin, insertion, and use of the flexor longus pollicis pedis? — *A.* Origin, two inferior thirds of fibula. Insertion, last phalanx of great toe. Use, to bend the great toe.

Q. What is the origin, insertion, and use of the tibialis posticus? — *A.* Origin, posterior and internal part of fibula, upper part of tibia and interosseous ligament. Insertion, tuberosity or inferior internal part of os naviculare, internal cuneiform bone, cuboid, and second and third metatarsal. Use, to extend the foot and present the sole obliquely inwards.

Muscles of the Foot.

Q. What is the origin, insertion, and use of the extensor brevis digitorum pedis? — *A.* Origin, upper and anterior part of os calcis, cuboid bone, astragalus and annular ligament. Insertion, internal tendon into base of first phalanx of great toe and the three others, and join the outer edge of corresponding tendon of extensor longus, and assist in forming aponeurosis to each toe. Use, to extend the toes.

Q. What is the origin, insertion, and use of the flexor brevis digitorum pedis? — *A.* Origin, inferior internal part of os calcis, annular ligament, plantar aponeurosis, and intermuscular septa. Insertion, second phalanx of four outer toes. Use, to bend the second joint of toes.

Q. What is the origin, insertion, and use of the flexor accessorius? — *A.* Origin, inferior and internal part of os calcis. Insertion, upper and outer part of tendon of flexor digitorum longus. Use, to assist in flexing toes.

Q. What is the origin, insertion, and use of the lumbricales pedis? — *A.* Origin, tendons of flexor longus. Insertion, internal side of first phalanx of four lesser toes. Use, to increase flexion of toes and draw them in.

Q. What is the origin, insertion, and use of the abductor pollicis pedis? — *A.* Origin, lower and inner part of os calcis, internal annular ligament, plantar aponeurosis, and internal muscular septa. Insertion, internal sesamoid bone, internal side of first phalanx of great toe. Use, to draw the great toe from the rest.

Q. What is the origin, insertion, and use of the flexor brevis pollicis pedis? — *A.* Origin, lower and anterior part of os calcis, external cuneiform bone. Insertion, sesamoid bones beneath phalanx of great toe. Use, to flex the great toe.

Q. What is the origin, insertion, and use of the adductor pollicis pedis? — *A.* Origin, calcaneo-cuboid ligament, base of second and third metacarpal bones. Insertion, external sesamoid bone within the last. Use, to draw the great toe towards the others.

Q. What is the origin, insertion, and use of the abductor minimi digiti pedis? — *A.* Origin, outer tuberosity of os calcis, exterior part of base of metatarsal bone of little toe. Insertion, into exterior part of base of metatarsal bone of little toe. Use, to draw the little toe from others.

Q. What is the origin, insertion, and use of the transversalis pedis? — *A.* Origin, anterior extremities of four external metatarsal bones. Insertion, external sesamoid bone of great toe. Use, to approximate the heads of metatarsal bones.

Q. What is the origin, insertion, and use of the abductor indicis pedis? — *A.* Origin, from double head at opposed surfaces of roots of metatarsal bones of great toe and first small toe. Insertion, inside of root of first joint of first small toe. Use, pulls it in.

Q. What is the origin, insertion, and use of the adductor indicis pedis? — *A.* Origin, from opposed roots of metatarsal bones of first and second small toes. Insertion, into outside of phalanx of same toe by tendon. Use, to draw toe inwards.

Q. What is the origin, insertion, and use of the adductor medii digiti? — *A.* Origin, opposite surfaces of roots of second and third metatarsal bones of lesser toes. Insertion, outside of base of first phalanx of second small toe. Use, to draw this toe out.

Q. What is the origin, insertion, and use of the adductor tertii digiti? — *A.* Origin, from opposite roots of metatarsal

bones of third and fourth small toes. Insertion, outside of root of first phalanx of third small toe. Use, to draw the toe out.

Q. What is the origin, insertion, and use of the abductor medii digiti? — *A.* Origin, inside of metatarsal bone of second small toe. Insertion, inside of first phalanx of second toe. Use, to draw the toe inwards.

Q. What is the origin, insertion, and use of the abductor tertii digiti? — *A.* Origin, inside of metatarsal bone of third toe. Insertion, inside of base of first phalanx of third toe. Use, to draw the toe inwards.

Q. What is the origin, insertion, and use of the adductor digiti minimi? — *A.* Origin, inside of base of metatarsal bone of fourth small toe. Insertion, into the inside of first phalanx of little toe. Use, to draw the toe inwards.

BURSÆ MUCOSÆ AND FASCIA.

Q. What are the bursæ mucosæ? — *A.* They are mucous bags of a delicate transparent texture, and whose internal surfaces are lubricated by a synovial fluid.

Q. What are their use? — *A.* To allow the ready play of tendons over bone, &c.

Q. Where are they generally situated? — *A.* They are chiefly situated in the extremities between tendons which rub against each other; or where they play on the surface of bones or joints, and between the integuments and certain prominent points of bone, viz., at the knee, elbow, and knuckles.

Q. What is their structure? — *A.* Similar to that of the synovial membranes of joints.

Q. How are they connected with the surrounding parts? — *A.* They adhere with great firmness to the parts by means of cellular tissue.

Q. What is their internal arrangement? — *A.* Their internal surfaces are in contact, and are only lubricated by the synovial fluid which is formed in them.

Q. What are the fascia? — *A.* Tendinous expansions, to brace and protect the muscles whilst in action, and support the form of parts; they are sometimes called aponeuroses.

Q. Enumerate the more important fascia. — *A.* The temporal fascia, the fascia of the arm, the fascia of the forearm, the palmar and the femoral fascia, the fascia of the leg, and the plantar fascia.

Q. What are the attachments of the temporal fascia? — *A.* It is attached to the temporal ridges of the os frontis and ossa pa-

rietalia, and the upper edge of the zygoma and posterior edge of the os malæ, and temporal process of the os frontis.

Q. From what is the fascia of the forearm principally derived? — *A.* From the tendon of the biceps.

Q. Whence is the palmar fascia derived? — *A.* From the internal annular ligament, and the tendon of the palmaris longus.

Q. Whence is the femoral fascia derived? — *A.* From the tensor vaginæ femoris, and glutæus maximus; it is also called the fascia lata of the thigh.

Q. Where are the fasciæ of the extremities strongest? — *A.* On the inner and anterior part of the forearm; and the fascia lata at the outer part of the thigh.

MOUTH AND ORGAN OF TASTE.

Q. What is meant by the mouth? — *A.* That cavity bounded above by the palatine arch, below by the tongue, before by the lips, and behind by the velum palati and pharynx. The anterior aperture is called facial; the posterior, pharyngeal.

Q. What bones contribute to form the mouth? — *A.* The superior and inferior maxillary, the ossa palati, and the teeth.

Q. What are the external parts of the mouth? — *A.* The lips and cheeks; the former are at the exterior aperture of the mouth covered by a peculiar membrane ranking between mucous membrane and the skin, covered by villi. The latter are muscles covered externally by integuments, fat, &c., and lined by mucous membrane, and supplied with glands.

Q. What are the commissures of the lips? — *A.* The union of the two.

Q. What other parts enter into a description of the lips? — *A.* The fossula or groove extending from the septum narium, and the frœna, one for the upper and one for the lower, consisting of folds of membrane fixing the lips to the jaws opposite the incisors.

Palatine Muscles.

Q. What is the origin, insertion, and use of the constrictor isthmi faucium? — *A.* Origin, middle of soft palate near the root of the uvula. Insertion, side of tongue near its root. Use, to close the opening between the mouth and pharynx.

Q. What is the origin, insertion, and use of the palato-pharyngeus? — *A.* Origin, middle of soft palate near the root of the uvula. Insertion, into pharynx at a space between the middle and lower constrictors, and into superior posterior margin of thyroid cartilage. Use, to draw the soft palate downward.

Q. What is the origin, insertion and use of the circumflexus or tensor palati? — *A.* Origin, spinous process of sphenoid bone, behind foramen ovale, and from contiguous part of Eustachian tube, and by a broad tendon into soft palate, near its middle, and into posterior lunated edge of palate bone. Use, to spread out the soft palate.

Q. What is the origin, insertion, and use of the levator palati? — *A.* Origin, point of petrous bone, and contiguous part of Eustachian tube. Insertion, soft palate. Use, to draw the soft palate up.

Q. What is the origin, insertion, and use of the azygos uvulæ? — *A.* Origin, posterior pointed termination of middle palate suture; and, insertion, down into the uvula. Use, to draw the uvula up, and diminish vertical breadth of soft palate.

Tongue.

Q. What is the origin and insertion of the stylo-glossus? — *A.* Origin, styloid process. Insertion, side of tongue.

Q. What is the origin and insertion of the hyo-glossus? — *A.* Origin, from cornu and body of os hyoides. Insertion, side of tongue.

Q. What is the origin and insertion of the genio-hyo-glossus? — *A.* Origin, tubercle on the posterior face of symphysis of lower jaw. Insertion, mesial line of tongue from apex to base, and body and lesser cornu of os hyoides.

Q. What is the origin and insertion of the lingualis? — *A.* Origin, fasciculus of fibres on inferior surface of tongue, running from base to apex.

Q. What is the origin and insertion of the superficialis linguæ? — *A.* Origin, it covers the upper surface of the tongue below the mucous membrane, commences on a line with the greater papillæ, and advances to the tip.

Q. Describe the transversalis linguæ. — *A.* It consists of small scattered fasciculi which traverse the tongue at right angles.

Q. Describe the verticales linguæ. — *A.* They consist of small scattered fasciculi like the preceding, and cross them at right angles in traversing the thickness of the tongue.

Pharynx.

Q. What is the pharynx? — *A.* It is that membranous and muscular bag expanded above and contracted below, and terminating in the gullet or œsophagus.

Q. How is it situated? — *A.* Between the mouth, nares, and larynx, below the cuneiform process of the os occipitis, before the cervical vertebræ, and above the œsophagus.

Q. Of what is it composed? — *A.* Of three coats, an external one, muscular, a cellular coat, and a mucous coat.

Q. What is its use? — *A.* For deglutition, receiving the food and transmitting it to the œsophagus.

Muscles of the Pharynx.

Q. What is the origin, insertion, and use of the musculus constrictor pharyngis inferior? — *A.* Origin, side of cricoid cartilage, inferior cornu, and posterior part of ala of thyroid cartilage. Insertion, mesial line on back of pharynx. Use, to compress the pharynx, and raise it and the larynx upward.

Q. What is the origin, insertion, and use of the constrictor pharyngis medius? — *A.* Origin, cornu and appendix of os hyoides, stylo-hyoid, and thyreo-hyoid ligaments. Insertion, mesial line and cuneiform process of os occipitis. Use, to compress the pharynx, and to draw it and the os hyoides upward.

Q. What is the origin, insertion, and use of the constrictor pharyngis superior? — *A.* Origin, petrous bone, lower part of internal pterygoid plate and hamular process, from intermaxillary ligament; posterior third of mylo-hyoid ridge, and side of base of tongue. Insertion, cuneiform process of os occipitis, middle line on back of pharynx. Use, to contract the fauces.

Œsophagus.

Q. What is the œsophagus? — *A.* The tube in front of the spine and behind the trachea, to conduct food from the pharynx to the stomach.

Q. What is its shape and length? — *A.* It is cylindrical, and from nine to ten inches in length, increasing in size from above downwards.

Q. Of how many coats is it composed, and what are they? — *A.* Three, muscular, cellular, and mucous; the muscular is external, and consists of external and longitudinal fibres, and internal circular; the cellular and mucous coats have very little peculiar to them.

Q. What peculiar arteries and nerves supply the œsophagus? — *A.* The œsophageal, and nerves from the pneumogastric.

TEETH.

Q. What is the number of the teeth in the adult? — *A.* Thirty-two.

Q. Where are they situated? — *A.* In the alveolar processes of each jaw.

Q. Of what substances are the teeth composed? — *A.* Of two, one internal, of the nature of bone, and the other external and hard, called enamel.

Q. Upon what part of the teeth is the enamel thickest? — *A.* Upon the tops.

Q. How are the fibres of the enamel arranged? — *A.* They are disposed as radii from the centre of each tooth.

Q. How are the fibres of the bony part of the teeth arranged? — *A.* They are generally arranged in a perpendicular direction.

Q. Into what portions is each tooth divided? — *A.* It is divided into a large portion external to the socket, called its corona; into a narrow part below this, called its neck; and one, two, or three processes proceeding from the neck, called the roots.

Q. Are the fangs, neck, and corona of each tooth hollow? — *A.* Yes.

Q. What passes through these hollows? — *A.* A branch of an artery, vein, and nerve.

Q. Into what classes are the teeth divided? — *A.* Into incisores, canini, and molares.

Q. What is the number of the incisor teeth? — *A.* Eight; four in the front part of each jaw.

Q. What is the form of the incisor teeth? — *A.* They somewhat resemble wedges, having a sharp cutting edge.

Q. Which of the upper incisors are the largest? — *A.* The two middle ones are the largest in the upper jaw.

Q. Which of the lower incisores are the largest? — *A.* The lateral ones.

Q. What is the situation of the canini? — *A.* They are placed on each side of the incisores.

Q. What is their number? — *A.* They are four in number.

Q. What is their form? — *A.* They are larger and more pointed than the incisores, and resemble the tooth of the dog, from which they take their name.

Q. What is the situation of the molares? — *A.* They are placed behind the canini.

Q. What is their number? — *A.* Twenty.

Q. Which of the molares have been called bicuspides? — *A.* The two anterior on each side of both jaws.

Q. What is their form? — *A.* They have a double pointed corona, and have one or two fangs.

Q. Which of the molares have been termed dentes sapientiæ? —*A.* The posterior molares, one on each side of both jaws.

Q. What is their form? — *A.* They have a large irregular corona, and generally but one fang.

Q. What is the form of the third and fourth molares? — *A.* They have a large corona, and in the lower jaw have two, and in the upper three roots.

Q. How are the teeth formed? — *A.* From a small pulpy substance, placed in the alveolar processes of the jaws.

Q, When are the pulps of the teeth first discernible? — *A.* About the fourth month of the fœtal state.

Q. What is the appearance of the pulps of the teeth? — *A.* They are firm, semitransparent, and supplied with numerous vessels.

Q. How are the pulps of the teeth invested? — *A.* By thin capsules.

Q. Into what layers are the membranes of the pulps of the teeth divisible? — *A.* Into two layers, of which the external is vascular and spongy.

Q. What is interposed between the capsule and the pulp of teeth? — *A.* A small portion of fluid.

Q. When and how does ossification commence in the pulps of the teeth? — *A.* About the eighth month, and from several points.

Q. To what part of the teeth are their capsules connected? — *A.* To the neck of each tooth.

Q. What is secreted by the capsules of the teeth? — *A.* The enamel.

Q. How many teeth compose the first set? — *A.* Twenty.

Q. Of what kinds does the first set consist? — *A.* Eight incisivi, four canini, and eight molares.

Q. About what time do the teeth begin to appear through the gums? — *A.* About the age of six months, though sometimes earlier, and are completed in two years.

Q. When do the teeth begin to shed? — *A.* About seven years of age.

Q. When are the teeth completely shed? — *A.* At about fourteen years of age this process is generally completed.

Q. What is the immediate cause of the shedding of the teeth? — *A.* It is effected by the absorption of the fangs of the first set, and of their sockets.

Q. What are the connexions of the teeth? — *A.* They are articulated to the alveolar processes of the jaws.

Q. What are their uses? — *A.* They are the direct instru

ments of mastication, and are of essential use in pronunciation.

Q. What are the internal parts of the mouth? — *A.* They are the gums, the palate, the tongue, the amygdalæ, and the salivary glands and ducts.

Gums.

Q. What is the situation of the gums? — *A.* They cover both the sides of the alveolar processes, and surround the necks of all the teeth.

Q. What is their structure? — *A.* They are composed of a firm, spongy, elastic, and very vascular substance, firmly adhering, by means of periosteum, to the alveolar processes.

Q. By what membrane are they invested? — *A.* By a fine membrane, which is a continuation of that which lines the lips and cheeks.

Palate.

Q. What is the situation and form of the palate? — *A.* It is surrounded by the teeth of the upper jaw, and extends to the great opening of the pharynx; it resembles an arch.

Q. How is it divided, and which part is most anterior? — *A.* It is divided into the hard and soft palate; the hard palate is most anterior, and is composed of the palatine processes of the upper jaw and ossa palati.

Q. By what membrane is the palate covered? — *A.* The membrane which covers it resembles that which lines the superior and middle parts of the pharynx; it is studded with small glands.

Q. How is the soft part of the palate formed? — *A.* The soft palate, or velum palati, is formed by a continuation of that membrane which lines the hard palate and the cavity of the nose, and by various muscles lying in this duplicature.

Q. What is its form? — *A.* It resembles an arch, placed transversely above the root of the tongue, and forming anteriorly one continued surface with the hard palate.

Q. To what part is the uvula attached? — *A.* To its middle part.

Q. What is its form? — *A.* It is a conical body.

Q. What is its structure? — *A.* It is formed by a small muscle enveloped in the glandular membrane which lines these parts.

Q. What are the arches of the palate? — *A.* They are two

folds, which proceed downward and to each side; so that the arch on each side is double.

Q. In what direction do the two arches on each side proceed from the uvula? — *A.* The anterior arch runs towards the side of the basis of the tongue; and the posterior towards the side of the pharynx.

Q. What is situated between the anterior and posterior arch of the palate on each side? — *A.* An irregular glandular body, called the tonsil or amygdaloid gland.

Tongue.

Q. Into what parts is the tongue divided? — *A.* Into a base and apex, a superior and inferior side, and two edges.

Q. Of what is it composed? — *A.* It chiefly consists of soft muscular fibres, intermixed with a medullary or fatty substance.

Q. By what membrane is the tongue invested? — *A.* Its upper side consists of a thick membrane, studded all over with small eminences, and covered by a continuation of the cuticle; it is likewise continued over the lower side, but here it is smooth, forming only a fold in the middle, called frænum.

Q. What are the papillæ? — *A.* The small eminences on its superior surface.

Q. How many kinds of papillæ are observable on the tongue? — *A.* There are three kinds.

Q. Where are the papillæ maximæ situated? — *A.* On the basis of the tongue, in small fossulæ.

Q. What is their form? — *A.* They resemble in miniature a mushroom, having a narrow neck, and being depressed in the middle. They secrete a salivary or mucilaginous fluid.

Q. Where are the papillæ mediæ situated? — *A.* Chiefly in the middle and anterior parts of the tongue.

Q. What is their form and size? — *A.* They are slightly convex and cylindrical, and next in size to the maximæ.

Q. Where are the papillæ villosæ and filiforme? — *A.* They occupy the whole surface of the upper side of the tongue, and even the interstices of the other papillæ.

Q. What is their form and size? — *A.* They are of a conical form, and the smallest papillæ of the tongue.

Salivary Glands.

Q. Enumerate the salivary glands, their situation and use? — *A.* They are three in number; namely, the parotid, the submaxil-

lary, and the sublingual; they are situated on each side of the face, and secrete the saliva or spittle.

Q. What other glands contribute to augment the juices of the mouth? — *A.* There are numerous glands distributed under the membrane, lining all parts of the mouth, which perform this office. They are named from the parts on which they are situated; namely, the labial on the inside of the lips, the palatine on the palate, the lingual on the tongue, the buccal on the inside of the cheeks, &c., &c.

Parotid Glands.

Q. Where is the parotid gland situated? — *A.* It is the largest of the lateral glands; it is situated between the external ear and the ramus and angle of the lower jaw, extending over some part of the masseter.

Q. From what part of the gland does its duct proceed? — *A.* Its excretory duct, called Steno's duct, arises from several lesser ducts at its anterior and upper part.

Q. What is its course? — *A.* It passes obliquely over the outside of the masseter muscle.

Q. Where does this duct open into the mouth? — *A.* It perforates the cheek, and opens into the mouth opposite the interstice, between the second and third molar teeth.

Sub-maxillary Glands.

Q. Where is the sub-maxillary gland situated? — *A.* On the inside of the angle of the lower jaw, near the internal pterygoid muscle.

Q. From whence does its excretory duct proceed? — *A.* From that side of the gland which is turned to the hypo-glossus. It is called Wharton's duct.

Q. What is its course? — *A.* It advances between the genio-glossus and mylo-hyoideus muscles, under the sublingual glands.

Q. Where does this duct open? — *A.* On one side of the frænum of the tongue.

Sublingual Glands.

Q. Where are the sublingual glands situated? — *A.* Under the anterior portion of the tongue, between the genio-glossus and mylo-hyoideus muscles.

Q. Where do its ducts terminate? — *A.* It has several small ducts, which open close under the side of the tongue, near the gums, a little farther back than the frænum.

Amygdalæ or Tonsils.

Q. Where are the amygdalæ situated? — *A.* In the interstice between the arches of the palate on each side.

Q. What is the form of the amygdalæ? — *A.* They somewhat resemble the outside of an almond shell, being uneven and covered with several foramina; they are filled with numerous and large follicles.

Q. What is their use? — *A.* They secrete a viscid fluid.

Thyroid Gland.

Q. Where is the thyroid gland situated? — *A.* On the anterior and inferior part of the neck; its middle portion lies on the crico-thyroidei, and its lateral portions on the thyro-hyoidei muscles.

Q. What is its form? — *A.* It seems to be composed of two oblong portions, united by their inferior extremities, so as to have some resemblance to a crescent.

ABDOMINAL VISCERA.

Q. Where is the abdomen situated? — *A.* Between the thorax and pelvis.

Q. How is the cavity of the abdomen formed? — *A.* It is bounded above by the diaphragm and the margin of the chest; behind by the five lumbar vertebræ; below by the pelvis; anteriorly and laterally by the abdominal muscles.

Q. Into how many regions is the abdomen divided? — *A.* Into nine. The right and left hypochondriac; the epigastric; the right and left lumbar; the umbilical; the hypogastric, and right and left iliac.

Q. What membrane lines the cavity of the abdomen, and is reflected over most of the viscera? — *A.* A thin serous membrane called the peritoneum.

Q. What are the contents of the abdomen? — *A.* Besides the peritoneum it contains the organs of digestion and chylification, viz., the stomach, intestines, liver, spleen, and pancreas: the urinary organs, viz., the kidneys, ureters, and bladder: and lastly, part of the organs of generation.

Peritoneum.

Q. What is the situation of the peritoneum? — *A.* It adheres to the inner surface of the abdominal cavity; it is reflected over, invests, and supports the viscera.

Q. What is its structure? — *A.* Serous.

Q. What is the appearance of the outer surface of the peritoneum? — *A.* Its outer surface is cellular, and is adherent to the surfaces of the viscera, with which it is in contact.

Q. What is the appearance of its inner surface? — *A.* It is very smooth and polished.

Q. How is the peritoneum moistened? — *A.* By a serous fluid, discharged from exhalent vessels.

Q. What are the duplicatures of the peritoneum? — *A.* They are very extensive and numerous; after having completely invested an organ, the peritoneum passes double to the parietes of the abdomen, to be here expanded; these duplicatures confine the organs in their places, and support them. They are sometimes called ligaments; the extensive one which supports the intestines, is called the mesentery; and a very large one, hanging loose before the intestines, is called the omentum.

Q. What are the processes of the peritoneum? — *A.* They are elongations, which accompany parts in their exit from the cavity of the abdomen.

Q. What ligamentous cords are seen upon the anterior surface of the peritoneum? — *A.* There are four; they are the remains of parts peculiar to the fœtus, viz., the two umbilical arteries, the umbilical vein, and the urachus.

Stomach.

Q. What is the stomach?—*A.* The stomach is a membranous bag, into which the food is received, and where it is digested.

Q. Where is it situated? — *A.* It is situated in the left hypochondrium, and in the epigastrium.

Q. What is its form? — *A.* It is oblong and incurvated, large at one end and small at the other.

Q. Which is its greater and which its lesser extremity? — *A.* The left is the greater and the right the lesser extremity.

Q. Which is the lesser and which the greater curvature? — *A.* The superior is the lesser and the inferior the greater curvature.

Q. How many openings has the stomach, and what are they called? — *A.* It has two; the cardiac and pyloric.

Q. Where are they situated? — *A.* The cardiac is at the superior extremity, and the pyloric at the inferior and commencement of the intestinal canal.

Q. How many coats has the stomach, and what are their names? — *A.* Four; the peritoneal, muscular, cellular, and mucous.

Q. What is the situation of the peritoneal coat? — *A.* It is the most external; it is smooth and lubricated.

Q. Where is the muscular coat? — *A.* Immediately within the peritoneal.

Q. Of how many planes of fibres does the muscular coat consist? — *A.* Two; an external and an internal.

Q. What is the course of the external plane of fibres? — *A.* Longitudinal.

Q. What is the course of the internal plane? — *A.* Circularly transverse.

Q. Where is the cellular coat situated? — *A.* Immediately within the muscular coat.

Q. What is its structure? — *A.* It is cellular or filiamentary, containing numerous small glands.

Q. What is the situation of the mucous coat? — *A.* It is the most internal coat of the stomach.

Q. What is its structure? — *A.* It somewhat resembles the pile of velvet, and is very vascular.

Q. How are the rugæ of the stomach formed? — *A.* By the two internal coats being thrown into folds.

Q. What is the direction of these rugæ? — *A.* They are chiefly placed in a transverse direction.

Q. From whence are the nerves of the stomach derived? — *A.* From the eighth pair, and great sympathetic.

Q. From whence are the arteries of the stomach derived? — *A.* They come from the cæliac.

Q. Whence do the veins pass? — *A.* They go to the vena portæ.

Intestines.

Q. What are the intestines? — *A.* They are a long membranous tube, beginning at the pylorus, and ending at the anus.

Q. How are they divided? — *A.* They are divided into the large and small intestines; the small being subdivided into the duodenum, jejunum, and ilium — and the large into the cœcum, colon, and rectum.

Duodenum.

Q. Where is the duodenum situated? — *A.* Immediately below the pylorus.

Q. What is its length? — *A.* It is about twelve fingers breadth, as its name imports.

Q. What is its course? — *A.* It first bends a little backward and downward, then towards the right kidney, and thence it passes before the renal artery and vein, gradually ascending to

the left, before the aorta and the last dorsal vertebra; it then continues its course a little forward, making a small turn.

Q. How is the duodenum fixed? — *A.* It is retained in its situation by the folds of the peritoneum, and especially by a transverse duplicature, which gives origin to the meso-colon.

Q. How many coats has the duodenum? — *A.* It, with all the rest of the small intestines, has four coats, resembling those of the stomach.

Q. What is peculiar to the peritoneal coat of the duodenum? — *A.* It does not invest the whole circumference of the intestine.

Q. What is the peculiarity of the muscular coat of this intestine? — *A.* It is thicker than in the jejunum and ilium.

Q. What is the peculiar disposition of the nervous and villous coats of the small intestines? — *A.* The nervous and villous coats of the small intestines are much more extensive than the other two, and are thrown into folds called valvulæ conniventes.

Q. What is the form of the valvulæ conniventes? — *A.* They resemble portions of circular planes, having one edge fixed to the intestine and the other loose.

Q. In what intestines are the valvulæ conniventes largest and most frequent? — *A.* In the duodenum they are small, but grow much larger and more numerous in the jejunum, and again decrease in the ilium.

Q. How do the villi of the duodenum differ from those of the jejunum? — *A.* They are much less conspicuous in the duodenum than in the jejunum.

Q. Where do the biliary and pancreatic ducts open into the duodenum? — *A.* On the short side of its first incurvation there is an opening, which is sometimes the common aperture of the excretory duct of the liver and of the pancreas; at other times the ducts open separately.

Jejunum and Ilium.

Q. How is the termination of the jejunum distinguished from the beginning of the ilium? — *A.* There is no mark of distinction between the termination of the jejunum and the beginning of the ilium; this division is therefore arbitrary. It is usual to consider the superior two-fifths as the jejunum and the remainder as the ilium.

Q. What is the course of the jejunum? — *A.* The jejunum, beginning at the duodenum, bends from left to right and obliquely forward, making several convolutions; it lies chiefly in the upper part of the umbilical region.

Q. How do the valvulæ conniventes of the jejunum differ from those of the duodenum and ilium? — *A.* Those of the jejunum are more prominent, loose, and floating than in the duodenum, and they gradually diminish in the ilium.

Q. What glands are found in the jejunum and ilium? — *A.* The glands of Peyer and Brunner. They exist in irregular clusters.

Q. Where are they most numerous? — *A.* Towards the end of the ilium.

Cœcum.

Q. What is the cœcum? — *A.* The cœcum or blind gut is a short, roomy pouch, into which the ilium opens.

Q. What is its situation? — *A.* It is situated under the right kidney upon the iliacus internus; its bottom being turned downward.

Q. What is the appendix of the cœcum named? — *A.* Appendix cœci vermiformis.

Q. Where does the appendix cœci vermiformis open into the cœcum? — *A.* On the inner side of its bottom; its other extremity is impervious.

Q. What is its size? — *A.* Its diameter is about a quarter of an inch, and it is about three inches long.

Q. What is its structure? — *A.* In structure it resembles very closely the intestines.

Q. What is its use? — *A.* Its use is not understood; it has been thought by some to secrete the odorous matter of the excrement, and by others to be the remains of the vesicula alba of the fœtus.

Colon.

Q. What is the situation of the colon? — *A.* The colon forms the greater part of the large intestines; it is situated around the small ones, beginning at the cœcum and ending at the rectum.

Q. What is its course? — *A.* It ascends in the right iliac region; it then forms the great arch above the umbilical region, crossing from the right kidney to the lower part of the left hypochondrium; this arch is situated immediately below the liver, gall bladder, and stomach; thence the colon turns back under the spleen, runs before the left kidney, turns towards the vertebræ, and terminates by a double incurvation.

Q. What is this incurvation called? — *A.* It is called its sigmoid flexure.

Q. What guards the opening of the small into the large intestines? — *A.* At the termination of the ilium a pair of valves

are situated, called valvulæ coli, or valvulæ cœci, or valvulæ ilii.

Q. What is the form of this opening? — *A.* It resembles a fissure, its middle being most open.

Q. What is the structure of the large intestines? — *A.* The colon, as well as the cœcum and rectum, has the same number and kind of coats as the small intestines.

Q. What is the character of the muscular coat of the large intestines? — *A.* The longitudinal fibres of the muscular coat are collected into three distinct bundles, called the longitudinal bands, beginning at the cœcum; besides these, there are occasionally transverse bands.

Q. What are the cavities called which are formed by the contraction of the bands of the colon? — *A.* They are called the cells of the colon.

Q. What are the appendices coli adiposæ? — *A.* There are many fatty processes hanging from the outside of the colon and cœcum, called appendices coli adiposæ, or appendices epiploicæ.

Rectum.

Q. What is the situation of the rectum? — *A.* It extends from the last lumbar vertebra to the anus.

Q. What is its course? — *A.* It runs in a direct course in the hollow of the os sacrum and os coccygis.

Q. In what does the rectum terminate? — *A.* Its external termination is called the anus.

Q. How does the membranous coat of this intestine differ from that of the other intestines? — *A.* It often contains a great quantity of fat.

Q. How does its muscular coat differ from that of the other intestines? — *A.* Its muscular coat is thicker, and its longitudinal fibres stronger.

Q. How does its nervous and villous coats differ from that of the other intestines? — *A.* Its nervous and villous coats are larger, and form numerous rugæ.

Q. How are these rugæ arranged? — *A.* Towards the anus they become longitudinal, and towards the inner margin of the anus they form little bags, the openings of which are turned upward.

Q. Is the rectum supplied with glands? — *A.* Yes; it has a great number of mucous glands.

Mesentery.

Q. How is the mesentery formed? — *A.* By two layers of

the peritoneum, which separate at the loose or folded edge to surround the intestines.

Q. Into what parts is the mesentery divided?—*A.* That part which supports the small intestines retains the name of mesentery: that which fixes the large intestines is called meso-colon.

Q. Where does the mesentery begin? — *A.* It begins at the last incurvation of the duodenum.

Q. What is its course? — *A.* It passes obliquely from left to right along the vertebræ of the loins.

Q. What is its form? — *A.* It is narrow at its upper and lower parts, but chiefly at its upper part; while the middle portion is very broad, and its intestinal edge much plaited.

Q. How are its laminæ connected? — *A.* They are connected together by cellular substance.

Q. What is contained between the laminæ of the mesentery? — *A.* Numerous lymphatics, arteries, veins, nerves, and glands.

Q. What is the meso-colon? — *A.* It is a continuation of the mesentery to support the large intestines.

Q. Where does it commence? — *A.* At the extremity of the ilium.

Q. Where is the ligamentum coli dextrum situated? — *A.* At the commencement of the meso-colon, under the right kidney.

Q. How is it formed? — *A.* By a small transverse fold of the mesentery.

Q. What is the course of the meso-colon after the formation of the ligamentum dextrum? — *A.* After the formation of the ligamentum dextrum, the meso-colon ascends towards the right kidney, where it almost disappears by the adhesion of the colon to that kidney and to the first turn of the duodenum; appearing again, it increases in breadth, and passes transversely under the liver, stomach, and spleen, including the great arch of the colon; it then turns downward toward the left kidney.

Q. Where does the meso-colon form the ligamentum coli sinistrum? — *A.* Below the left kidney it again becomes short, and forms the ligamentum coli sinistrum.

Q. What is the course of the meso-colon after it forms the ligamentum coli sinistrum? — *A.* It widens, but less than in the upper part, and ascends on the left psoas muscle, and continues on to the sigmoid flexure of the colon.

Q. Where is the meso-rectum situated? — *A.* Between the rectum and os sacrum, at the upper part, it fixes this gut; it is a continuation of the meso-colon.

Liver.

Q. What is the liver? — *A.* The liver is the largest viscus

in the abdomen; it is a solid mass, of a dark red colour, inclined to a brownish-yellow, whose office it is to secrete the bile.

Q. Where is it situated? — *A.* It is situated immediately under the diaphragm, partly in the right hypochondrium, which it nearly fills; and partly in the epigastrium, between the spine and ensiform cartilage, terminating generally in the left hypochondrium.

Q. What is its form? — *A.* Irregular, being convex superiorly, unequally concave inferiorly, very thick towards the back and right side; it becomes gradually thin towards the left side, and forms an acute edge anteriorly.

Q. How is it divided? — *A.* Into three lobes, viz., the great or right lobe, the small or left lobe, and the lobulus spigelii.

Q. How is the right lobe divided from the left? — *A.* It is divided superiorly by a membranous ligament, and inferiorly by a considerable fissure.

Q. What is the situation of the lobulus spigelii? — *A.* It is situated on the inferior side of the liver, towards its back part, near the great fissure.

Q. How many depressions are seen on the under side of the liver?— *A.* Seven.

Q. What are the depressions of the liver called? — *A.* First, the great fissure; secondly, one for the sinus of the vena portæ; thirdly, one for the vena cava; fourthly, a furrow between the left lobe and lobulus spigelii, for a venous canal in the fœtus; fifthly, a depression for the gall bladder; sixthly, a superficial cavity, caused by the stomach; and seventhly, the great sinus, for the spine and œsophagus, at the posterior part of the left lobe.

Q. Where is the great fissure of the liver situated? —*A.* It runs from behind forward, on the inferior side of the liver, between its two lobes.

Q. Where is the sinus of the vena portæ? — *A.* It is placed transversely between the eminences on the inferior surface of the great lobe.

Q. Where is the sinous of the vena cava? — *A.* It is situated posteriorly at the extremity of the great fissure, between the great lobe and lobulus spigelii.

Q. Where is the depression for the gall bladder? — *A.* It is situated on the forepart of the inferior surface of the great lobe.

Q. How many ligaments does the liver possess? — *A.* It is kept in its situation by five ligaments.

Q. What are the names of the ligaments of the liver? — *A.*

The broad ligament, the round ligament, the right and left lateral ligament, and the coronary ligament.

Q. How are the ligaments of the liver formed? — *A.* The broad, and the right and left ligaments, are continuations or duplicatures of the peritoneum; the round ligament was the umbilical vein of the fœtus, and the coronary ligament is merely a broad adhesion.

Q. To what does the middle or broad ligament of the liver connect it? — *A.* It divides the right lobe from the left, and connects the liver to the diaphragm, and to the upper and inner part of the sheath of the rectus abdominis obliquely, so as to be nearer the linea alba below than above.

Q. Where is the round ligament of the liver situated? — *A.* It is the remains of the umbilical vein of the fœtus, and is placed in the anterior edge of the broad ligament. It is fixed to the umbilicus, and enters the great fissure.

Q. To what do the right and left ligament of the liver connect it? — *A.* They connect it to the cartilages of the false ribs.

Q. To what does the coronary ligaments of the liver connect it? — *A.* It connects it to the right ala of the tendinous portion of the diaphragm.

Q. What is the structure of the liver? — *A.* It is composed of several kinds of vessels, which by their intertexture form numerous friable corpuscles.

Q. By what are the vessels of the liver enveloped? — *A.* By a sheath of cellular membrane, and peritoneal membrane called the capsule of the vena portæ, or Glisson's capsule.

Q. What are the vessels of the liver? — *A.* They are the hepatic artery, the vena portæ, and the hepatic veins; to which may be added the excretory ducts and absorbents.

Q. By what vessels is the blood carried to the liver? — *A.* By the hepatic artery and vena portæ.

Q. Of what use is the hepatic artery? — *A.* It is the nutrient artery of the liver.

Q. What is the use of the vena portæ? — *A.* It acts both as a vein and artery; as a vein, it receives the blood from most of the abdominal viscera; as an artery, it ramifies through the liver, and then secretes the bile.

Q. How many great branches are generally given off by the vena portæ? — *A.* It gives off five principal branches.

Q. In what do the ramifications of the vena portæ terminate? — *A.* The terminations of its branches are in villous follicles, or acini, as they have been called.

Q. What is the use of these folliculi or acini? — *A.* The bile is secreted in them.

Q. What is the name of the small excretory ducts of the hepatic folliculi? — *A.* They are called pori biliarii.

Q. In what do the pori biliarii terminate? — *A.* They terminate in one large duct, called the ductus hepaticus.

Q. Where does the hepatic duct terminate? — *A.* After joining the duct from the gall bladder called the cystic duct, it terminates in the duodenum.

Q. How is the blood conveyed from the liver? — *A.* The hepatic veins return the blood to the inferior cava.

Q. Whence does the liver derive its nerves? — *A.* From the great sympathetic and eighth pair.

Gall Bladder.

Q. What is the gall bladder? — *A.* It is a small bag which contains the bile.

Q. Where is it situated? — *A.* In the anterior part of the inferior surface of the great lobe of the liver.

Q. What is its form? — *A.* It is pyriform, but in infants often cylindrical.

Q. How is it divided? — *A.* Into a body, fundus, and neck.

Q. How is the gall bladder situated when we stand? — *A.* It lies in a plane, slightly inclined from behind forward, in the erect posture; its fundus being turned forward.

Q. How many coats does the gall bladder possess? — *A.* Four.

Q. What is peculiar to the internal coat? — *A.* The internal or villous coat is thrown into numerous minute folds, arranged in a beautiful reticular form, filled with small lacunæ, or ducts of follicles, especially near its neck; at which place the folds become longitudinal, and form a kind of small pylorus.

Q. Has the gall bladder any direct connexion with the liver? — *A.* It is connected by vessels and cellular membrane to the liver; but in the human body, no branches from the pori biliarii have been discovered opening into it.

How is the neck of the gall bladder formed? — *A.* It is formed by the contraction and incurvation of the small extremity.

Q. What is the internal appearance of the neck of the gall bladder? — *A.* On its internal surface there are several reticular rugæ.

Q. What is the course of the cystic duct? — *A.* It proceeds from the neck of the gall bladder, runs near the hepatic duct, and then joins it.

Q. What duct is formed by the union of the hepatic and cystic ducts? — *A.* The ductus communis choledochus.

Q. Where does the ductus communis choledochus terminate? — *A.* It terminates, frequently, in common with the pancreatic duct, on the inside of the duodenum, or else alone.

Q. What is the course of the bile? — *A.* It is secreted by the extremities of the vena portæ in the acini; passes through the pori biliarii and branches of the hepatic duct; by this duct it is conveyed to the ductus communis choledochus; from whence, in part, it passes by the cystic duct to the gall bladder: when needed in the intestine, it returns by the cystic duct and mixes in the ductus communis choledochus with fresh bile from the hepatic duct; and lastly, passes into the duodenum.

Pancreas.

Q. What is the pancreas? — *A.* It is a long, flat, glandular body, of a grayish-white colour.

Q. What is its situation? — *A.* It is placed at the back part of the epigastric region, transversely under the stomach, and before the spine, the crura of the diaphragm, the aorta, and vena cava.

Q. How is the pancreas generally divided? — *A.* Into a superior and an inferior edge, an anterior and a posterior side, a large and a small extremity.

Q. With what parts are its extremities connected? — *A.* Its large or right extremity is connected to the second incurvation of the duodenum, and its lesser extremity to the omentum near the spleen.

Q. Where is that part situated which has been termed the lesser pancreas? — *A.* At the lower part of the great extremity, where it is connected with the duodenum.

Q. Where does the duct of the lesser pancreas terminate? — *A.* It passes into the extremity of the duct of the greater pancreas, although sometimes it has a separate opening into the duodenum.

Q. How does the pancreatic duct arise? — *A.* From numerous small branches; and form a large one, called duct of Wirsungius.

Q. What is the situation of this duct? — *A.* It is placed horizontally with the substance of the gland, toward the middle of its inferior edge.

Q. Where does it terminate? — *A.* Sometimes along with the ductus communis choledochus in the duodenum, at others alone.

Q. What is the structure of the pancreas? — *A.* It consists

of a great number of small glandular particles connected loosely together; it resembles the salivary glands.

Q. Whence does it derive its arteries? — *A.* From the pyloric and duodenal, but chiefly from the splenic artery.

Q. Whence does its veins pass? — *A.* They pass into the splenic vein.

Q. From whence does it derive its nerves? — *A.* From the great sympathetic and eighth pair.

Spleen.

Q. What is the spleen? — *A.* It is a soft, sponge-like, fleshy purple mass.

Q. Where is it situated? — *A.* In the left hypochondrium, at the large extremity of the stomach.

Q. What is its shape? — *A.* It is somewhat of an oval form.

Q. Into what parts is it generally divided? — *A.* It has an external surface, uniformly convex; an internal surface, divided by a groove into two concavities; the anterior opposed to the stomach, the posterior to the colon and left kidney; two edges, often notched; and two extremities.

Q. What is its structure? — *A.* It appears to be of cellular structure, but it is probably a congeries of bloodvessels.

Q. From whence does it receive its blood? — *A.* From the splenic artery, which is a branch of the cœliac.

Q. Whence do its veins pass? — *A.* To the vena portæ.

Q. From whence does it derive its nerves? — *A.* From the great sympathetic and eighth pair.

Q. What is its use? — *A.* This is not positively known, but the more probable is that it acts as a diverticulum for the internal venous circulation.

Omentum.

Q. What is the omentum? — *A.* It is a large duplicature of the peritoneum.

Q. What is its situation? — *A.* It hangs loosely before the small intestines,

Q. What is its form? — *A.* It resembles a flat bag, whose sides are in contact.

Q. Where is it attached? — *A.* Its mouth or opening is attached to the great curvature of the stomach, and to the arch of the colon, and may be separated by inflation.

Q. What is its structure? — *A.* It consists of two laminæ

connected by cellular substance, between which there are numerous portions of fat.

Q. What is the situation of the little omentum? — *A.* It is fixed to the small curvature of the stomach, and to the concave side of the liver.

Q. How does the cavity of the omentum communicate with the abdomen? — *A.* It communicates with the abdomen on the right side only, under Glisson's capsule, by a semilunar orifice, called the foramen of Winslow.

Kidneys.

Q. What are the kidneys? — *A.* They are two glandular bodies, of a red colour, destined to secrete the urine.

Q. What is their situation? — *A.* They are situated on the posterior part of the abdomen, on each side of the lumbar vertebræ, between the last false rib and ossa ilia.

Q. What is the difference in the situation of the right and left kidney? — *A.* The right kidney lying under the great lobe of the liver is lower than the left, which lies under the spleen.

Q. What is the form of the kidney? — *A.* It somewhat resembles the form of a large bean; its circumference is convex on the outer side, and concave on the inner; the posterior side is broader and flatter than the foreside, and the upper extremity is more incurvated and larger than the lower.

Q. What coats does the kidney possess? — *A.* They have no peritoneal investment, but they are everywhere surrounded by a proper coat, which consists of two laminæ, of which the external is thin and adheres to the internal; this penetrates the substance of the kidney everywhere by numerous elongations.

Q. What is the structure of the kidney? — *A.* It consists of two substances, namely, an external termed cortical substance, and an internal named medullary substance.

Q. How may the cortical and medullary substances be distinguished from each other? — *A.* The medullary substance is of a much paler colour, and more dense texture than the cortical; it is divided into a number of unequal conical portions, which terminate in nipple projections, called papillæ, or mamillary processes.

Q. What is the number of the papillæ? — *A.* They vary in number from eight to twelve, or more.

Q. What is the name of the cavities in which the papillæ are situated? — *A.* Each papilla is situated in a small funnel-like cavity, called calix or infundibulum.

Q. What is the name of the cavity in which the calices or

infundibula of the kidney terminate? — *A.* The infundibula join and form two or three tubes, which ultimately form a large conical cavity, called the pelvis of the kidney; it is placed in part within, but more without the body of the kidney, and is the commencement of the duct of the kidney.

Q. What is the name of the duct leading from the pelvis of the kidney? — *A.* The ureter.

Q. What is the course of the ureter? — *A.* It descends, obliquely and slightly inflected, from the kidney to the sides of the anterior part of the os sacrum; and passing between the rectum and bladder terminates in the last of these viscera.

Q. How many coats has the ureter? — *A.* Three.

Q. What is the structure of the coats of the ureter? — *A.* The external consists of a compact filamentary substance; the middle one of several strata or fibres; and the internal one is of the mucous kind.

Q. Whence are the arteries of the kidneys derived? — *A.* The artery of the kidneys which is called the emulgent, comes directly from the aorta.

Q. Whence do the veins of the kidney pass? — *A.* The veins which are called the emulgent veins pass to the inferior cava.

Q. Whence are the nerves derived? — *A.* From the great sympathetic and eighth pair.

Q. What is the situation of the ureter in relation to the emulgent artery and vein? — *A.* The emulgent artery and vein, and the ureter, enter the kidney at its inner edge, the artery being uppermost; the pelvis, and beginning of the ureter, behind and below the bloodvessels.

Renal Glands.

Q. What are the renal glands? — *A.* They are two small, flat, dark yellow-coloured bodies.

Q. Where are they situated? — *A.* Immediately above the kidneys, on which they rest.

Q. What is the shape of these glands? — *A.* Each gland is of an oblong, irregular, three-sided figure.

Q. What is the internal appearance of these glands? — *A.* A cavity is found within them.

Q. What is the form of this cavity? — *A.* It is of a narrow and triangular figure.

Q. What is contained in these cavities? — *A.* They are full of strong, yellow villi, and a dark bile-like fluid.

Q. Are these glands larger in the fœtus or adult? — *A.* They are much larger in the fœtus.

PELVIC VISCERA.

Q. Of what are the pelvic viscera generally said to consist? — *A.* Under this head is comprised the urinary bladder, rectum, and parts of generation.

Urinary Bladder.

Q. What is the urinary bladder? — *A.* It is a large membranous bag, which serves as a reservoir for the urine.

Q. What is its situation? — *A.* In the lower part of the abdomen, and front of the pelvis, immediately behind the symphysis pubis, above and before the lower part of the rectum.

Q. What is its form? — *A.* It is somewhat oviform, rounder above than below when empty, and broader below than above when full.

Q. What parts of the urinary bladder are generally enumerated? — *A.* It is divided into a body, a neck turned downward and forward, and a fundus turned upward.

Q. How many coats has the bladder? — *A.* Four.

Q. What are their names? — *A.* An external or peritoneal, a muscular, a cellular, commonly called nervous, and a villous or mucous coat.

Q. What is the extent of the peritoneal coat? — *A.* It only covers the fundus, sides, and back part, to a little within the termination of the ureters.

Q. What is the direction of the fibres of the muscular coat? — *A.* They are collected into distinct bundles: the external ones are mostly longitudinal; the middle ones are inclined to each side; and the internal ones become more and more oblique; thus crossing each other in various directions.

Q. What is the nature of the cellular or nervous coat? — *A.* It nearly resembles in situation and use the tunic, of the same name, in the stomach and intestines.

Q. What is the structure of the internal coat? — *A.* It is of firm texture, though not thick; it is thrown into folds or rugæ, when the bladder is empty.

Q. How many openings are there into the bladder? — *A.* There are three, situated at the under part.

Q. What is the anterior opening? — *A.* The beginning of the urethra surrounded by the neck of the bladder.

Q. What is termed the neck of the bladder? — *A.* It is an elongation of the proper coats of the bladder, terminating in the inferior orifice.

Q. Where do the ureters open into the bladder? — *A.* At the posterior part.

Q. At what distance are these openings from each other? — *A.* Passing obliquely through the coats of the bladder, they open an inch and a half from each other, and from the urethra.

Q. Where is the urachus? — *A.* At the top of the bladder, above the symphysis pubis; it ascends between the peritoneum and linea alba to the umbilicus.

Q. What is the use of the urachus? — *A.* In the fœtus it is hollow, but its use is not understood.

Q. Whence are the arteries of the bladder derived? — *A.* From the internal iliac.

Q. Whence do its veins pass? — *A.* To the internal iliac veins.

Q. Whence are its nerves derived? — *A.* From the sacral and great sympathetic.

Male Organs of Generation.

Q. Of what parts do the male organs of generation consist? — *A.* They consist of the testicles, with the epididymis, and vasa deferentia, contained in the scrotum; the vesiculæ seminales, prostate gland, Cowper's glands, and verumontanum, about the neck of the bladder; and lastly, the penis, composed of the corpora cavernosa, corpus spongiosum, glans penis, and urethra.

Scrotum.

Q. How is the scrotum formed? — *A.* It is a loose bag, formed merely by a continuation of the integuments; it is devoid of fat.

Q. What is the raphe? — *A.* It is a projecting line, which divides it into two equal parts.

Q. What is the dartos? — *A.* The cellular substance on the inside of the scrotum is fibrous, and of a red colour; it has therefore by some been thought muscular, and called dartos.

Q. What is the septum scroti? — *A.* Loose cellular substance every where connects the testicles to the scrotum, and forms a septum between them.

Testes.

Q. What are the testes? — *A.* They are two glandular bodies of an oval figure, which secrete the semen, and are contained in the scrotum.

Q. How many coats have the testicles? — *A.* Each testicle

has two coats, viz., the tunica vaginalis, and the tunica albuginea.

Q. Describe the tunica vaginalis. — *A.* It surrounds the testicle as the pericardium does the heart, adhering only at its posterior and superior part; its internal surface is lubricated by a serous fluid.

Q. What is the tunica albuginea? — *A.* It firmly invests the testicle, and gives it support and form.

Q. What is the internal structure of testes? — *A.* When the tunica albuginea is opened, the testicle is seen to consist of an immense number of whitish tubes, called tubuli seminiferi, folded in various ways, and distributed in different fasciculi between membranous septa; the septa are disposed longitudinally, diverging from the posterior edge of the testicle, form a white body, which may be termed the nucleus of the testicle; at this nucleus the tubuli seminiferi terminate in common trunks, forming the rete testes, which afterwards penetrate the upper part of the anterior extremity of the testes, and are called the vasa efferentia.

Epididymis.

Q. What is the epididymis? — *A.* It is an oblong, flattened body, situated along the lateral external part of the upper edge of the testicle as far as its posterior extremity, from the common trunks of the tubuli seminiferi or vasa efferentia; it in some measure resembles a flat arch, slightly concave on the under side, and irregularly convex on the upper side.

Q. What is the course of the epididymis? — *A.* Its anterior extremity, called its head, arises from the testicle, and receives the vasa efferentia; its posterior extremity or cauda, which also adheres, becomes gradually smaller; the whole appears composed of one convoluted tube.

Q. Where does it terminate? — *A.* In the excretory duct of the testicle called the vas deferens.

Vas Deferens.

Q. What is the vas deferens? — *A.* It is the excretory duct of the testicle, and is a small white tube of dense structure.

Q. Whence does it arise? — *A.* It arises from the epididymis.

Q. What is its course? — *A.* It forms, in common with the bloodvessels and nerves of the testicle, the spermatic cord, in the cellular substance of which it ascends to the abdominal ring, being situated behind the vessels; having reached the

peritoneum, it separates from the vessels and runs back, in a curved direction, through the cellular substance of the peritoneum, descends to the nearest side of the bladder, then passes behind it, covered by its peritoneal coat; it afterwards continues its course towards the neck of the bladder, where it terminates near its fellow. In this course it crosses the umbilical artery and the extremity of the ureter, passing behind the former, and between the latter and the bladder.

Vesiculæ Seminales.

Q. What are the vesiculæ seminales? — *A.* They are two oblong membranous reservoirs.

Q. What is their situation? — *A.* They are situated obliquely at the lower and under part of the bladder, and before the rectum; near each other anteriorly, but distant behind.

Q. What is their structure? — *A.* They are formed by a convolution of one tube, whose doublings are closely connected together.

Q. What is their internal appearance? — *A.* Internally they appear to be composed of cells.

Q. What is their external covering? — *A.* They are covered and connected to the bladder and other surrounding parts by cellular membrane.

Q. What is the nature of their internal coat? — *A.* It is a villous secreting membrane.

Q. How are they connected with the vasa deferentia? — *A.* The vasa deferentia, becoming larger, run between the continuous extremities of the vesiculæ seminales; and the termination of each is partly formed by the contiguous vesicula, so that these extremities communicate on each side.

Q. Where do the vesiculæ seminales open? — *A.* Each vesicle, after joining the contiguous vas deferens, pierces the prostate gland, and opens into the urethra.

Q. What is their use? — *A.* They secrete a peculiar fluid, and by some are thought to retain the semen.

Prostate Gland.

Q. What is the prostate gland? — *A.* It is a firm glandular body.

Q. Where is it situated? — *A.* At the neck of the bladder and beginning of the urethra.

Q. What is its form? — *A.* It is somewhat of the form and about the size of a chesnut, broad behind, and pointed before.

Q. What are its connections with the surrounding parts? — *A.* Its basis is turned towards the bladder, its apex towards the

urethra, its inferior surface is convex, and connected to the rectum; through its substance, near the superior surface, the urethra passes.

Q. What is its structure? — *A.* It is of a spongy but very compact texture, consisting of numerous follicles.

Q. What openings are there from the follicles of the prostate into the urethra? — *A.* Their ducts, which are ten or twelve in number.

Q. What is its use? — *A.* It secretes a peculiar thin white fluid, which mingles with the semen.

Cowper's Glands.

Q. What are these? — *A.* They are two bodies, about the size of a pea.

Q. Where are they situated? — *A.* Before the prostate, near the bulb of the urethra.

Q. Where do their ducts open? — *A.* Near the beginning of the urethra.

Q. What is their use? — *A.* They contribute a fluid which lubricates the urethra.

Verumontanum, or Caput Gallinaginis.

Q. What is the verumontanum? — *A.* It is a small oblong oval eminence.

Q. How is it situated? — *A.* It is situated immediately within the prostate, at the under part of the urethra.

Q. By what is the verumontanum perforated? — *A.* Its summit is perforated by the two orifices of the vesiculæ seminales.

Penis.

Q. What are the parts which compose the penis? — *A.* The penis consists of the corpora cavernosa, corpus spongiosum, urethra, and glans penis.

Corpora Cavernosa.

Q. What are the corpora cavernosa? — *A.* They form the body of the penis; they are two large ligamentary tubes, firmly united together.

Q. Where are they situated? — *A.* They are situated by the side of each other.

Q. What grooves are formed by their union? — *A.* Their junction is marked by two grooves, of which one is superior, the other inferior and much the largest.

Q. What is situated in the lower groove? — *A.* The corpus spongiosum urethræ.

Q. What is situated in the upper groove? — *A.* The vena magna ipsius penis.

Q. To what are the ends of the corpora cavernosa joined anteriorly? — *A.* They terminate anteriorly by a rounded extremity, which is covered by the glans penis; posteriorly, they are entirely separate, forming the crura penis, which are attached to the edge of the ramus of the os ischium and os pubis.

Q. What is the structure of the corpora cavernosa? — *A.* A dense ligamentous sheet forms their external part; internally, they consist of numerous cells, which freely communicate with each other.

Q. How are the two corpora cavernosa divided? — *A.* They are internally separated from each other by a particular septum, called pecteniformis, which however is perforated by numerous fissures.

Urethra.

Q. What is the urethra? — *A.* It is a long membranous canal, extending from the neck of the bladder to the end of the penis.

Q. What is its situation? — *A.* It is lodged in the lower groove, between the two corpora cavernosa.

Q. What is its form? — *A.* It is not throughout of equal bore, being most dilated in the prostate gland, again an inch and a half before it, and lastly, just before its external orifice.

Q. What is its structure? — *A.* It is a continuation of the membrane which lines the bladder.

Q. What are the lacunæ? — *A.* Numerous small openings on its surface leading to minute pouches.

Q. In what direction are the openings of the lacunæ? — *A.* Their openings are turned forward.

Corpus Spongiosum.

Q. What is the name of the substance surrounding the urethra? — *A.* It is called the corpus spongiosum urethræ, except at about a finger breadth and a half from its origin at the bladder, where it is termed the membranous part of the urethra.

Q. Where is the membranous part of the urethra situated? — *A.* About an inch of its length before the prostate.

Q. Where is the bulb of the urethra situated? — *A.* The posterior commencement of the corpus spongiosum is dilated into a conical prominence called the bulb.

Q. Where is the glans penis situated? — *A.* It expands over the ends of the corpora cavernosa.

Q. By what is the glans penis perforated? — *A.* It is perforated anteriorly by the orifice of the urethra.

Q. Where is the corona glandis? — *A.* It is a prominent edge, situated posteriorly.

Q. What is the structure of the corpus spongiosum? — *A.* It is composed of a congeries of veins.

Q. Whence are the arteries of the penis derived? — *A.* From the internal pudic.

Q. What is the course of the veins of the penis? — *A.* They receive the blood from the cells of the corpora cavernosa; they then form the corpus spongiosum, which is an extensive plexus of veins; from this several branches pass to the dorsum penis, and join the vena magna penis; this passes under the arch of the pubis, where it opens into another considerable plexus which surrounds the prostate and neck of the bladder; and finally the hypogastric veins receive the blood.

Q. How is the erection of the penis effected? — *A.* The arteries, acting with increased velocity, distend the corpora cavernosa with blood, where it is retained on account of the peculiar construction of the veins through whose plexus it flows slowly.

Integuments of the Penis.

Q. What are the integuments of the penis? — *A.* The common integuments, devoid of fat, afford a loose and very moveable covering to the penis, except on the glans, where they are very firmly adhering, and of much more delicate structure.

Q. What is the præputium? — *A.* Immediately behind the corona glandis the integuments form a loose doubling, called the præputium, which in the unerected state cover the glans.

Q. What is the frænum? — *A.* A fold of the præputium at the under part of the glans.

THORAX.

Q. What is the situation of the thorax? — *A.* Between the neck and the abdomen.

Q. Of what does it consist? — *A.* Of the vertebræ behind, and the ribs behind and laterally of the sternum, and cartilages of the ribs in front, and of the intercostal muscles, pleuræ and diaphragm.

Q. What is its form? — *A.* Conoidal.

Q. What are its chief viscera? — *A.* Those of respiration and circulation.

Respiration.

Q. What is meant by this term? — *A.* The inhaling and exhaling the air to and from the lungs, as in inspiration and expiration.

Q. How is inspiration and expiration performed? — *A.* Inspiration, by the contraction and descent of the diaphragm, and the raising of the ribs, by which means the thoracic cavity is enlarged and air enters the trachea and cells of the lungs; and expiration is immediately the reverse of this.

Q. What are the organs of respiration? — *A.* The larynx, trachea, bronchia, and lungs.

Larynx.

Q. What is the larynx? — *A.* The organ of the voice.

Q. Where is it situated? — *A.* At the upper extremity of the trachea, below the os hyoides and at the root of the tongue.

Q. Of what is it composed? — *A.* Of cartilages and ligaments, and lined by a mucous membrane.

Q. What are the cartilages? — *A.* They are one thyroid, one cricoid, one epiglottis, and two arytenoid.

Q. Describe the thyroid. — *A.* It is placed at the anterior part of the larynx; and consists of two halves, which are united, and form an angle projecting forward; its superior edge has a notch in the middle and elevations on each side; and terminates in two cornua, posteriorly which ascend; its inferior edge is straight, and terminates in shorter cornua, which bend down; its posterior edges are straight, and on the outer side of each ala a line runs, from a small knob near its upper cornu forward and downward to terminate in another.

Q. Describe the cricoid cartilage. — *A.* It is placed below the thyroid, and is the base of the larynx; it is an oval ring of unequal thickness and breadth.

Q. Describe the arytenoid cartilages. — *A.* They resemble triangular pyramids, and are placed on the upper margin of the cricoid; when the two are joined together they resemble the mouth of a pitcher.

Q. Describe the epiglottis. — *A.* It is placed on the posterior face of the base of the os hyoides; and in form resembles an oval disk, and is useful in preventing articles of food falling into the glottis.

Q. Describe the ligaments of the larynx. — *A.* The middle thyreo-hyoid ligament fills the space between the os hyoides and the thyroid cartilage. The lateral thyreo-hyoid ligament on the posterior margin of this membrane is extended between the cornu major of the thyroid cartilage to the tuberculated extremity of the os hyoides. The thyreo-arytenoid ligaments, two in number on each side of the larynx; the inferior one arises from the middle of the anterior angle of the base of the arytenoid cartilage, and is extended to the inferior part of the entering angle of the thyroid; the superior one arises from the middle of the anterior edge of the arytenoid cartilage, and is inserted in the entering angle of the thyroid.

Q. What is the origin, insertion, and use of the thyreo-hyoideus muscle? — *A.* Origin, obliquely from the side of the thy roid cartilage. Insertion, into part of the base, and nearly all cornu of os hyoides. Use, when the thyroid cartilage is fixed it draws down the os hyoides, and when the latter is fixed it draws up the thyroid cartilage.

Q. What is the origin, insertion, and use of the crico-thyroideus? — *A.* Origin, forepart of cricoid cartilage. Insertion, lower border of thyroid. Use, to draw the two cartilages obliquely together.

Q. What is the origin, insertion, and use of the crico-arytenoideus posticus? — *A.* Origin, back of cricoid cartilage. Insertion, posterior part of base of arytenoid. Use, to draw the arytenoid back, and make the ligament tense.

Q. What is the origin, insertion, and use of the crico-arytenoideus lateralis? — *A.* Origin, side of cricoid. Insertion, side of base of arytenoid. Use, to draw the latter outwards, and open the chink of the glottis.

Q. What is the origin, insertion, and use of the thyreo-arytenoideus? — *A.* Origin, posterior surface of thyroid. Insertion, anterior edge of arytenoid cartilage. Use, to relax ligaments of glottis.

Q. What is the origin, insertion, and use of the arytenoideus obliquus? — *A.* Origin, base of one arytenoid cartilage. Insertion, tip of the other. Use, to close the chink of the glottis.

Q. What is the origin, insertion, and use of the arytenoideus transversus? — *A.* Origin, posteriorly, from whole length of one arytenoid cartilage. Insertion, in corresponding manner into the other, and fills the cylindrical concavity of the arytenoid cartilages. Use, to close the chink of the glottis.

Q. What is the origin, insertion, and use of the thyreo-epiglottideus? — *A.* Origin, posterior face of thyroid cartilage.

Insertion, into side of epiglottis. Use, to draw epiglottis downwards.

Q. What is the origin, insertion, and use of the arytenoepiglottideus? — *A.* Origin, superior lateral parts of arytenoid cartilage. Insertion, side of epiglottis. Use, to draw epiglottis downwards.

Q. What is meant by the rima glottis and the glottis? — *A.* The opening between the two lower ligaments is the former, and the space between the upper ligaments and duplicature of mucous membrane passing from arytenoids to epiglottis, the latter.

Q. What is the use of the larynx? — *A.* It forms the chief part of the organ of voice, and affords a free passage for respiration, and affords attachment to numerous muscles.

Trachea.

Q. What is the situation of the trachea? — *A.* It is situated anteriorly in the lower part of the neck, between the duplicature of the superior mediastinum.

Q. What is its form? — *A.* Tubular, and flattened posteriorly.

Q. What is the structure of the trachea? — *A.* It consists anteriorly of segments of cartilaginous circles, forming an incomplete canal, which is membranous posteriorly, and lined by mucous membrane.

Q. Into what does the trachea divide? — *A.* At its termination it divides into two tubes of similar structure, called bronchiæ.

Q. Where does this division take place? — *A.* Behind the curvature of the aorta.

Q. How many coats has the trachea? — *A.* Four, including the internal lining.

Q. Whence is the external coat derived? — *A.* It is a continuation of the cellular covering of the lungs.

Q. What is the second coat? — *A.* It is the internal perichondrium to its cartilages.

Q. What forms the third coat? — *A.* It has been supposed to be muscular; it completes the circumference of the cartilaginous circles.

Lungs.

Q. Where are the lungs situated? — *A.* In the cavity of the thorax.

Q. What is their general form? — *A.* They are convex next

the ribs, concave next the diaphragm, and irregularly formed next the mediastinum and heart.

Q. Into what portions are the lungs divided? — *A.* They consist of a right and a left lung, having between them the heart and posterior mediastinum; the right lung is subdivided into three lobes, and the left into two.

Q. What is the structure of the lungs? — *A.* They are almost entirely of a spongy texture, consisting of an immense number of small membranous cells.

Q. By what membrane is the lungs invested? — *A.* The pleura pulmonalis.

Q. Where do the bronchiæ ramify? — *A.* Within the substance of the lungs.

Q. What is their form? — *A.* They are conical tubes; which divide and subdivide, and ultimately become membranous tubes.

Q. Where do they terminate? — *A.* In the air cells.

Q. How are the air cells connected? — *A.* In bundles called lobuli.

Q. What is the structure of the bronchiæ? — *A.* They resemble the trachea.

Q. What is the relative situation of the bronchial vessels to the branches of the pulmonary artery and vein? — *A.* A branch of the bronchiæ generally lies between one of the pulmonary arteries and pulmonary vein.

Q. What is the interlobular substance? — *A.* It is the cellular or spongy substance which surrounds the lobuli, and connects them together.

Arteries, Veins, and Nerves of the Lungs.

Q. How many kinds of bloodvessels are there for the lungs? *A.* Two, the one called pulmonary, for the purpose of carrying the blood from the right side of the heart to the lungs for the purpose of aërating it; the other called bronchial, for the nourishment of the substance of the lungs.

Q. How is the pulmonary artery ramified in the lungs? — *A.* It divides into two branches, one for each lung; they take the same course as the bronchiæ, and ramifying on the surfaces of the bronchial cells, they form a beautiful plexus, called the rete mirabile of Malpighi.

Q. What veins receive the blood of the bronchial arteries? — *A.* The bronchial veins.

Q. Whither do the bronchial veins pass? — *A.* They pass irregularly, either to the vena azygos or guttural vein.

Q. What blood do the pulmonary veins receive? — *A.* The blood from the pulmonary arteries.

Q. How many pulmonary veins are there? — *A.* There are four; two for each lung.

Q. Whither do they pass? — *A.* To the left auricle of the heart.

Q. Whence are the nerves of the lungs derived? — *A.* From the eighth pair, and great sympathetic.

Bronchial Glands.

Q. Where are these situated? — *A.* About the termination of the trachea and beginning of the bronchiæ.

Q. What are their appearance? — *A.* Mostly blue.

Thymus Gland.

Q. Where is this situated? — *A.* In the superior part of the anterior mediastinum.

Q. What is its form? — *A.* Oblong, with two processes, above and below.

Q. What is its structure? — *A.* Glandular.

Q. Is not this gland larger in the fœtus than in the adult? — *A.* Yes.

Q. What is its use? — *A.* It is not known.

Pleuræ.

Q. What is the situation of the pleuræ? — *A.* It lines the cavity of the thorax, and closely invests the lungs.

Q. What is its structure? — *A.* It is a thin, transparent serous membrane; its outer surface is adherent to the thorax and lungs; its inner surface is smooth and lubricated by serous fluid.

Q. What is the use of this membrane? — *A.* To afford a smooth and firm covering to the lungs, a lining to the cavity of the thorax, and to subdivide this into two cavities.

Q. What are the names of the duplicatures of the pleuræ? — *A.* The mediastinum.

Q. How is the mediastinum formed? — *A.* The portions of the pleura which line the parietes of the thorax on each side meet behind the sternum, unite, and forming a double membrane are reflected directly backwards; they then separate to invest the heart, pericardium, and great vessels; they give off the covering to the lungs; and then behind the heart they again approach each other and pass to the bodies of the vertebræ, so that in fact there are two pleuræ, one for each side.

Q. What cavities are situated between the duplicatures of the

pleuræ? — *A.* There are three, viz., the anterior, posterior, and middle cavities of the mediastinum.

Q. What are contained in these cavities? — *A.* In the anterior we have the remains of the thymus gland. In the middle we have the heart and its pericardium. In the posterior, the bronchiæ, œsophagus, descending aorta, beginning of intercostal arteries, descending cava, vena azygos, thoracic duct, par vagum, and great sympathetic nerves.

Q. To what part of the sternum is the mediastinum attached? — *A.* To the posterior part, a little to the left side.

Q. What names have been given to other parts of the pleuræ? — *A.* That part of the pleuræ which covers the lungs has been called pleuræ pulmonalis; and where it lines the thorax, pleuræ costalis.

Q. From whence are the arteries of the pleuræ derived? — *A.* Chiefly from the intercostals and bronchial.

Q. Whither do the veins of the pleuræ pass? — *A.* With those which correspond with the arteries in name and distribution.

Q. From whence are its nerves derived? — *A.* From the intercostals.

CIRCULATORY SYSTEM.

Q. What is the circulatory system? — *A.* A congeries of tubes, which convey the blood to and from every part of the animal economy.

Q. How is the blood propelled through this system? — *A.* By the heart and arteries, and returned again to the heart by the veins.

Q. What is the colour of the blood in the arteries and veins? — *A.* In the arteries it is bright red, and in the veins of a more purple hue.

Q. Do not lymphatics play a part in the circulatory system? — *A.* Yes.

Q. What are the extreme vascular ramifications called? — *A.* Capillaries.

Q. Of how many coats are the arteries composed? — *A.* Three, an external or cellular, a middle or muscular, an internal or nervous coat.

Q. Is an artery elastic? — *A.* Yes.

Q. How would you distinguish them from the veins? — *A.* By being whiter, more dense, and firmer, and when cut across having a gaping aperture; and by their pulsatory motion in the living subject.

Q. How do the arteries begin at the heart? — *A.* By two trunks. The pulmonary trunk from the right ventricle to the lungs, and the aorta from the left ventricle, which is distributed by branches over the whole body.

Q. How do they terminate? — *A.* By veins, by exhalents, by glands, in cellular bodies, and by anastomosis.

Q. How are the arteries nourished? — *A.* By small vessels, called vasa vasorum.

Q. How are the veins distinguished from the arteries? — *A.* By being more transparent, less elastic, and having no pulsation.

Q. How is their structure? — *A.* Similar to the arteries, but their coats are much thinner.

Q. Where do they begin? — *A.* From the extreme branches of the arteries as a general rule, but in some cases by open mouths.

Q. How are they distributed? — *A.* As the arteries, but they are more numerous.

Q. What are in the veins which are deficient in the arteries? — *A.* Duplicatures of the internal coat called valves, to prevent the reflow of the blood.

Q. What veins are without valves? — *A.* Those of the head and viscera.

Q. What are the principal venous trunks? — *A.* Six; four pulmonary veins, and the superior and inferior cava.

Q. What are the veins of the heart proper? — *A.* The coronary.

Blood.

Q. What is peculiar to the blood? — *A.* Its consistence of size, its red colour, and its nauseous saline taste.

Q. Is it a homogeneous fluid? — *A.* No; after a short time when drawn it coagulates, and we have serum and crassamentum.

Q. What is the serum of the blood? — *A.* A light straw-coloured fluid, containing albumen, water, and soda.

Q. What is the coagulating lymph of the blood? — *A.* It is the fibrin or muscular portion of the blood.

Q. Upon what does the colouring matter of the blood depend? — *A.* Upon red globules, which are highly plastic.

Q. Are not these the heavier parts of the blood? — *A.* Yes.

Q. What is the colouring principle of these red globules? — *A.* Iron.

Q. What is the heart? — *A.* The hollow muscular organ of

the circulation, from which the arteries proceed, and to which the veins return.

Q. Where is it situated? — *A.* In the left side of the thorax invested by the pericardium, placed between the lungs, and resting upon the superior part of the diaphragm.

Heart.

Q. What is its form? — *A.* Somewhat conical, flattened on its inferior surface, and rounded at its upper part.

Q. How is the heart divided externally? — *A.* Into a basis, turned backwards and upwards; an apex, pointing forward and to the left side; a rounded edge to the right, a more acute edge to the left; a superior convex surface, and an inferior flat surface.

Q. What are its divisions internally? — *A.* Into four cavities, viz., two auricles at its base, and two ventricles forming its body.

Q. What communications exist between the cavities of the heart? — *A.* There is no communication betwixt the two auricles, nor any betwixt the two ventricles; but the right auricle communicates with the right ventricle, and there is a similar opening between the left auricle and the left ventricle; the two sides of the heart are therefore distinct.

Q. What is the use of the auricles? — *A.* They receive the blood from the great venous trunks which are fixed to them, and transmit it to the ventricles.

Q. What is the use of the ventricles? — *A.* To propel the blood of the right one through the lungs, and of the left one through the general system.

Right Auricle.

Q. What is the situation of the right auricle? — *A.* Toward the anterior part of the base of the heart.

Q. How is it divided from the left auricle? — *A.* By the septum auricularum.

Q. What are the musculi pectinati? — *A.* They are transverse fleshy fibres on the sides of the auricle.

Q. What veins open into the right auricle? — *A.* The two venæ cavæ and the coronary vein.

Q. What are the appendices to the auricles? — *A.* Small projections from the auricular cavities, like dog's ears.

Q. Where do the two cavæ enter, and what is the projection called between their mouths? — *A.* The superior cava opens at the upper posterior part, and the inferior cava enters at the

lower posterior part, and the tuberculum Loweri is situated between the mouths of the cavæ.

Q. Where does the coronary vein enter the right auricle? — *A.* Towards the inner and inferior part.

Q. How is the mouth of the coronary vein protected? — *A.* By a semilunar valve, called the valve of Thebesius.

Q. What is the valve of Eustachius? — *A.* A fold of the inner membrane, situated to the left of the opening of the inferior cava.

Right Ventricle.

Q. What is the situation of the right ventricle? — *A.* At the anterior part of the right side of the heart.

Q. Is the right or left ventricle the largest? — *A.* The right is the largest.

Q. What are the columnæ carneæ? — *A.* Fleshy pillars, by the contraction of which the valves of the ventricles are closed.

Q. What are the corda tendinæ? — *A.* They are the tendons of the columnæ carneæ, by which they are connected to the edges of the valves.

Q. How is the communication between the right auricle and ventricle protected? — *A.* By the tricuspid valve.

Q. What is the construction of this valve? — *A.* It is a tendinous curtain fixed around the circular opening into the ventricle; its opposite edge presents three points, which are connected to the sides of the ventricle by tendinous cords.

Q. What is the use of this valve? — *A.* When the ventricle contracts, this valve prevents the blood from returning into the auricle.

Q. What artery arises from the right ventricle? — *A.* The pulmonary artery, at its upper and left side.

Q. How is the mouth of the pulmonary artery protected? — *A.* It is guarded by three semilunar valves.

Q. What is the particular form of the semilunar valves? — — *A.* The loose edge of each resembles two small crescents, uniting in a middle papilla, called corpus sesamoideum aurantii.

Q. What is the use of these valves? — *A.* They support the column of blood in the artery, and prevent its returning into the ventricle.

Left Auricle.

Q. Where is the left auricle situated? — *A.* At the superior and posterior part of the left side of the heart.

Q. What difference is there in the size of the left auricle

from that of the right? — *A.* The left is smaller than the right, and its sides are thicker.

Q. What is its structure? — *A.* It resembles that of the right auricle, but is more muscular.

Q. What veins open into the left auricle? — *A.* The four pulmonary veins.

Left Ventricle.

Q. What is the situation of the left ventricle? — *A.* At the posterior and left part of the heart.

Q. What is its general structure? — *A.* It is similar to that of the right, but much more muscular.

Q. How is the communication between the left auricle and ventricle protected? — *A.* By the mitral valve.

Q. What is the construction of the mitral valve? — *A.* Similar to the tricuspid, excepting that it has only two portions for a valve.

Q. What artery arises from the left ventricle? — *A.* The aorta.

Q. How many valves are there at the mouth of the aorta? — *A.* Three, called semilunar.

Q. What is their structure and use? — *A.* Similar to the pulmonary valves.

Arteries, Veins, and Nerves, to supply the Heart itself.

Q. What are the arteries which nourish the heart, and whence are they derived? — *A.* They arise from the aorta just after it has left the heart, and are called coronary.

Q. What is their course and distribution? — *A.* That which supplies the right side of the heart runs between the right auricle and ventricle; and that which supplies the left side passes between the pulmonary artery and left ventricle.

Q. Where do the coronary veins terminate? — *A.* In the great coronary vein, which terminates in the right auricle.

Q. Whence are the nerves of the heart derived? — *A.* From the cardiac plexus.

Pericardium.

Q. By what is the heart surrounded? — *A.* By the pericardium.

Q. What is the construction of this? — *A.* It is a fibro-serous membranous bag, conical in form.

Q. What are its connexions? — *A.* It adheres to the tendinous centre of the diaphragm; below, and to the great vessels at the base of the heart.

Q. How is its inner surface lubricated? — *A.* By a serous fluid.

Circulation of the Blood.

Q. How is the circulation of the blood effected? — *A.* By the alternate contraction of the auricles and ventricles, called the diastole and systole of the heart.

Q. Describe the course of the blood. — *A.* The blood being returned by the superior vena cava from the upper part of the body, and by the inferior vena cava from the lower part, is emptied into the right auricle; this contracts and discharges its contents into the right ventricle: when filled the right ventricle contracts; by that contraction its tricuspid valve is shut, and its contents propelled through the ramifications of the pulmonary artery into the lungs. The blood is returned by the four pulmonary veins into the left auricle, which, being distended, now contracts and throws its blood into the left ventricle; the left ventricle then also contracts, its mitral valve shuts, and its blood is propelled through the aorta and arteries into the capillary vessels of the system. It is again returned by the veins into the two venæ cavæ and the right auricle, to undergo precisely the same process. The mouths of the aorta and pulmonary artery being each protected by three semilunar valves, the blood is prevented passing back from them into the ventricles.

Q. What sensible change is produced on the blood in the lungs? — *A.* The venous blood, which is brought to the right side of the heart, is of a dark purple hue; during its passage through the lungs, it attracts oxygen from the air in the bronchial cells, and gives out a quantity of carbonic acid gas; when returned to the left auricle, it is found of a bright florid red colour.

Pulmonary Artery.

Q. Where does this arise, and what is its course? — *A.* It arises from the right ventricle, ascends towards the left, passing before the beginning of the aorta.

Q. How is it divided? — *A.* Into two, viz., the right and left pulmonary arteries, one for each lung, and are distributed throughout the lungs.

Q. How does the right pulmonary artery differ from the left in its course? — *A.* It passes behind the aorta and superior cava; and is the longest.

Q. How do they terminate in the lungs? — *A.* By minute ramifications, which form upon the surfaces of the air cells, the rete mirabile Malpighii.

Aorta.

Q. From what part of the heart does the aorta arise; and what is its course? — *A.* It arises from the superior part of the left ventricle opposite the fourth dorsal vertebra, and then ascends obliquely to the right; then curves back and to the left, as high as the second dorsal vertebra; it then passes down and back to the left side of the body to the os sacrum.

Q. How is it generally divided? — *A.* It is usually divided into the ascending and descending aorta.

Q. What parts of the body are supplied with blood from each of its divisions? — *A.* The head and upper extremities are supplied from the ascending aorta; the trunk and lower extremities from the descending.

Q. What are the capital branches of the aorta? — *A.* They are the two subclavians, the carotids, the cœliac, the superior mesenteric, the emulgent, the inferior mesenteric, and the iliac arteries.

Q. What are the smaller branches? — *A.* They are the coronary, bronchial, œsophageal, intercostal, inferior diaphragmatic, spermatic, lumbar, and sacral arteries.

Q. Which of the branches of the aorta arise in pairs, and which of them singly? — *A.* They all arise in pairs except the cœliac, the two mesenteric, some of the œsophageal, the bronchial, and sometimes the sacral.

Q. What are the first arteries given off by the aorta? — *A.* The coronary.

Q. What are the names of the arteries given off from the arch of the aorta? — *A.* The arteria innominata, or common trunk of the right carotid and right subclavian; and the left carotid and left subclavian.

Q. What is the general course of the carotid arteries, and how are they divided? — *A.* They run directly to the head, and are divided into the external and internal carotids.

Q. How is the external carotid distributed? — *A.* To the face and external parts of the head.

Q. How are the internal carotids distributed? — *A.* To the brain.

Q. Whither do the subclavian arteries pass, and where do they terminate? — *A.* They pass behind and under the clavicles to the upper extremity, and terminate at the upper edge of the first rib.

Q. What name do they assume in passing from the thorax? — *A.* Axillary arteries.

Q. What arteries are given off from the thoracic portion of the descending aorta? — *A.* The bronchial, œsophageal, and intercostal arteries.

Q. What arteries does the abdominal portion of the descending aorta give off? — *A.* The phrenic, cœliac, superior mesenteric, emulgent spermatic, inferior mesenteric, lumbar, sacral, and iliac arteries.

Q. Whither do the phrenic arteries pass? — *A.* To the diaphragm.

Q. Where do the cœliac arteries go? — *A.* To the stomach, spleen, and liver.

Q. What parts do the superior mesenteric supply? — *A.* The mesentery, small intestines, &c.

Q. Where do the emulgent arteries go? — *A.* To the kidneys.

Q. Where do the remainder of the branches go? — *A.* The spermatic to the testes, the inferior mesenteric to the great intestines, the lumbar to the loins, and the sacral to the sacrum.

Q. How does the aorta terminate? — *A.* In the two iliac arteries, which pass to the pelvis and lower extremities.

Q. How are the iliac arteries divided? — *A.* Into the external and internal iliacs; the internal iliacs go to the pelvis, the external pass to the thighs and lower extremities.

Q. Where do they terminate? — *A.* Under Poupart's ligament.

Q. What name does the external iliac assume on passing from the abdomen? — *A.* The continuations of the external iliacs on the lower extremities, are called the femoral arteries.

ARTERIES OF THE HEAD.

Q. Where do the carotids arise? — *A.* The right arises from the arteria innominata, and the left is the next capital branch given off by the aorta.

Q. What is their course? — *A.* They ascend on each side of the trachea, between it and the internal jugular vein, as high as the larynx, without giving off any branches; and in this course are called the primitive carotids.

Q. How are they divided? — *A.* Opposite to the os hyoides they divide into the external and internal carotids.

Q. What is the relative situation of the external and internal carotid arteries? — *A.* The external is situated before and to the inside of the internal, at their origin.

External Carotid Artery.

Q. What is the general course of the external carotid artery? — *A.* It ascends behind the angle of the lower jaw, passes under and sometimes in the substance of the parotid gland, and terminates opposite the condyle of the lower jaw.

Q. How many branches does it give off, and what are their names? — *A.* It gives off nine branches, viz., anteriorly, the superior thyroideal, the lingual, the external maxillary or labial, and the facial; posteriorly, the occipital, the posterior auris; interiorly, the ascending pharyngeal; and lastly, it divides into the temporal, and the internal maxillary.

Q. Where does the superior thyroideal artery arise, and what is its course and distribution? — *A.* It arises from the inner side of the external carotid near its origin; and immediately after its origin, it bends downwards and gives branches to the jugular glands, the fat, and the skin; then runs transversely, and is distributed to the thyroid gland and larynx, as well as slightly to the pharynx.

Q. What is the next branch given off? — *A.* The lingual, which passes over the cornu of the os hyoides to the muscles of that bone and of the tongue, and to the sublingual gland; then loses itself in the tongue, where it has been called the raninal artery.

Q. What is the next branch given off? — *A.* The external maxillary or labial, which arises anteriorly, and passes over and just before the masseter, and middle of the lower jaw; it then runs under the depressor anguli oris, supplying it, the buccinator, and the quadratus; it sends off first, the submental, below the chin, — next, a contorted branch, which, dividing at the commissure of the lips, runs along their edges, and forms, with its fellow, the coronaria labiorum; it then ascends towards the nose, and is distributed about it; it afterwards reaches the inner angle of the palpebræ, and dispenses several branches.

Q. What is the next branch given off? — *A.* The ascending pharyngeal, arising from the inner side of the external carotid; is of small size, and ascends upon the rectus anticus to the pharynx; and some of its branches enter the cranium.

Q. What branch is next given off? — *A.* The occipital, arising posteriorly.

Q. What is its course? — *A.* It passes obliquely before the internal jugular vein, and giving twigs to the stylo-hyoideus, stylo-glossus, and digastric, it runs between the styloid and mastoid processes, supplying the muscles and integuments of

the os occipitis; it communicates posteriorly with the vertebral and cervical, and superiorly with the temporal artery.

Q. What is the next branch? — *A.* The posterior auris, arising posteriorly; is distributed to the external ear.

Q. What is the next branch? — *A.* The facial; it arises anteriorly, and passes across before the masseter muscle, and is distributed to it, and to the fat of the cheek.

Q. What artery is next given off? — *A.* The temporal.

Q. What is its course and distribution? — *A.* It emerges from the parotid gland, ascends over the zygoma, and divides into an anterior, middle, and posterior branch. The anterior or frontal branch supplies the forehead; the middle or parietal branch goes partly to the forehead and partly to the occiput; and the posterior or occipital branch, to the occiput.

Q. What is the next and last branch? — *A.* The internal maxillary; it commences from the termination of the external carotid, and courses just below the cervix of the lower jaw, bending inward, forward, and downward; and then ascends forward to the sphœno-maxillary fissure.

Q. What arteries does the internal maxillary give off? — *A.* The arteria meningea media, the inferior maxillary, the alveolar, the infra-orbitar, the palato-maxillary, and the sphœno-palatine; and also various other branches to the adjacent parts, from which they have received names.

Q. Describe the course and distribution of the branches enumerated. — *A.* The arteria meningea media passes through the foramen spinosum of the os sphœnoides to the dura mater; the inferior maxillary enters the canal of the lower jaw, and goes to the teeth and chin; the alveolar goes to the back teeth of the upper jaw; the infra-orbitar passes along the infra-orbitary canal to the cheek; the palato-maxillary descends in the canal of the same name to the palate; and the sphœno-palatine goes to the cavity of the nose.

Internal Carotid Artery.

Q. What is the general course of the internal carotid artery? — *A.* At first it forms a curve backward, and is situated more posteriorly than the external; it ascends to the petrous portion of the temporal bone, passes through its canal into the cavernous sinus; it there forms another considerable curve by the side of the sella turcica, and by the side of the internal clynoid process it pierces the dura mater.

Q. Enumerate the branches of the internal carotid. — *A.* It sends one branch forward just as it pierces the dura mater,

which accompanies the optic nerve through the foramen opticum, called the ophthalmic, which is distributed to the contents of the orbit; it then divides into three branches; namely, the communicans, which runs backwards to join the vertebral; the anterior cerebri; and the media cerebri.

Q. What is the course of the anterior cerebri? — *A.* It runs forward and unites with its fellow from the other side, and then divides into two or three branches, which go to the anterior lobes of the brain, the corpus callosum, and to the middle lobes of the brain.

Q. What is the course of the media cerebri? — *A.* It is larger than the former; divides into several rami, which supply the superficial parts of the brain above and below.

ARTERIES OF THE UPPER EXTREMITIES.

Subclavian Arteries.

Q. What is the number of the subclavian arteries? — *A.* There are two, one going to each arm.

Q. Where do they arise, and what is their course? — *A.* The right subclavian arises from the arteria innominata; the left is the third branch, which proceeds directly from the arch of the aorta, and pass transversely under the clavicles, and over the first rib; the left is the shortest.

Q. Where do they change their name? — *A.* Above the middle of the first two ribs, between the anterior insertions of the scaleni; they then take the name of axillary arteries.

Q. Enumerate the branches of the subclavian artery. — *A.* They run some way without giving off any branches; then each gives off six, viz., the vertebral, the internal mammary, the cervical, the intercostal, the inferior thyroideal, and the supra-scapular arteries.

Q. Where does the vertebral artery arise, and what is its course and distribution? — *A.* From the posterior and upper side of the subclavian. It ascends and enters the canal formed in the transverse cervical process, sending off twigs in its ascent to the medulla spinalis and its membranes, and giving arteries to the vertebral muscles; its course is very tortuous, especially before it enters the cranium, at the foramen magnum occipitis; before entering the cranium it communicates with the cervical and occipital arteries, and immediately after it enters it gives branches to the medulla oblongata, corpora olivaria, &c.; it then advances on the basilary process of the os occipitis; here,

joining its fellow, it forms the basilar artery, which communicates with the branches of the internal carotid, and is distributed to the posterior lobes of the brain.

Q. What is the circulus arteriosus, or the circle of Willis? — *A.* The branches of communication between the vertebral arteries and the internal carotids surrounding the sella turcica.

Q. Where does the internal mammary artery arise? — *A.* It arises from the anterior and lower side of the subclavian.

Q. What is its course and distribution? — *A.* It descends behind the cartilages of the true ribs, an inch from the sternum, giving branches to the thymus gland, mediastinum, pericardium, pleura, intercostal muscles, &c., and passes from the thorax by the side of the ensiform cartilage of the sternum, to the rectus abdominis, where it communicates with the epigastric artery.

Q. Where does the cervical artery arise? — *A.* From the upper side of the subclavian.

Q. What is its course and distribution? — *A.* It sometimes arises singly and immediately divides, or its two branches have distinct origins; the cervicalis anterior runs behind the carotid of the same side, and is distributed to the anterior muscles of the neck, and to those of the larynx, pharynx, &c.; the posterior cervical passes under the transverse process of the last vertebra of the neck and runs to the posterior cervical muscles.

Q. Where does the superior intercostal arise, and what is its course? — *A.* From the lower side of the subclavian; and it descends on the inside of the two or three uppermost ribs near their heads, and sends off, under each of these ribs, a branch which runs along its lower edge, and supplies the intercostal muscles, and contiguous parts of the pleuræ, &c.

Q. Where does the inferior thyroideal arise? — *A.* From the upper part of the subclavian, near the internal mammary.

Q. What is its course and distribution? — *A.* It ascends, passes behind the primitive carotid, and is chiefly distributed to the thyroid gland.

Q. Where does the supra-scapular artery arise, and what is its course and distribution? — *A.* It arises near the inferior thyroideal, and sometimes from it; and passes to the notch behind the coracoid process of the scapula, and is distributed to the muscles at the back and upper part of that bone.

Axillary Arteries.

Q. Where do the axillary arteries commence? — *A.* They

begin at the first rib, between the insertions of the scaleni, being the continuations of the subclavian.

Q. Where do they terminate? — *A.* Opposite the lower part of the tendon of the latissimus dorsi; the continuation of each is called the brachial artery.

Q. Enumerate the branches of the axillary arteries. — *A.* Each axillary artery sends off five or six branches, namely, the external mammary or thoracic arteries, the infra-scapular, the anterior circumflex, and the posterior circumflex.

Q. How many external mammary arteries are there? — *A.* Usually three or four, but two are chiefly noticed.

Q. Which is the first branch given off by the axillary artery? — *A.* The superior mammary.

Q. What is its course? — *A.* It descends between the pectoralis major and minor, giving branches to them and to the serratus anticus, latissimus dorsi, &c.

Q. What is the second branch given off, and its course and distribution? — *A.* The inferior mammary. It runs along the inferior edge of the pectoralis major, and is distributed to the adjacent muscles, breast, and skin.

Q. What is the third branch given off, and its course and distribution? — *A.* The infra-scapular; which is a very considerable artery, and takes the course of the inferior costa of the scapula, sending branches to the subscapularis, teres major and minor, and large branches to the inferior part of the scapula.

Q. What is the course and distribution of the anterior circumflex artery? — *A.* It is small; it runs forwards under the coraco-brachialis, then bends outward, and passes under the deltoid.

Q. Where does the posterior circumflex artery arise, and what is its course and distribution? — *A.* It is a considerable vessel, arising from the lower and posterior part of the trunk; and it runs backward between the head of the os humeri and teres major, surrounding the articulation till it reaches the posterior part of the deltoid, under which it passes and is distributed.

Q. Where does the brachial artery commence? — *A.* It is the continuation of the axillary artery, beginning immediately below the tendon of the latissimus dorsi.

Q. What is its course? — *A.* It descends on the inside of the arm, over the coraco-brachialis, and short head of the triceps, and along the inner edge of the biceps to the middle of the arm.

Q. What branches are given off by the brachial artery above the bend of the arm? — *A.* Besides many small branches to

the neighbouring parts, it sends off, first, the profunda humeri superior, from the inner side of its upper part — it is a long branch, which passes behind the bone, and communicates with the radial artery; secondly, the profunda inferior, about the middle of the arm, which descends toward the inner condyle; thirdly, the anastomodicus magnus, given off a little above the inner condyle, communicating with the arteries of the forearm.

Q. What is the situation of the brachial artery at the bend of the arm? — *A.* At the bend of the arm it runs under the aponeurosis of the biceps, and under the median vein.

Q. How does the brachial artery terminate? — *A.* A little below the fold of the arm it divides into two principal branches; an inner or posterior, named ulnar or cubital, and an outer or anterior named radial.

Q. What is the course of the ulnar artery? — *A.* It passes deep under the flexors of the hand and fingers to the inner part of the forearm, along the outer side of the flexor carpi ulnaris and os pisiforme to the palm of the hand; passing over the anterior annular ligament, and under the palmar fascia, and here forming the superficial palmar arch.

Q. What are the chief branches given off by the ulnar before it reaches the wrist? — *A.* First, the ulnar recurrent; second, the anterior interosseous artery; and third, the posterior interosseous artery.

Q. What is the course of the ulnar recurrent? — *A.* It runs to the inner condyle, then turns up to communicate with the branches of the anastomodicus.

Q. Where is the anterior interosseous given off, and what is its course? — *A.* It is given off deeply between the heads of the ulna and radius; it descends close to the interosseous ligament, passes under the pronator quadratus, behind which it perforates the ligament, and goes to the back of the wrist.

Q. Where is the posterior interosseous given off, and what is its course? — *A.* It has usually a common origin with the anterior; and about a couple of inches below the articulation it pierces the interosseous ligament, and having given off a recurrent towards the external condyle of the os humeri, it descends behind the ligament, and is distributed to the muscles on the back of the arm, and communicates with the anterior interosseous and other arteries.

Q. What is the course of the superficial palmar arch? — *A.* It crosses the upper part of the palm of the hand and passes towards the thumb, lying between the palmar fascia and flexor tendons of the fingers.

Q. What branches are given off by it? — *A.* It sends off five branches, viz., the ulnaris profunda, and four digital arteries.

Q. What is the course and distribution of the ulnaris profunda? — *A.* It passes deep under the flexor tendons to join the arcus profundus of the radial artery; it also sends a branch to the inner side of the little finger.

Q. What is the course and distribution of the digital arteries? — *A.* They are given off in succession; each passes between the heads of two neighbouring metacarpal bones; it then splits into two, one branch passing along the inside of one finger, the other branch along the outside of the adjacent finger. The first supplies the outside of the little finger, and inside of the ring finger; the second goes to the outside of the ring finger, and inside of the middle finger; the third to the outside of the middle finger, and inside of the fore-finger; the fourth to the outside of the index, and inside of the thumb.

Q. How does the superficial palmar arch terminate? — *A.* By a branch of communication with the radial artery.

Q. What is the general course of the radial artery? — *A.* It takes the direction of the radius; it passes over the pronator teres, and at the wrist it lies superficially between the tendons of the flexor carpi radialis, and supinator longus.

Q. What branch does it give off before it reaches the wrist? — *A.* In its course to the wrist it gives off the radial recurrent over the outer condyle, to communicate with the anastomosing branches of the brachialis; and in its course downward it supplies, by small branches, the various muscles through which it passes.

Q. What branches does the radial artery give off at the wrist? — *A.* It gives off the superficialis volæ to the ball of the thumb and palm of the hand, which often communicates with the superficial palmar arch.

Q. How does the radial artery form the deep palmar arch? — *A.* It runs backwards under the tendons of the abductor and extensors of the thumb; between the basis of the first bone of the thumb and of the metacarpal bone of the fore-finger, it passes into the palms of the hand, where it forms the arcus profundus.

Q. What is the course of the arcus profundus? — *A.* It runs under the tendons of the flexor muscles close to the bones, and joins the communicating branch of the superficial arch; and gives off a branch to the thumb, and one passes from it between each metacarpal bone.

THORACIC ARTERIES.

Q. Enumerate the branches given off by the thoracic portion of the aorta. — *A.* The bronchial, the œsophageal, and the inferior intercostal arteries.

Q. Where do the bronchial arteries arise? — *A.* They are given off very irregularly, but they generally arise from the fore part of the aorta; there is at least one for each lung, and sometimes more.

Q. What is their course and distribution? — *A.* They pass directly to each lung, to the substance of which they are distributed.

Q. Where do the œsophageal arteries arise? — *A.* They are from three to six in number, and arise from the fore part of the aorta, and are distributed to the œsophagus.

Q. Where do the intercostal arteries arise? — *A.* They arise in pairs along the back part of the descending aorta, all the way to the diaphragm.

Q. What is their course? — *A.* They run transversely over the bodies of the vertebræ, and supply the intercostal muscles, contiguous pleuræ, &c.

TABDOMINAL ARTERIES.

Q. Enumerate the arteries given off by the abdominal aorta? — *A.* The phrenic, the cœliac, the superior mesenteric, the emulgent, the capsular, the spermatic, the inferior mesenteric, the lumbar, and the sacral arteries.

Q. How many phrenic arteries are there, and where do they arise, and what is their course? — *A.* They are two in number, and arise from the aorta, between the crura of the lesser muscle of the diaphragm, run along the concave side of the diaphragm, and are distributed to its fibres, and to the neighbouring parts.

Q. Where does the cœliac artery arise, and what are the distributions? — *A.* From the fore part of the aorta, immediately after its passage through the crura of the diaphragm, nearly opposite to the junction of the last dorsal with the first lumbar vertebra, and divides into three great branches, viz., the coronary of the stomach, the hepatic, and the splenic.

Q. What is the course and distribution of the coronary of the stomach? — *A.* It is the least of the three branches; it passes to the left, and having reached the superior orifice of the stomach, it returns along the lesser curvature, giving branches

which surround the stomach, and communicates with the pyloric artery.

Q. What is the course and distribution of the hepatic artery? — *A.* It runs to the upper and inner part of the pylorus, there giving off, first, the pyloric artery, which is small, and a larger one; the gastro-epiploica dextra, which runs along the right side of the great curvature of the stomach, having first at the pylorus given off the duodenal artery to the duodenum; it then proceeds behind the gall ducts towards the gall bladder, to which it gives off the cystic arteries; then divides into two branches, one of which goes to the right and the other to the left lobe of the liver.

Q. What is the course and distribution of the splenic artery? *A.* — It runs towards the left, hidden behind the pancreas; and towards the spleen, adhering to the pancreas, to which it gives off several branches; the pancreatica, near the extremity of the pancreas, it gives off the gastro-epiploica sinistra, to the left portion of the great curvature of the stomach; it then gives the vasa brevia to the great extremity of the stomach; and lastly, it divides into four or five considerable branches, which terminate in the spleen.

Q. Where does the superior mesenteric artery arise, and what is its course? — *A.* It arises from the fore part of the aorta, a little below the cœliac, and descends obliquely to the left, at first covered by the pancreas; it then passes over the duodenum, and enters between the two laminæ of the mesentery. In the rest of its course it takes a sweep obliquely from the left to the right, and terminates at the extremity of the ilium; by this means it forms a long arch, from which sixteen or eighteen branches proceed, chiefly to the small intestines; the first and last branches are shorter than the middle ones. These branches join each other by numerous arches; the first considerable branch is the colica dextra, which, passing along the superior part of the colon, communicates with the inferior mesenteric; the second principal branch supplies the last portion of the ilium and the first of the colon, and is called the ilio-colica.

Q. Where does the inferior mesenteric artery arise, and what is its course? — *A.* It arises from the fore part of the aorta, about a finger's breadth below the spermatic arteries, and divides into three or four branches, which are distributed to the large intestines; the first of which, communicating with the colica dextra upon the colon, is named colica senistra; the lower branch sends off the anterior hemorrhoidalis interna to the posterior portion of the rectum.

Q. How many emulgent arteries are there, and where do they arise, and what is their course? — *A.* They are two, one for each kidney; they arise from the sides of the aorta, immediately under the superior mesenteric. The right lies more backward and is longer than the left, passing behind the vena cava; they both lie behind the emulgent veins, and enter the substance of the kidneys behind the vein.

Q. Where do the capsular arteries arise? — *A.* The right comes most commonly from the right emulgent, and the left from the aorta above the emulgent.

Q. What is their course and distribution? — *A.* They pass directly, and are distributed to the renal capsules.

Q. Where do the spermatic arteries arise, and what is their course? — *A.* They arise near each other from the fore part of the aorta, between the emulgents and inferior mesenteric. They descend obliquely outward, giving off minute branches; in men they pass through the abdominal ring to be distributed to the testes; while in women they remain in the abdomen, and are distributed to the ovaria and uterus.

Q. Where do the lumbar arteries arise, and how are they distributed? — *A.* They arise from the posterior part of the abdominal aorta, in five or six pairs, and are distributed on each side of the loins.

Q. Where does the sacral artery arise? — *A.* It generally arises from the bifurcation of the aorta; it is distributed to the os sacrum, contiguous peritoneum, &c., &c.

PELVIC ARTERIES.

Q. What is the course of the right primitive iliac? — *A.* It passes first before the origin of the left iliac vein, and then descends before the right iliac vein.

Q. What is the course of the left primitive iliac? — *A.* It descends before and to the outer side of the left vein.

Q. How are they divided? — *A.* Opposite the union of the ilium and sacrum, each divides into an internal and external iliac artery.

Q. What is the course of the trunk of the internal iliac? — *A.* It passes into the cavity of the pelvis, a little before the sacro-iliac junction; and being directed a little forwards it forms a curve, whose convexity is turned downwards and backwards.

Q. What are the chief branches given off by the internal iliac? — *A.* They are the lesser iliac, the glutæal, the sciatic, the pudic, the obturator, and the umbilical arteries.

Q. Where do the lesser iliacs arise, and what are their course? — *A.* They are the first branches given off by the internal iliac, but sometimes they proceed from the glutæal; and pass behind the psoas, and are distributed to the iliacus internus, to the os ilium, to the quadratus lumborum, &c.

Q. Where does the glutæal artery arise, and what is its course? — *A.* It is one of the greatest branches given off, and is the second branch given off by the internal iliac; and passes from the pelvis, along with the sciatic nerve, through the greater sacro-ischiatic notch; and is distributed in numerous branches to the glutæus maximus and medius.

Q. What is the third branch given off, and its course? — *A.* The sciatic; it is next in size to the glutæal; and after detaching several branches to the rectum, &c., it passes obliquely over the sciatic nerve, accompanying it through the great sacro-ischiatic notch, and descending with it along the posterior part of the thigh, and being distributed to the parts adjacent.

Q. Where does the pudic artery arise? — *A.* It generally arises from one common trunk with the sciatic.

Q. What is its course and distribution? — *A.* After sending branches to the bladder, rectum, &c., it quits the pelvis through the great sacro-ischiatic notch; then passes behind the spine of the ischium, and again enters the pelvis through the lesser sacro-ischiatic notch; it next runs on the inside of the tuberosity of the ischium, and separates into two, an inferior or perineal artery, and a superior, which is the artery of the penis. The latter runs along the branch of the ischium and pubis to the symphysis; in this course it sends an artery to the bulb of the urethra, and having reached the symphysis pubis, it divides into two branches, one the dorsal, the other the cavernous artery of the penis; the dorsal runs along the superior groove of the penis, the cavernous enters and is distributed within the corpora cavernosa.

Q. Where does the obturator artery arise, and what is its course? — *A.* Its origin varies; sometimes it arises from the internal iliac, and sometimes from the lesser iliac; now and then from the epigastric, and but rarely from the external iliac; and passes from the pelvis at the upper part of the ligament of the foramen ovale, and is distributed to the pectineus and triceps.

Q. What is there peculiar to the umbilical artery? — *A.* It is important to the fœtus, but is nearly obliterated in the adult.

Q. What is its course? — *A.* It ascends on the side of the bladder, giving branches to it, the peritoneum, and contiguous

parts; and then assumes the form of a ligament, and passes upwards to the umbilicus.

Q. What is the course of the external iliac? — *A.* It descends on the iliac muscle as far as Poupart's ligament.

Q. What branches does it give off? — *A.* The epigastric, and circumflex iliac.

Q. Where does the epigastric artery arise, and what is its course? — *A.* It arises internally from the external iliac, as it passes under Poupart's ligament; and it ascends obliquely behind the tendon of the transversalis abdominis, toward the posterior part of the rectus, behind which it runs, giving branches to the contiguous parts; and terminates by anastomosing with the internal mammary artery.

Q. Where does the circumflex iliac arise, and what is its course? — *A.* It arises from the outer side of the external iliac, under Poupart's ligament; and it passes to the inner labium of the crista of the ilium, where it is distributed to the abdominal muscles.

ARTERIES OF THE LOWER EXTREMITY.

Q. Where does the femoral artery commence? — *A.* Immediately after the external iliac passes under Poupart's ligament.

Q. What is its course? — *A.* It descends over the brim of the pelvis and head of the os femoris; it is placed on the inside of the femoral vein; and is covered only by the skin, fat, and glands; it then descends between the Sartorius, vastus internus, and triceps, being covered for a great part of the way by the former. Below the middle of the thigh it passes through the tendinous part of the triceps, then over the inner ridge of the linea aspera, and below the tendon of the triceps into the ham, where it forms the popliteal artery.

Q. What branches does it send off in the groin? — *A.* To the inguinal glands, one or two to the parts of generation, called the external pudics; others to the muscles near the groin, and the profunda.

Q. Where is the profunda given off, and what is its course? — *A.* It arises about four inches below Poupart's ligament, from the posterior part of the femoral artery; it is nearly equal in size to the femoral artery. It passes deep, betwixt the adductors and vastus internus; it gives off high up, first, the circumflexa interna, distributed to the pectinalis, triceps, and obturator, and anastomoses with the obturator artery; second,

the circumflexa externa, near the former, which is distributed to the external and upper part of the thigh, anastomosing with the glutæal; third, the perforantes, usually three in number, sent off lower down and posteriorly; they perforate the triceps, and are distributed to the back part of the thigh.

Q. What name does the femoral artery assume in the hams? — *A.* Popliteal.

Q. What branches does it give off? — *A.* Two superiorly, called the superior articular, which pass to the upper part of the knee-joint; two inferiorly, to the lower part of the knee-joint, called the inferior articular; and one or two between these, called the middle articular.

Q. How does it terminate? — *A.* It divides into the anterior and posterior tibial arteries.

Q. What is the course of the anterior tibial? — *A.* It passes between the heads of the tibia and fibula, through the interosseous ligament; then descends on its forepart, between the tibialis anticus and extensor digitorum; passes under the common annular ligament; and advances on the convex side of the foot as far as the interstice between the first and second metatarsal bones.

Q. How is the anterior tibial artery distributed? — *A.* As it passes between the tibia and fibula it gives off several small branches; it gives off numerous others as it descends upon the leg, and over the upper part of the foot; at its termination it sends off a large branch between the heads of the first and second metatarsal bones, to join the posterior tibial; it also sends several branches over the metatarsal bones, and a considerable one to each side of the great toe.

Q. What is the course of the posterior tibial artery, and how is it distributed? — *A.* It descends between the soleus, tibialis posticus, flexor digitorum communis, and flexor longus pollicis; it then runs behind the inner ankle, and passes to the sole of the foot through the concavity of the os calcis, where it divides into the external and internal plantar arteries; and it gives branches to the muscles as it descends, and the nutrient artery to the bone; it also communicates behind the inner ankle with the anterior tibial.

Q. What is the course and distribution of the external plantar artery? — *A.* It passes on the concavity of the os calcis obliquely under the sole of the foot, to the base of the fifth metatarsal bone; thence it runs across, forming the plantar arch, toward the great toe, where it communicates with the large branch of the anterior tibial; from the convex side of this plantar

arch branches proceed to the outside of the second toe and to both sides of the three last ones, in the same way as the digital arteries of the hand are given off.

Q. What is the course and distribution of the internal plantar artery? — *A.* Having passed beyond the middle of the sole of the foot it divides, sending one branch to the great toe, where it communicates with the branch of the anterior tibial, and another to the first phalanges of the other toes, communicating with the branches of the arch.

Q. What is the course and distribution of the fibular artery? — *A.* It descends on the back of the fibula, between the soleus and flexor longus pollicis, giving rami in its course, and about the lower third of the fibula it sends a branch between it and the tibia to the integuments of the tarsus: between the astragalus and tendo-Achillis, it forms an arch with the posterior tibial; thence running outward and above the external ankle it communicates with the anterior tibial, and sends off several rami.

VEINS.

SUPERIOR CAVA.

Q. Where does the superior cava arise, and how does it terminate? — *A.* It arises from the superior part of the right auricle, where it is surrounded by the pericardium; it then ascends a little to the right and backwards, and terminates behind the cartilage of the first rib by dividing into two branches, called the subclavian veins.

Q. What veins does the superior cava receive? — *A.* The azygos, the right internal mammary vein, and several lesser branches.

Q. What is the vena azygos? — *A.* It is the trunk of the intercostal veins of the right side, and of the inferior intercostals of the left.

Q. What is its course? — *A.* It crosses from the left to the right, ascends on the right side of the bodies of the vertebræ, passes behind and above the root of the right lung, and enters the posterior part of the vena cava.

Q. What veins does the right subclavian receive? — *A.* The external jugular, the internal jugular, and the vertebral.

Q. What is peculiar to the left subclavian? — *A.* It is by much the longest, passes before and across the arteries going to the head, and receives, besides the same veins as the right, the trunk of the left superior intercostals and the left internal mammary.

Q. What is the axillary vein? — *A.* It is a continuation of the subclavian, and receives the blood of the veins, which correspond to the branches of the axillary artery.

VEINS OF THE HEAD AND NECK.

Q. What veins does the external jugular receive? — *A.* The frontal vein, from the forehead; the angular vein from about the inner angle of the eye; the temporal vein, from the temple; the auricular vein, from the ear; the lingual vein, from the tongue; the occipital vein, from the occiput; and the supra-humeral vein, from the scapula.

Q. What is its course and termination? — *A.* It runs superficially down the neck over the muscles, and passing behind the clavicle, it terminates generally in the subclavian of the same side, but sometimes in the axillary, and sometimes in the union of these two.

Q. How is the internal jugular formed? — *A.* It receives branches from the facial and temporal, but is chiefly formed by the sinuses of the dura mater.

Q. What are the chief sinuses of the dura mater? — *A.* The cavernous, the circular, the superior and inferior petrosal, the occipital, the inferior longitudinal, the torcular herophili, and the superior longitudinal.

Q. Where is the cavernous sinus situated? — *A.* On each side of the sella turcica, at the apex of the petrous portion of the temporal bone.

Q. Whence does it receive its blood? — *A.* From the great ophthalmic veins.

Q. Where is the circular sinus situated? — *A.* Around the pituitary gland.

Q. Where is the superior petrosal sinus situated, and whence do they receive blood? — *A.* In the groove of the ridge of each os petrosum, and receive blood from the cavernous and circular sinuses.

Q. Where is the inferior petrosal sinus situated? — *A.* Along the suture, formed by the os petrosum and os occipitis.

Q. From whence does it receive its blood? — *A.* From the cavernous and circular sinuses.

Q. Where is the occipital sinus situated? — *A.* In the inferior portion of the internal crucial spine of the os occipitis, and receives blood from the cerebellum.

Q. Where is the inferior longitudinal sinus situated? — *A.* On the lower edge of the falx.

Q. Where is the torcular herophili situated, and whence

does it receive blood? — *A.* In the junction of the falx and tentorium, and receives blood from the inferior longitudinal sinus, and from the vena magna galeni.

Q. Where is the superior longitudinal sinus situated? — *A.* In the furrow of the spine of the os frontis, upper edges of the parietal bones, and superior portion of the internal crucial ridge of the os occipitis.

Q. Where are the lateral sinuses placed? — *A.* Along the posterior edge of the tentorium, in the grooves of the lateral portions of the crucial ridge of the os occipitis; in those on the inside of the posterior inferior angle of the parietal bones; in those of the inside of the mastoid portions of the temporal bones; and in those on each side of the foramen magnum of the occipital bone.

Q. From whence do they receive their blood? — *A.* From the superior longitudinal, torcular herophili occipital, and petrosal sinuses.

Q. Where do they terminate? — *A.* At the jugular foramina, where the internal jugular veins begin.

Q. What is the course of the internal jugular veins, and where do they terminate? — *A.* They descend by the sides of the cervical vertebræ, along the edges of the longus colli, behind the sterno and omo-hyoideus, behind the external extremity of the clavicle, and terminate in the subclavian veins.

Q. What is the course of the vertebral vein? — *A.* It accompanies the vertebral artery, through the foramina of the transverse processes of the cervical vertebræ.

Q. Whence does it receive its blood? — *A.* It receives blood from the lateral sinuses, through the foramen condyloideum posterius and foramen mastoideum, and from the vertebral canal.

Q. Where does it terminate? — *A.* It terminates in the upper and posterior part of the subclavian vein.

VEINS OF THE UPPER EXTREMITIES.

Q. How are the veins of the upper extremities classed? — *A.* Into deep-seated and superficial.

Q. What is the situation and names of the deep-seated veins? — *A.* They accompany the arteries, and are the axillary, two brachial, two radial, two interosseous, and two ulnar.

Q. What are the superficial veins, and where are they situated? — *A.* They are the cephalic and basilic, and lie directly under the skin.

Q. Where is the cephalic vein situated, and what branches does it receive? — *A.* Along the outer and fore part of the arm and forearm, and receives branches from the back of the hand, and from a little below the bend of the arm, &c.

Q. Where does it terminate? — *A.* It ascends and terminates in the axillary vein.

Q. What is the situation of the basilic vein, and what are the branches it receives? — *A.* Along the inner and fore part of the arm and forearm, and receives branches from the ulnar side of the arm and hand, and terminates in the axillary vein.

Q. What is the situation and divisions of the median vein? — *A.* Between the cephalic and basilic, and divides into two branches, called median cephalic and basilic.

Q. What is the chief branch which joins it? — *A.* The vena profunda, a branch of communication with the deep-seated veins.

INFERIOR CAVA.

Q. What is the origin of the inferior vena cava? — *A.* From the inferior part of the right auricle of the heart.

Q. What is its course? — *A.* It pierces the diaphragm; is placed in a notch at the posterior part of the liver; descends along the bodies of the vertebræ to the right side of the aorta, and opposite the junction of the fourth and fifth lumbar vertebræ it divides into two branches, called the iliac veins.

Q. What veins are received by the vena cava? — *A.* The two phrenic, or diaphragmatic veins; the four hepatic veins; and lower down, the two emulgent and the spermatic veins; and the lumbar veins.

Q. Where do the hepatic veins enter the cava? — *A.* At its anterior part, just where it passes behind the liver.

Q. What is the course of the emulgent veins? — *A.* They are the veins of the kidneys; and the left is the longest; which passes before the aorta, and receives the left spermatic vein.

Q. What are the terminations of the spermatic veins? — *A.* The right enters the vena cava, the left opens into the left emulgent.

Q. What is the course of the primitive iliac veins? — *A.* They follow the distribution of the iliac arteries; and divide at the sacro-iliac junction into the internal and external iliacs.

Q. Whence does the internal iliac receive its blood? — *A.* From the veins which correspond to, and accompany the various branches of, the internal iliac artery.

Q. What veins does the external iliac vein receive? — *A.* The veins of the lower extremities.

VEINS OF THE LOWER EXTREMITIES.

Q. How are the veins of the lower extremities arranged? — *A.* Like those of the upper, into a deep-seated and a superficial set.

Q. What are the deep-seated veins of the lower extremity? — *A.* The femoral, popliteal, two posterior tibial, two anterior tibial, and two interosseal veins.

Q. What are the names of the superficial veins? — *A.* Saphena major and saphena minor.

Q. What is the situation, and what branches does the saphena major receive? — *A.* At the inner part of the foot, knee, and thigh, and receives branches from the tibial side of the back of the foot, and runs along the inner part of the thigh, and terminates in the crural vein.

Q. What is the course of the saphena minor, and where does it terminate? — *A.* From the outside of the foot it ascends on the external part of the leg, and terminates in the popliteal vein.

VENA PORTÆ.

Q. What is the vena portæ? — *A.* It is a vein peculiar to the liver, and with two sets of branches.

Q. What is the vena portæ abdominalis? — *A.* It is the one set of the vena portæ, which is distributed over the stomach, intestines, spleen, and pancreas, and receiving their blood.

Q. What is the vena portæ hepaticæ? — *A.* It is the set of the branches of the vena portæ, which are ramified through the substance of the liver, secreting the bile, and terminating in the hepatic veins.

Q. What is the situation of the trunk of the vena portæ? — *A.* Partly in the transverse fissure of the liver, where it is called the sinus of the vena portæ; and partly in Glisson's capsule.

Q. How is the trunk of the vena portæ formed? — *A.* By the junction of the vena mesenterica major, the vena splenica, and the vena mesenterica minor, or hemorrhoidalis interna.

Q. Where does the vena mesenterica major derive its blood? — *A.* From the veins corresponding to the superior mesenteric artery.

Q. What veins does the splenica receive? — *A.* From the spleen, from a branch of the coronary vein of the stomach, the pancreatic veins, and the gastro-epiploica sinistra.

Q. Where does the mesenterica minor or inferior derive its blood? — *A.* From the inferior mesenteric and some branches of the cœliac arteries.

Q. What lesser veins join the trunk of the vena portæ? — *A.* The cystic, the pyloric, and the duodenal veins; also the gastrica dextra and the coronary vein of the stomach.

ABSORBENT SYSTEM IN GENERAL.

Q. What are the absorbents? — *A.* A numerous set of minute transparent vessels, which take up the nutritive part of our food, and the various fluids and solids of the living body.

Q. What division has been made of the absorbents? — *A.* Into lacteals and lymphatics.

Q. What difference is there between the lacteals and lymphatics? — *A.* The lacteals contain a milk-like fluid, the chyle; and they are the absorbents of the small intestines; while the other absorbents of the body are called lymphatics.

Q. How do the absorbents begin? — *A.* By minute open mouths; from all the internal cavities; from the cellular membrane and every interstice; from the ducts and glands; and from the surface of the skin, stomach, intestines, &c.

Q. What is their general course? — *A.* Those of the veins; and in the limbs there are a deep-seated and a superficial set.

Q. How do they terminate? — *A.* By two trunks into the subclavian vein, near the angle formed by it and the internal jugular.

Q. What is the thoracic duct? — *A.* The left trunk is called the thoracic duct; which receives all the absorbents of the body, excepting those of the right arm and right side of the head, which go to form the right trunk.

Q. What is the structure of the absorbents? — *A.* Thin and transparent, but remarkably dense, and stronger than the veins.

Q. How many coats have they? — *A.* A muscular and cuticular coat.

Q. How is the cuticular coat disposed? — *A.* It is the most internal, and forms pairs of valves in every absorbent vessel.

Q. What are the lymphatic glands? — *A.* Small glandular bodies through which the absorbents convey their contents before they terminate in the common trunks.

Q. Where are they situated? — *A.* In clusters in various parts of the body; as just below the occiput, under the ears and jaw, along the side of the neck, in the axilla, at the root of

the lungs; in the abdomen, called mesenteric glands, belonging to the lacteals; in the loins, pelvis, &c.

Q. What are the vasa inferentia and vasa efferentia? — *A.* The absorbents which enter a gland are called vasa inferentia; and those which pass out of the gland, are called vasa efferentia.

Q. What is the structure of these glands? — *A.* They appear to be cellular.

LYMPHATICS OF THE HEAD AND NECK.

Q. How are the lymphatics of the head and neck classed? — *A.* Into the facial, temporal, occipital, and thoroideal lymphatics.

Q. What is the course of the facial lymphatics? — *A.* They accompany the trunk and branches of the facial bloodvessels, and pass through several small glands in their course.

Q. What is the course of the temporal lymphatics? — *A.* They accompany the temporal bloodvessels, and pass through glands at the root of the zygomatic process.

Q. What is the course of the occipital lymphatics? — *A.* They accompany the occipital bloodvessels, pass through glands behind the mastoid process, and descend with the others along the external and internal jugular veins, to join the lymphatics of the upper extremities.

Q. What is the course of the thyroideal lymphatics? — *A.* They descend on each side of the trachea through the cervical glands to the commencement of the thoracic duct.

Q. Are there any lymphatics in the brain? — *A.* They have never yet been demonstrated.

LYMPHATICS OF THE UPPER EXTREMITIES.

Q. What is the course of the superficial lymphatics of the upper extremity? — *A.* They follow the course of the cephalic and basilic veins.

Q. What is the course of the deep-seated lymphatics? — *A.* They accompany the arteries; there being three or four, or more, lymphatic trunks to each artery.

Q. How do the lymphatics of the upper extremity terminate? — *A.* In the axillary lymphatic trunk.

Q. Where does the left axillary lymphatic trunk terminate? — *A.* Into the thoracic duct.

Q. Where does the right axillary lymphatic trunk terminate?

— *A.* It terminates in a second trunk common to it and the lymphatics of the right side of the head.

LYMPHATICS OF THE LOWER EXTREMITIES.

Q. What is the course of the superficial lymphatics of the lower extremities? — *A.* They follow the course of the saphena major and minor veins.

Q. What is the course of the deep-seated lymphatics of the lower extremities? — *A.* They accompany the arteries; and several lymphatic trunks are found with each artery.

LYMPHATICS OF THE TRUNK.

Q. Describe the lymphatics of the pelvis. — *A.* The lymphatics from the nates, and the organs of generation, pass through the inguinal glands; then under Poupart's ligament to glands situated at the brim of the pelvis. Those from the testicles pass along the spermatic cord to the lumbar glands; those from the cavity of the pelvis generally proceed along the internal iliac arteries; and a third set ascend upon the psoas magnus. At the posterior part of the pelvis they collect toward the right side, forming a plexus in the right lumbar region, and at the third lumbar vertebra they unite, and being soon joined by the lacteals form the receptaculum chyli.

Q. Describe the lymphatics of the abdomen. — *A.* The abdominal lymphatics from the kidneys proceed through glands to a considerable vessel near the aorta; those from the spleen pass along with its artery; those from the pancreas join the lymphatics of the spleen; those from the stomach in part join those of the spleen; others follow the course of the coronary artery, being joined by vessels from the liver; those of the liver either ascend its broad ligament, or join the deep-seated vessels, or ascend in trunks behind the sternum. The lymphatics of the intestines are called lacteals; they run through glands placed in the mesentery to the receptaculum chyli.

Q. Describe the lymphatics of the lungs. — *A.* They are either superficial or deep-seated; and passing through the bronchial glands they partly join the thoracic duct behind the bifurcation of the trachea; while some of those from the right lung ascend, and terminate in the great lymphatic vessel which opens between the right subclavian and jugular vein; and others from the left, passing behind the arch of the aorta, terminate near the end of the thoracic duct. The lymphatics of the heart accompany the coronary vessels, and those of the left side terminate

with the last-mentioned lymphatics of the lungs, while those of the right terminate between the right subclavian and jugular veins.

LACTEAL SAC AND DUCT.

Q. Where is the lacteal sac situated? — *A.* On the body of the first lumbar vertebra, behind the right crus of the diaphragm and above the right renal artery.

Q. What is its form? — *A.* It is irregularly oval, diminishing towards its upper part; being about an inch in length and a third of an inch in breadth.

Q. In what does the lacteal sac terminate? — *A.* In the thoracic duct, which proceeds from its upper part.

Q. What is the course of the thoracic duct? — *A.* It passes between the crura of the diaphragm and beneath the right side of the aorta, and ascends between that vessel and the vena azygos to the fifth dorsal vertebra, where that vein in its passage to join the cava covers it. The duct then passes behind the œsophagus and the curvature of the aorta to the left side, till behind the left carotid artery, and on that side of the œsophagus it ascends to the first or second dorsal vertebra, and leaving the carotid, makes a circular turn and divides; uniting again almost immediately, it descends and terminates behind the internal jugular vein, in the upper part of the subclavian vein.

NEUROLOGY.

NERVES IN GENERAL.

Q. What are the nerves? — *A.* Long, firm, white chords, which ramify after the manner of the bloodvessels, and are distributed to all parts of the body.

Q. Where do they arise? — *A.* From the brain, medulla oblongata, and medulla spinalis.

Q. What communications have the different nerves with each other? — *A.* They anastomose; forming sometimes a plexus; at others, a knot, or ganglion is found in the course of the nerve, from which numerous branches arise.

Q. What is the structure of the nerves? — *A.* They consist of fasciculi, or bundles of distinct longitudinal fibres, closely connected together by cellular substance.

Q. What are the coverings of the nerves? — *A.* Continuations of those which envelope the brain and spinal marrow, now called neurilema.

Q. What is the structure of the ganglions? — *A.* They are of a reddish-grey colour, of firm consistence, and formed by a close intertexture of filaments.

Q. How are the nerves classed? — *A.* Into cerebral, of which there are ten pairs; and spinal, of which there are thirty pairs; and the great sympathetic nerve.

Q. How do the cerebral nerves pass out of the cranium? — *A.* Through various holes, in its basis.

Q. How do the spinal nerves pass out of the vertebral canal? — *A.* Through the lateral foramina of the vertebræ, and the anterior foramina of the os sacrum.

Q. Enumerate the cerebral nerves. — *A.* The ten pairs of cerebral nerves are, the first pair, or olfactory nerves; the second pair, or optic nerves; the third pair, or motores oculorum; the fourth pair, or pathetici; the fifth pair, or trigemini; the sixth pair, or motores externi; the seventh pair, or auditory nerves; the eight pair, or par vagum; the ninth pair, or lingual nerves; and the tenth pair, or suboccipital nerves.

Q. How are the spinal nerves divided? — *A.* Into cervical, dorsal, lumbar, and sacral.

MEDULLA SPINALIS.

Q. Whence may the medulla spinalis be said to arise? — *A.* It proceeds from the extremity of the medulla oblongata.

Q. What is its situation? — *A.* In the canal of the vertebræ.

Q. By what membranes is it invested? — *A.* By the pia mater, tunica arachnoidea, and dura mater.

Q. What is its form? — *A.* It is somewhat flattened anteriorly and posteriorly, and a groove runs along these surfaces.

Q. What is its internal structure? — *A.* Like the cerebrum and cerebellum, it consists of a cortical and medullary substance.

Q. Where does it terminate? — *A.* It terminates pointed, at the os sacrum; towards its end it consists of bundles of nervous filaments, which are called cauda æquina.

Q. Where are the arteries derived? — *A.* From the vertebrals, intercostals, lumbar, and sacral.

Q. Are there many veins for the spinal marrow? — *A.* Yes.

Q. What is supposed to exist in the nervous system? — *A.* The seat of intelligence generally.

Q. What are some of the physical functions over which it presides? — *A.* The digestion, respiration, secretion, exhalation, &c.

Q. Is not the nervous system among the earliest processes of evolution? — *A.* Yes.

BRAIN IN GENERAL, AND OF ITS MEMBRANES.

Q. Where is the brain situated? — *A.* It fills the cavity of the cranium.

Q. How is it divided? — *A.* Into the cerebrum and cerebellum.

Q. By what membranes is the brain enveloped? — *A.* By three membranes, namely, the dura mater, tunica arachnoidea, and pia mater.

Dura Mater.

Q. What is the situation of the dura mater? — *A.* It is the most external, and by far the most dense, of the three membranes; it lines the inside of the cranium, to which it firmly adheres, and separates and supports the various portions of the brain by means of duplicatures or processes, and consists of two laminæ.

Q. How does the internal differ from the external laminæ? — *A.* It has a smooth, polished, and lubricated surface.

Q. How are the processes of the dura mater formed? — *A.* By duplicatures of the internal lamina.

Q. What are the chief processes of the dura mater? — *A.* The falx cerebri, the tentorium, the falx cerebelli, and the sphœnoidal folds.

Q. What are the sinuses of the dura mater? — *A.* The two laminæ firmly adhere to each other, excepting opposite the duplicatures of the internal one, where triangular channels are formed, called the sinuses of the dura mater; which are the venous reservoirs of the brain.

Falx.

Q. What is the situation of the falx cerebri? — *A.* It forms a partition along the upper and middle part of the cavity of the cranium, extending from the edge of the crista galli, along the sagittal suture, to the middle of the tentorium.

Q. What is its form, and what portions does it separate? — *A.* That of a half crescent; the broadest part or basis of which is turned backwards, and joins the tentorium. It passes between the hemispheres of the cerebrum, and supports each in their various positions in the head.

Tentorium.

Q. What is the situation of the tentorium? — *A.* It is stretched across the anterior part of the cavity, being fixed to the os occipitis, along the grooves of the lateral sinuses, and to the angles of the ossa petrosa, as far as the posterior clynoid processes of the os sphœnoides.

Q. Where is it the broadest? — *A.* At its middle.

Q. What portions of the brain does it separate? — *A.* The cerebrum from the cerebellum, and supports the posterior lobes of the former.

Q. What is remarkable at its anterior part? — *A.* An oval notch, through which pass the parts which unite the cerebrum and cerebellum.

Falx Cerebelli.

Q. Where is the falx cerebelli situated? — *A.* It descends from the middle of the tentorium, along the inner spine of the os occipitis to the foramen magnum.

Q. What portions of the brain does it separate? — *A.* The hemispheres of the cerebellum.

Sphœnoidal Folds.

Q. Enumerate the sphœnoidal folds of the dura mater. — *A.* There are two lateral folds, one on each side of the sella turcica, joining the anterior and posteroir clynoid processes; also two anterior folds at the edges of the sphœnoidal fissures.

Q. What are the uses of these folds? — *A.* The lateral ones form the fossula for the pituitary gland, and the anterior ones divide the anterior from the middle lobes of the cerebrum.

Elongations of the Dura Mater.

Q. What are the elongations of the dura mater? — *A.* Productions of both its laminæ, which pass out of the cranium by various apertures, and the most important pass through the great foramen, and line the great canal of the vertebræ; the others pass out along with the cerebral nerves.

Sinuses of the Dura Mater.

Q. What are the names of the chief sinuses of the dura mater? — *A.* The great sinuses are the superior longitudinal, in the convex edge of the falx cerebri, terminating in the two lateral sinuses, which are situated in the convex edge of the tentorium; the torcular herophili, formed between the basis of the falx cerebri and the middle of the tentorium: the lesser

sinuses are, the inferior longitudinal, the occipital, the superior and inferior petrosal, the cavernous, and the circular around the sella turcica.

Arteries and Nerves of the Dura Mater.

Q. How are the arteries of the dura mater distinguished, and whence are they derived? — *A.* Into the anterior, middle, and posterior; the anterior comes from those of the orbit; the middle is a branch of the external carotid, and the posterior from the vertebral arteries.

Q. Whence does it receive its nerves? — *A.* From the trunk of the fifth pair, at its entry into the cavernous sinus, and from the eighth pair, as it passes out of the cranium.

Pia Mater and Tunica Arachnoidea.

Q. What is the situation of the pia mater? — *A.* It surrounds and closely invests the whole mass of the brain.

Q. Where is the tunica arachnoidea situated? — *A.* It is a delicate transparent membrane, and spread uniformly over the surface of the brain.

Q. How is the pia mater distributed? — *A.* The pia mater forms numerous plicæ, duplicatures, and septa, which pass everywhere between the folds of the cerebrum and cerebellum; it is highly vascular, allowing the vessels of the brain to ramify in it, before they enter that substance.

MEDULLA OBLONGATA.

Q. What is the medulla oblongata? — *A.* It is a large medullary body, situated in the middle of the basis of the cerebrum and cerebellum.

Q. How is it composed? — *A.* By the union of the crura of the cerebrum and cerebellum.

Q. What are the crura of the cerebrum and cerebellum? — *A.* They are the continuations of the medullary substance of those parts which unite at the pons varolii.

Q. How does the medulla oblongata terminate posteriorly? — *A.* In the medulla spinalis.

Pons Varolii.

Q. What is the situation of the pons varolii? — *A.* It is placed across the union of the crura cerebri and cerebelli.

Q. What is its form and appearance? — *A.* It is a transverse, semiannular protuberance, and its surface is streaked trans-

versely, and divided into lateral parts by a longitudinal depression.

Corpora Olivaria, Pyramidalia and Restiformia.

Q. What other eminences are there on the medulla oblongata? — *A.* From the pons varolii the medulla oblongata descends, becomes conical, and has six longitudinal eminences on its inferior surface, called the corpora pyramidalia, and corpora olivaria, and corpora restiformia.

Q. What are the situations of these bodies? — *A.* The corpora pyramidalia are placed in the middle, the corpora olivaria are on the outside of the former, and the corpora restiformia are posterior to the olivaria.

CEREBELLUM.

Q. Where is the cerebellum situated? — *A.* In the inferior cavity of the cranium, under the tentorium.

Q. What is its general form? — *A.* It is broader laterally than before or behind, and flattened superiorly.

Q. How is it divided? — *A.* Into two lobes posteriorly, by the falx cerebelli.

Q. What is its superficial appearance? — *A.* It has no convolutions, but on its surface are deep concentric sulci or grooves.

Q. What is its structure? — *A.* Like the cerebrum, it consists of two, the cortical and medullary.

Q. What is the appearance called arbor vitæ? — *A.* By cutting the cerebellum vertically from above downward, the appearance of the branches of a tree are produced.

Q. What are the external eminences of the cerebellum denominated, and where are they? — *A.* The appendices vermiformes; one is situated at the anterior and superior part, the other at the posterior and inferior part of the cerebellum.

Q. Where is the fourth ventricle situated? — *A.* It runs backward and downward along the middle of the cerebellum.

Q. What opens into it anteriorly? — *A.* The iter-a-tertio-ad-quartum-ventriculum.

Q. Where is the valve of Vieussens situated? — *A.* At the beginning of the fourth ventricle, immediately behind the iter-a-tertio-ad-quartum-ventriculum.

Q. What is its posterior termination called? — *A.* Calamus scriptorius.

Q. From whence do the crura cerebelli proceed? — *A.* From the inferior and anterior part of the cerebellum.

CEREBRUM.

Q. Where is the cerebrum situated? — *A.* In the superior part above the tentorium, and its anterior lobes rest upon the anterior and middle of the base of the cranium.

Q. What is its form, and how is it divided? — *A.* It is oval, convex above and concave below, and is divided into two hemispheres laterally; and transversely, into anterior, middle, and posterior lobes.

Q. Where are these lobes situated? — *A.* The anterior ones are placed in the anterior fossæ; the middle rest in the middle fossæ, and the posterior rest on the tentorium.

Q. What is the fissure between the anterior and middle lobes called? — *A.* Fissure of Sylvius.

Q. What is the appearance of the surface of the cerebrum? — *A.* It is covered with tuberosities called convolutions.

Q. What are the anfractuosities of the brain? — *A.* They are the grooves which separate the convolutions, and penetrate deeply into the substance of the brain; and into these pass the duplicatures of the pia mater.

Q. Of what substances does the cerebrum consist? — *A.* Of two kinds; an external, called cortical or cineritious, and an internal, called medullary.

Q. What is the colour of the cortical or cineritious substance? — *A.* Reddish-ash.

Q. What is the colour of the medullary portion? — *A.* A milk-white hue.

Corpus Callosum.

Q. What is the situation of the corpus callosum? — *A.* It is an oblong white body, at the bottom of the fissure which divides the two hemispheres.

Q. What is seen on the surface of the corpus callosum? — *A.* A groove, which runs along its middle, called the rapha.

Q. What does the corpus callosum join on each side? — *A.* Its edges blend with the medullary substance of the two hemispheres.

Q. What names are given to the medullary substance of both hemispheres, together with the corpus callosum? — *A.* By cutting off the hemispheres of the cerebrum nearly even with the corpus callosum, there is seen a large oval mass of medullary substance, called the centrum ovale.

Lateral Ventricles.

Q. What are the lateral ventricles? — *A.* Two cavities,

situated under the corpus callosum, and medullary arches of the cerebrum.

Q. What is their form? — *A.* The general course of these cavities would be represented by two C's turned back to back; they are broad and round at their anterior and superior extremities; they then extend backwards, gradually separating from each other, and contracting; they then bend downward, after having sent backward a triangular pointed cavity, which slightly turns inward, called cavitas digitalis, or posterior horn; they lastly turn forward, and terminate under their superior extremities, only more backward and outward.

Q. What divides the lateral ventricles from each other? — *A.* The septum lucidum.

Q. What are the parts noticed in the lateral ventricles? — *A.* The septum lucidum, the fornix, the plexus choroides, the corpora striata, the thalami nervorum opticorum, the pineal gland, and tinea striata.

Septum Lucidum.

Q. To what bodies is the septum lucidum connected? — *A.* To the corpus callosum directly under the rapha, and to the fornix inferiorly.

Q. How is the septum lucidum composed? — *A.* Of two laminæ.

Q. What is the name of the cavity situated between the laminæ of the septum lucidum? — *A.* The fifth ventricle.

Fornix.

Q. What is the fornix? — *A.* A medullary body, situated immediately under the septum lucidum.

Q. What is its form? — *A.* Triangular.

Q. What are its connections? — *A.* It is connected by its superior surface to the septum lucidum, and by its posterior edge to the corpus callosum, of which it is a continuation.

Q. What are the continuations of its angles called? — *A.* Pillars, or crura.

Q. What names do the posterior pillars assume in the lower part of the lateral ventricles? — *A.* Corpora fimbriata.

Q. How do the anterior pillars terminate? — *A.* They are double; and dip down at the fore part of the ventricle.

Q. What is the appearance of the inferior surface of the fornix? — *A.* It rests on the thalami nervorum opticorum, and is covered by transverse prominent medullary lines called lyra.

Choroid Plexus.

Q. What is the choroid plexus? — *A.* Two loose membranous bodies, of a red and reticular or plexiform appearance.

Q. What is their situation in the lateral ventricles? — *A.* They begin small, under the anterior part of the fornix, where they are united; as they pass backwards, they increase and extend themselves throughout the whole course of these ventricles.

Q. How are they composed? — *A.* They are continuations of the pia mater.

Q. What parts are exposed by the removal of the fornix and choroid plexus? — *A.* The eminences of the lateral ventricles, viz., the corpora striata, and the thalami nervorum opticorum.

Corpora Striata.

Q. What is the situation and form of the corpora striata? — *A.* At the bottom of the anterior and outer part of the lateral ventricles; and in shape they are pyriform.

Q. What parts of the corpora striata are nearest each other? — *A.* Their anterior being separated only by the septum lucidum.

Q. What is the internal structure of the corpora striata? — *A.* They are composed of alternate striæ of the medullary and cortical substances.

Thalami Nervorum Opticorum.

Q. What is the situation of the thalami nervorum opticorum? — *A.* Between the posterior extremities of the corpora striata.

Q. What is their form? — *A.* They are convex superiorly, and of an oval shape; but their internal sides are flat, smooth, and in contact.

Q. How are the thalami nervorum opticorum connected? — *A.* They are joined at the middle and anterior part of their internal sides by the commissura mollis, a short cord of soft substance.

Q. What is the tenia striata? — *A.* It is a white, prominent line, lodged in the groove formed between the corpus striatum and thalamus, on each side.

Q. What is the internal structure of the thalami nervorum opticorum? — *A.* Their external surface is white; but internally they are medullary and cineritious.

Pedes Hippocampi.

Q. What are the pedes hippocampi? — *A.* Two medullary protuberances of a semi-cylindrical form.

Q. Where are they situated? — *A.* In the posterior contorted parts of the lateral ventricles.

Q. What is the course of the pedes hippocampi? — *A.* They describe a curve, whose convexity is directed outwards, following the course of the ventricles.

Q. What is remarkable on their inner edges? — *A.* The corpora fimbriata run along the internal concave edges.

Q. How do they terminate? — *A.* Their terminations at the extremity of the ventricles are rounded, and present two or three little smooth tubercles.

Q. Of what are they composed? — *A.* They are composed of medullary substance externally, and of cortical substance internally.

Hippocampus Minor.

Q. What is the hippocampus minor? — *A.* It is an oblong medullary protuberance, situated in the posterior horn of each ventricle.

Q. What is its form? — *A.* It is of the same form, and takes the same course, as the cavity.

Q. With what is it connected? — *A.* It is connected with the posterior pillar of the fornix, from which it seems to proceed.

Pineal Gland.

Q. Where is the pineal gland situated? — *A.* Behind the thalami nervorum opticorum, and above the tubercular quadrigemina, under the posterior part of the fornix.

Q. What is its form? — *A.* It is irregularly round, and sometimes conical.

Q. How is it connected? — *A.* To the lower part of the thalami, by two medullary peduncles.

Q. What is its internal structure? — *A.* Mostly of cortical substance, and generally contains a gritty matter.

Q. What is situated below the pineal gland? — *A.* Its base is connected with the posterior commissure of the cerebrum, which is a transverse medullary cord towards the posterior part of the third ventricle.

Tubercula Quadrigemina.

Q. Where are the tubercula quadrigemina situated? — *A.*

They are two pairs of medullary eminences, situated behind the thalami nervorum opticorum, and under the pineal gland.

Q. What are their form? — *A.* Each is transversely oblong; the superior, called nates, being a little more rounded and broader than the inferior, called testes.

Q. What are their structure? — *A.* Their surface is medullary; and their inner substance cineritious.

Apertures in the Lateral Ventricles.

Q. What is the foramen of Monro? — *A.* It is an aperture of communication, between the third and lateral ventricles.

Q. Where is it situated? — *A.* Just behind the anterior pillars of the fornix.

Third Ventricle.

Q. Where is the third ventricle situated? — *A.* It is the space between the thalami nervorum opticorum.

Q. Where does it terminate? — *A.* At its fore part it extends downward, under the anterior commissure, and terminates in the infundibulum.

Q. What is the infundibulum? — *A.* It is a funnel-like membranous tube, which leads to the pituitary gland.

Q. What proceeds from its posterior part? — *A.* The iter-a-tertio-ad-quartum-ventriculum.

Q. Where does the iter-a-tertio-ad-quartum-ventriculum terminate? — *A.* It passes under the tubercula quadrigemina, and terminates in the fourth ventricle.

Pituitary Gland.

Q. Where is the pituitary gland situated? — *A.* In the sella turcica.

Q. What is its form? — *A.* It is transversely oval, and is sometimes on its lower part divided into two lobes by a small notch.

CEREBRAL NERVES.

First Pair.

Q. Where do the olfactory nerves arise? — *A.* From the corpora striata.

Q. What is their course and distribution? — *A.* They pass forward on each side of the crista galli, reach the os æthmoides without anastomosing, and pass out of the cranium by a great number of filaments, through the holes in the cribriform plate

of the æthmoid bone, and ramify in the membrane lining the nose.

Q. With what other nerves does it inosculate? — *A.* The ophthalmic and maxillary.

Second Pair.

Q. Whence do the optic nerves arise? — *A.* They arise from the thalami nervorum.

Q. What is their course and distribution? — *A.* They pass outward and unite before the sella turcica, separate and leave the cranium through the optic foramen, and pass to enter the globe of the eye.

Third Pair.

Q. Whence do the third pair arise? — *A.* The third pair, or motores oculorum, arise from the crura cerebri, just before the anterior edge of the pons varolii.

Q. What is their course? — *A.* They perforate the dura mater behind the posterior clynoid processes, run along the upper part of the cavernous sinus, and pass out through the foramen lacerum superius.

Q. Enumerate the branches of the motores oculorum? — *A.* Each sends a branch to the rectus superior, and a ramus to the levator palpebræ superioris; then a branch to the rectus internus; a branch to the rectus inferior; the longest branch, to the obliquus inferior; and a branch to the lenticular ganglion.

Q. What is the distribution of the ciliary plexus? — *A.* From the lenticular ganglion proceed several filaments, forming the ciliary plexus; which surround the optic nerve, and run to the iris, which they supply.

Fourth Pair.

Q. Whence do the pathetici arise? — *A.* Behind the nates.

Q. What is their course and distribution? — *A.* They pass on each side to the edge of the tentorium, and along the upper part of the cavernous sinus, and pass out through the foramen lacerum orbitale inferius, and terminate in the obliquus superior.

Fifth Pair.

Q. Whence do the trigemini arise? — *A.* From the sides of the pons varolii, by numerous distinct filaments.

Q. What is their course within the cranium? — *A.* They pass toward the point of the os petrosum, where each perforates the dura mater, and forms a flat semilunar ganglion.

Q. What are the branches of the trigemini? — *A.* From the semilunar ganglion, the first, or ophthalmic; the second, or superior maxillary; the third, or inferior maxillary are given off.

Q. How do these branches pass out of the cranium, and to what are they distributed? — *A.* The ophthalmic passes through the foramen lacerum orbitale inferius, and sends off a frontal branch, a nasal branch, a lachrymal branch, and branches to the lenticular ganglion and fourth pair. The superior maxillary passes through the foramen rotundum to upper jaw, and sends off the pterygoid branch, the sphœno-palatine the palatine, the infra-orbitar filaments to the teeth of the upper jaw. The inferior maxillary passes out through the foramen ovale towards lower jaw, and sends off a temporal branch, a branch to the cheek, a lingual branch or gustatory, a dental branch which enters the canal of the lower jaw, and passes through the mental foramen.

Sixth Pair.

Q. Where do the motores externi arise? — *A.* Between the pons varolii and the corpora olivaria.

Q. What is their course and distribution? — *A.* They advance to the dura mater, and perforate it on one side of the junction of the sphenoid and occipital bones; run through the cavernous sinus, by the side of the carotid arteries, to which they closely adhere, communicate with a branch of the fifth pair, send back a filament along the carotid artery, accompanying it in its canal, and joining the great sympathetic, and pass out through the foramen lacerum orbitale superius; and are distributed to the rectus externus oculi.

Seventh Pair.

Q. Where do the auditory nerves arise? — *A.* From the lateral and posterior part of the pons varolii.

Q. What is their course? — *A.* They pass into the meatus auditorious internus of the ear on each side, and consist of two portions; the portio mollis, and portio dura.

Q. What is the relative situation of the two portions? — *A.* The portio dura is placed anteriorly; the portio mollis is situated more posteriorly.

Q. What is the distribution of the portio mollis? — *A.* It enters the organ of hearing at the basis of the cochlea, and inner side of the vestibulum, and is alone distributed to the labyrinth.

Q. How does the portio dura pass out of the cranium, and what filaments does it give off? — *A.* Through the fallopian

aqueduct, and stylo-mastoid foramen; and it first gives filaments through the small hole on the superior surface of the os petrosum, to join the pterygoid nerve; then one to the stapedius, and as it goes out, another, which, passing through the tympanum, is called chorda tympani, and joins the lingual branch of the inferior maxillary nerve.

Q. What great branches does the portio dura give off where it emerges from the foramen stylo-mastoideum? — *A.* On quitting the stylo-mastoid foramen, it forms a plexus, whose branches are widely distributed to the temple, to the eyelids, cheeks, nose, lips, chin, head, and neck, forming what has been called the pes anserinus.

Q. With what nerves does the portio dura communicate? — *A.* With the three branches of fifth pair, and with the cervical nerves.

Q. What is Sir Charles Bell's opinion in regard to the portio dura?—*A.* That it is the superior respiratory nerve of the face.

Eighth Pair.

Q. Where does the par vagum or pneumogastric nerve arise? — *A.* From the corpora olivaria, laterally.

Q. Of what portions does the eighth pair consist? — *A.* At its commencement it consists of two separate portions; the first called the glosso-pharyngeal nerve, and the second the true par vagum.

Q. How do the eighth pair of nerves pass out of the cranium? — *A.* They run towards the jugular foramen before the extremity of the lateral sinus, from which the nerve on each side is separated by two small bony prominences, and a membranous septum; here the glosso-pharyngeal nerve is situated before the par vagum, and separated from it by a thin membranous septum.

Q. Where is the eighth pair joined by the nervous accessorius? — *A.* In its passage through the jugular foramen.

Q. What is the course of the nervous accessorius? — *A.* It ascends from the spinal marrow, enters the cranium at the foramen magnum occipitis, and, joining the par vagum, passes out again to be distributed to the integuments and muscles at the back of the neck.

Q. How is the glosso-pharyngeal nerve distributed? — *A.* To the tonsils, pharynx, and tongue, and sends branches of communication to the fifth, seventh, and ninth pairs.

Q. What is the situation of the par vagum in its passage from the head to the chest? — *A.* It passes before and adheres

to the ninth pair, and to the superior cervical ganglion of the great sympathetic; it descends along the neck by the side of the carotid artery, behind the internal jugular vein, and in company with the great sympathetic nerve.

Q. What are the first branches which the par vagum gives off? — *A.* First, a branch to the glosso-pharyngeal; second, the pharyngeal to the pharynx; thirdly, the laryngeal to the larynx and thyroid gland; fourthly, branches to the cardiac plexus, and others of communication with the great sympathetic, the recurrent, and ninth pair.

Q. How does the par vagum enter the thorax? — *A.* Passing before the subclavian artery and vein on the right side; but on the left, behind the subclavian vein, and before the arch of the aorta; and then gives off the recurrent.

Q. What is the course and distribution of the recurrent nerve? — *A.* It forms a kind of loop, which embraces the subclavian artery on the right side and aorta on the left; it then runs behind these vessels ascending to the posterior part of the larynx to be distributed to its muscles, and communicate with the great sympathetic, the cardiac plexus, &c.

Q. What is the course and distribution of the rest of the par vagum? — *A.* It gives branches which go to the heart, and form the cardiac plexus; branches to the lungs, forming the pulmonary plexus, which then pass to the œsophagus, descend behind it to the stomach, forming the œsophageal plexus; and are especially distributed to the stomach, forming the coronary plexus.

Ninth Pair.

Q. Where do the lingual nerves arise? — *A.* Between the corpora pyramidalia and olivaria, by several filaments, which, uniting, form two small cords.

Q. How do they pass out of the cranium, and what is their course and distribution? — *A.* They pierce the dura mater and pass out by the anterior condyloid foramen, course along the large ganglion of the great sympathetic before the jugular vein and carotid artery, and are distributed to the tongue.

Q. To what nerves do they adhere on their exit from the cranium? — *A.* After quitting the cranium each is united to the trunk of the eighth pair, to the superior cervical ganglion, and by a branch of communication to the tenth pair.

Q. What branches do they give off in their passage toward the tongue? — *A.* Shortly after their exit from the cranium they give off a large branch, which descends along with the carotid artery, called descendens noni.

Q. How is the descendens noni distributed? — *A.* It joins branches from the first, second, and third cervical, and is distributed to the muscles at the fore part of the neck.

Tenth Pair.

Q. Where do the sub-occipital nerves arise? — *A.* They arise at the extremity of the medulla oblongata and beginning of the spinal marrow, by small filaments.

Q. How do they make their exit from the cranium, and what branches are given off? — *A.* They pass directly outward, and emerge under the edge of the occipital foramen, and send branches of communication to the eighth and ninth pairs, to the superior cervical ganglion, and to the first cervical pair; and are then distributed to the extensor muscles of the head and neck.

Respiratory Nerves.

Q. What are the respiratory nerves? — *A.* The par vagum, the portio dura of the face, the external thoracic, the phrenic, and the spinal accessory nerves.

Q. What would be the effects of dividing or paralysing these nerves? — *A.* By dividing the portio dura the motions of the muscles on the side of the head would be stopped. By dividing the recurrent branch of the par vagum the voice would be destroyed; and if the laryngeal branch were divided the simultaneous action of the muscles of the chest and glottis would be lost; by compressing the par vagum difficulty of breathing would be produced; if the phrenic nerve should be divided the diaphragm would be paralysed; and if the spinal accessory were divided the respiratory motion of the mastoid and trapezius muscles would be destroyed.

VERTEBRAL NERVES IN GENERAL.

Q. How do the vertebral nerves arise from the medulla spinalis? — *A.* Each arises by two fasciculi of nervous filaments; one anterior, the other posterior.

Q. How do they pass from the canal of the spine? — *A.* The two fasciculi uniting form a ganglion, perforate the dura mater, and pass through the lateral foramina of the vertebral column, and one branch goes forward and the other backward.

Q. How many pairs are there of the vertebral nerves? — *A.* Thirty, viz., seven cervical, twelve dorsal, five lumbar, and six sacral.

CERVICAL NERVES.

First Pair.

Q. Where do the first pair of cervical nerves make their exit? — *A.* Between the first and second cervical vertebræ.

Q. How is the anterior branch distributed? — *A.* It communicates with the superior cervical ganglion, and with the suboccipital nerve sends branches to join the descendens noni and the second cervical pair, and others to the muscles at the anterior part of the neck.

Q. How is the posterior branch distributed? — *A.* To the muscles at the upper and back part of the neck.

Second Pair.

Q. Where do the second pair make their exit? — *A.* Between the second and third cervical vertebræ.

Q. How is the anterior branch distributed? — *A.* It communicates with the second and fourth cervical pairs, the great sympathetic, the descendens noni; and often concurs in the formation of the phrenic nerve.

Q. What is the distribution of the posterior branch? — *A.* It follows a nearly similar course to that of the first pair, with which it anastomoses, as well as with the portio dura of the seventh.

Third Pair.

Q. Where do the third pair pass out? — *A.* Between the third and fourth cervical vertebræ.

Q. How is the anterior branch distributed? — *A.* It communicates with the great sympathetic, fifth cervical, and sends a large branch to the phrenic.

Q. How is its posterior branch distributed? — *A.* To the back of the neck, and with those already noticed forms a plexus of nerves, which supply the back of the neck and head.

Diaphragmatic Nerve.

Q. How is the diaphragmatic or phrenic nerve formed? — *A.* By branches from several of the cervical nerves; of these the most constant and largest is from the third cervical.

Q. What is its course? — *A.* It runs before the scalenus, enters the thorax behind the anterior extremity of the clavicle; then receiving a filament from the first dorsal, and communicating with the sympathetic, it passes obliquely before the sub-

clavian artery, and on one side of the par vagum, near the origin of the recurrent; within the thorax it passes before the root of the lung, along the side of the pericardium, and running backwards enters the diaphragm.

Q. In what does the course of the right diaphragmatic nerve differ from that of the left? — *A.* It runs straighter, and lies more anteriorly; the left lies backward towards the aorta, then bending over the pericardium, where it covers the apex of the heart; and it is longer than the right.

Q. How is it distributed? — *A.* It terminates by numerous ramifications on the greater muscle of the diaphragm, and by some filaments on the lesser, where it communicates with the sympathetic, and contiguous abdominal plexuses.

Fourth, Fifth, Sixth, and Seventh Pair.

Q. How do the last four pairs of cervical nerves pass to the neck? — *A.* They pass from the spine between their respective vertebræ.

Q. How are their posterior branches distributed?—*A.* They are small, and distributed to the posterior part of the neck, and upper part of the back.

Q. How are their anterior branches distributed? — *A.* They send small branches of communication to the great sympathetic, a few to the neighbouring muscles, glands, &c., &c., and they then unite, and, together with the first dorsal, form the axillary plexus.

BRACHIAL NERVES.

Q. What is the axillary plexus? — *A.* The union of the four inferior cervical and first dorsal nerves.

Q. How is the axillary plexus constructed? — *A.* It consists at its origin of three distinct portions, viz., a common trunk formed by the union of the fourth and fifth cervical; below, a common trunk formed by the union of the last cervical and first dorsal; and between these, the sixth cervical nerve alone: these soon unite and form a bundle of nerves so interwoven as not to be unravelled, which pass under the clavicle with the artery and vein into the axilla.

Q. Whence do the brachial nerves arise? — *A.* From the axillary plexus.

Q. What are the different branches of the brachial nerves? — *A.* The scapularis and the thoracic nerves are first given off; they then divide into six large nerves, viz., the musculo-cuta-

neous, the median, the cubital, the internal cutaneous, the radial, and the axillary.

Q. From what part of the great plexus do the brachial nerves arise? — *A.* The musculo-cutaneous, median, cubital, and internal cutaneous arise anteriorly; the radial and axillary posteriorly.

Q. Where does the scapular nerve arise? — *A.* From the upper and back part of the plexus.

Q. What is its course and distribution? — *A.* It runs to the coracoid notch, and is distributed to the supra and infra-spinatus, and teres minor.

Q. Where do the thoracic nerves arise? — *A.* There are three in number, and arise from the upper part of the plexus.

Q. How are they distributed? — *A.* To the pectoralis major and minor, serratus major anticus, and latissimus dorsi.

Q. What is the course and distribution of the musculo-cutaneous nerve? — *A.* It passes through the substance of the coraco brachialis, then between the biceps and brachialis; to these it gives branches, and is distributed to the skin at the outer part of the forearm and back of the hand.

Q. What is the course and distribution of the median nerve? — *A.* It is the largest nerve from the axillary plexus; and accompanies the brachial artery; in the forearm it passes deep-seated, between the flexor sublimis and profundus, under the ligamentum annulare carpi, to the palm of the hand, where it divides into branches, viz., two to the thumb, two to the fore-finger, two to the middle finger, and one to the ring finger, after communicating with a branch of the cubital.

Q. What is the course and distribution of the cubital nerve? — *A.* It descends along the inner part of the arm, passes in a groove between the inner condyle of the humerus and the olecranon, perforates the flexor carpi ulnaris, descends over the ligamentum annulare carpi to the palm of the hand, where it sends off one branch to the ring finger, two to the little finger, and a branch of communication to the median nerve.

Q. What is the course and distribution of the internal cutaneous nerve? — *A.* It is the smallest of the brachial nerves; it passes superficially along the inside of the arm, and is distributed to the integuments at the inner and fore part of the forearm.

Q. What is the course and distribution of the radial nerve? — *A.* It runs backward round the os humeri, covered by the triceps, and gives branches to the outside of the elbow; at the bend of the arm it descends between the brachialis and supi-

nator longus, to which and to the contiguous extensors and supinators it gives rami; it here divides into a superficial, and a profound branch; the superficial branch accompanies the radial artery; and at the lower part of the radius it sends rami to the convex part of the thumb and three adjacent fingers; the profound branch passes between the upper extremity of the radius and supinator brevis, in its passage supplying the neighbouring muscles; it is then lost in the extensor communis and muscles of the carpus and thumb, after having given a ramus to the musculo-cutaneous nerve.

Q. What is the course and distribution of the axillary nerve? — *A.* It runs in the axilla, between the teres major and minor, and behind the head of the os humeri, round the neck of which it turns, passing between the articulation and the upper end of the long head of the triceps to the deltoid, under which it passes and ramifies, supplying the adjacent muscles and the joints.

DORSAL NERVES.

Q. Of how many pairs do the dorsal nerves consist? — *A.* There are twelve pairs of dorsal nerves.

Q. How do they pass from the vertebral canal? — *A.* The same as the cervical.

Q. How do they resemble each other? — *A.* Each presents a gangliform enlargement, from which a small posterior branch and a large anterior branch arise.

Q. How are the posterior branches distributed? — *A.* To the muscles and integuments of the back.

Q. How are the anterior branches distributed? — *A.* They each send two branches to the thoracic ganglia of the great sympathetic; then follow the course and distribution of the intercostal arteries, and are called the intercostal nerves.

Q. To the formation of what nerves do the first dorsal pair contribute? — *A.* After communicating with the great sympathetic and sending off its posterior and a small intercostal branch, it concurs in the formation of the axillary plexus.

Q. How are the humeral nerves formed? — *A.* The second and third intercostals send branches to form the humeral nerves, which pass into the axilla, and are distributed to the integuments on the inside of the arm.

Q. How are the lower five dorsal nerves distributed? — *A.* They supply the muscles and integuments of the abdomen.

LUMBAR NERVES.

Q. Of how many pairs do the lumbar nerves consist?—*A.* Of five.

Q. What is their general course and distribution? — *A.* They form each a ganglion after leaving the spine, and send off an anterior and a posterior branch in the same manner as the cervical and dorsal nerves; they send branches backward to the vertebral muscles, communicate with each other and with the sympathetic; and by their mutual communication they form the lumbar plexus.

Q. What is the course and distribution of the first lumbar pair? — *A.* The first pair is distributed in three branches; one to the abdominal muscles, around the crista of the ilium; the other passes to the pubis and scrotum, and the third to the groin, where it contributes to form the crural nerve.

Q. What is the course and distribution of the second pair? — *A.* They contribute largely to the lumbar plexus, and concur in the formation of the crural and obturator nerves.

Q. What is the distribution of the third pair? — *A.* They contribute to form the crural and obturator nerves, and give branches to the neighbouring muscles.

Q. What is the distribution of the fourth pair? — *A.* It sends a branch which, joining one from the third and one from the second pair, forms the obturator; at the same place it completes the formation of the crural nerve: its remaining portion joins the fifth pair.

Q. What is the course and distribution of the fifth pair? — *A.* They descend on the sacro-iliac symphysis, enter the pelvis, and receiving a branch from the fourth lumbar, join the sacral nerves to produce the sciatic plexus.

Q. What is the origin of the obturator nerve? — *A.* By branches from the second, third, and fourth pairs of lumbar nerves.

Q. What is its course and distribution? — *A.* It passes from the pelvis at the upper part of the obturator foramen, supplying in its course the obturator muscles and pectineus; it then divides into three chief branches to the portions of the triceps, and sends rami between them to the gracilis.

SACRAL NERVES.

Q. Of how many pairs do the sacral nerves consist? — *A.* There are generally six pairs.

Q. How are they distributed? — *A.* Their posterior small branches pass out by the posterior sacral foramina; the anterior branches of the four superior pass through the anterior sacral foramina; the two inferior through the lateral notches at the extremity of that bone, and in the os coccygis.

Q. Which of them form the sciatic plexus? — *A.* The three superior, by their junction with the fourth and fifth lumbar pairs.

Q. What are the branches proceeding from the sciatic plexus? — *A.* From the plexus, but more especially from the second pair, a branch goes to the vesiculæ seminales, prostate gland, uterus, and fallopian tubes; another, chiefly from the fourth pair, has a similar distribution, and goes also to the rectum and bladder; a third branch, the pudic, chiefly from the third, runs on the inside of the ischium to the corpus cavernosum, the muscles, parts of generation, and sphincter ani; from the extremity of the plexus, one branch, the glutæal, goes to the glutæus medius and minimus.

Q. How are the two last pairs of sacral nerves distributed? — *A.* The fifth pair, running forward between the extremity of the sacrum and ligament of the os coccygis, is distributed chiefly to the muscles of the anus, and neighbouring integuments; the last pair, running in a direct line from the extremity of the sacral canal, is distributed to the anus, integuments, &c.

CRURAL AND SCIATIC NERVES.

Crural Nerve.

Q. How is the crural nerve formed? — *A.* By the union of the three or four superior lumbar nerves.

Q. How does it pass out of the abdomen? — *A.* Under Poupart's ligament.

Q. How is it situated with regard to the femoral artery and vein? — *A.* Anteriorly.

Q. What is its course and distribution? — *A.* In the groin it divides into numerous branches; some superficial, which go to the integuments; others profound, which are distributed to the neighbouring muscles; one branch, longer and larger than the rest, accompanies the saphena vein to the ankle; and in its course on the thigh, accompanies the femoral artery.

Sciatic Nerve.

Q. How is the great sciatic nerve formed? — *A.* It is the

largest nerve in the human body, and is formed by the plexiform union of the last lumbar and first four sacral pairs.

Q. How does it pass out of the pelvis, and what is its course and branches? — *A.* It passes out by the great ischiatic notch, proceeds betwixt the great trochanter and tuberosity of the ischium, descends on the back part of the thigh to the ham, where it receives the name of popliteal nerve; and gives branches to the muscles and integuments in its passage to the ham.

Q. What is the situation, course, and distribution of the popliteal nerve? — *A.* It is situated between the hamstrings, and divides into an external or fibular nerve, and an internal or tibial nerve, which gradually separate and pass behind the condyles of the os femoris, and between the heads of the gastrocnemii muscles.

Q. What is the course of the tibial nerve? — *A.* It descends behind the popliteal muscle, between the gastrocnemii; it then pierces the head of the soleus, and runs between that muscle and the great flexors of the toes, near to the inner ankle.

Q. What is its distribution? — *A.* It sends rami to the joint of the knee, the muscles, and integuments contiguous to its course; it sends also branches to the tibialis posticus, to the upper part of the tibialis anticus muscle; it then sends a long ramus down the back of the leg, between the integuments and gastrocnemius, by the side of the saphena externa; the trunk then passes behind the inner ankle through an angular ligament to the sole of the foot, where it divides into the external and internal plantar nerves, which accompany the arteries of the same name.

Q. What is the course and distribution of the internal plantar nerve? — *A.* It runs first along the inner side of the sole of the foot, giving filaments to the adductor pollicis, flexor brevis digitorum, and massa carnea sylvii; it then divides into four branches, distributed to the toes after the manner of the median nerve in the hand.

Q. What is the course and distribution of the external plantar nerve? — *A.* It passes along the outer edge of the foot and divides into two branches; the first branch runs between the two last toes, and divides to their sides; the second branch goes to the inferior external side of the little toe.

Q. What is the course and distribution of the fibular nerve? — *A.* It runs forward round the head of the fibula, and divides into several rami, which are distributed to the outer part of the leg, and to the upper part of the foot, where it is distributed to the integument

GREAT SYMPATHETIC NERVE.

Q. What is the general situation of the great sympathetic nerve? — *A.* On the anterior and lateral parts of the spine, before the roots of the transverse processes; extending from the foramen carotideum of the temporal bone, to the lower part of the sacrum.

Q. What is its origin? — *A.* It is considered generally as beginning from a branch of the sixth pair given off in the cavernous sinus, and which is soon joined by another from the vidian nerve.

Q. What is the general arrangement of the great sympathetic nerve? — *A.* It has, at different distances, a great number of gangliform tubercles, from which ramifications proceed forward, as well as filaments backward, to the ganglia of the nerves of the medulla spinalis.

Q. How are the ganglia of the sympathetic divided? — *A.* They are divided into cervical, dorsal, lumbar, and sacral.

Q. How many cervical ganglia are there? — *A.* There are three, viz., a superior, a middle, and an inferior.

Q. What is the form and situation of the first or superior cervical ganglion? — *A.* It is large, soft, and of an oblong figure; situated longitudinally before the roots of the transverse processes of the first three vertebræ, and behind the internal carotid.

Q. What branches join the superior cervical ganglion? — *A.* Those of the eighth and ninth pairs, as well as from the four superior cervical nerves; it sends branches to the pharynx; others, which surround the bloodvessels, and a branch to the heart, called the superior or superficial cardiac nerve.

Q. What are the communications which the descending trunk forms in the neck? — *A.* In its course down the neck to the last cervical vertebra it communicates with the fifth and sixth cervical, and the recurrent, and sends branches to the cardiac plexus.

Q. What are the branches given off by the middle cervical ganglion? — *A.* This ganglion is not constant; when present, it gives and receives the branches noticed as belonging to its trunk in the neck.

Q. Where is the inferior cervical ganglion situated? — *A.* Behind the vertebral artery, at the root of the transverse process of the last cervical vertebra.

Q. What branches does it give and receive? — *A.* It receives

branches from the three inferior cervical and first dorsal pair, and from the recurrent; and sends off branches to the cardiac and pulmonary plexuses.

Q. Where does the great sympathetic form the first dorsal ganglion? — *A.* Immediately below the inferior cervical and behind the subclavian artery.

Q. How are the inferior cervical and first dorsal ganglia connected? — *A.* By a short portion of the trunk, which is sometimes double and plexiform, and by a branch which passes before the subclavian artery; thus forming an arch which encloses the body.

Q. How is the cardiac plexus formed? — *A.* By branches from the trunk of the great sympathetic in the neck, (or from the middle cervical ganglion, when present,) and from the inferior cervical ganglion; and meeting those from the other side, they form the cardiac plexus, whose branches supply the heart and its pericardium.

Q. What is the course of the great sympathetic trunk as it descends in the thorax? — *A.* From the first dorsal ganglion the great sympathetic descends over the ligaments, joining the heads of the ribs to the vertebræ; on the last false rib it bends towards the bodies of the vertebræ; between each rib it forms a ganglion; these ganglia regularly communicate with the dorsal nerves by two filaments from each.

Q. What branches does the great sympathetic give off about the middle of the thorax? — *A.* Five, and sometimes more; considerable branches from several ganglia below the fifth, pass forward and downward on the bodies of the vertebræ; they unite and form one short nerve on the last dorsal vertebra, called the splanchnic.

Q. Where does the splanchnic nerve perforate the diaphragm? — *A.* At the upper and lateral part of the lower muscle of the diaphragm.

Q. Where does the great sympathetic nerve form the semilunar ganglion? — *A.* After having entered the abdomen, behind the renal capsule.

Q. What are the connexions and branches of the semilunar ganglion? — *A.* It forms a communication between the splanchnic nerve of each side, before the aorta; it then forms the solar plexus, from whence proceed numerous branches to the different viscera, viz.; the cœliac or stomachic plexus, to the stomach; the hepatic plexus, to the liver, duodenum, and pancreas; the splenic plexus, to the spleen and pancreas; the renal or emulgent plexus, to the kidneys; the superior mesenteric plexus, to

the small intestines ; the inferior mesenteric plexus, to the large intestines ; the hypogastric plexus, to the contents of the pelvis ; the spermatic plexus, to the testicles.

Q. How is the trunk of the great sympathetic disposed of after having detached the five branches which form the splanchnic nerve ? — *A.* It perforates the inferior muscle of the diaphragm, and then runs on the bodies of the vertebræ, where it forms the lumbar ganglia.

Q. What filaments do the lumbar ganglia receive from the lumbar nerves ? — *A.* Each lumbar ganglion receives two filaments from the corresponding lumbar nerve.

Q. With what nerves do the sacral ganglia communicate ? — *A.* The great sympathetic passes into the pelvis, communicating with the sacral nerves, where it forms the sacral ganglia.

Q. How does the great sympathetic nerve terminate ? — *A.* It sends branches to the inferior mesenteric plexus, and terminates by a communication with the nerve of the opposite side, forming an inverted arch, where, together with the two lowest sacral nerves, it gives several branches to the rectum, anus, and coccygeal muscles.

SENSES.

Q. What are the organs of the senses ? — *A.* The nose, the eyes, the ears, the tongue, the palate, and skin (the two latter have been treated of previously).

Nose.

Q. How is this divided ? — *A.* Into an external prominent part and internal cavity.

Q. What are the external parts ? — *A.* The root, arch, tip, alæ, and nostrils.

Q. What are the internal parts ? — *A.* The septum, turbinated bones, posterior openings of the nares, the frontal, maxillary and sphœnoidal sinuses, palatine duct, and ductus ad nasum.

Q. What bones form the nose ? — *A.* The os frontis, os æthmoides, sphœnoides, ossa maxillaria, ossa nasi, ossa lachrymalia, ossa palati, vomer, inferior turbinated bones and cartilages.

Q. What are the soft parts of the nose ? — *A.* The integuments, muscles, pituitary membrane, vessels, nerves, and hairs.

Q. How is the root and arch formed ? — *A.* By the nasal processes of the superior maxillare, and the nasal bones.

Q. Of how many cartilages does the inferior part of the external nose consist, and what is their situation ? — *A.* Of five,

the middle one, is part of the septum nasi; and divides the nostrils; two anteriorly form the tip, and two laterally the alæ.

Q. What is the form and extent of the cavities of the nose? — *A.* Antero-posteriorly from the nostrils to the posterior openings of the nares, immediately above the arch of the palate. They are bounded on the inner side by the septum, and on the outer side by the maxillary, lachrymal, æthmoid, and turbinated bones.

Q. How are the internal nares lined, and what are their use? — *A.* By the pituitary membrane; and serves for the expansion of the olfactory and other nerves, for the transmission of vessels, and the secretion of the fluid which moistens its surface.

Q. What sinuses open into the internal nares, and where do they open? — *A.* The frontal, sphœnoidal, and maxillary sinuses. The frontal opens into the anterior superior part of the nares, the sphenoidal into the superior posterior part of the nares, and the maxillary laterally above the inferior turbinated bones.

Q. Where are the ducti incisivi situated? — *A.* Behind the large superior dentes incisivi, between the arch of the palate and the bottom of the nares.

Q. What are their use? — *A.* They transmit several twigs of arteries and veins, and sometimes are perforated by ducts.

Q. Whence is the nose supplied with blood? — *A.* From the external carotids; and the veins go to the external jugular.

Q. What are the nerves of the nose? — *A.* The olfactory are the chief nerves of the nose, or the nerves of smelling; and the nerves of common sensation are from the fifth pair.

EYES AND APPENDAGES.

Q. Where are the eyes situated? — *A.* In the orbits, surrounded by muscle, and an apparatus for tears; these parts are called the appendages of the eye.

Q. Where and what are the orbits? — *A.* Two conical, or funnel-like cavities situated on each side of the nose, just below the forehead.

Q. What are the names of the bones which compose the orbit? — *A.* The os frontis, os sphœnoides, os æthmoides, os maxillare superius, os malæ, os lachrymale, and os palati.

Q. By what foramina is each orbit perforated, and where are they situated? — *A.* By the optic foramen at its apex; by the sphenoidal fissure at the upper part of the external side; by the

spheno-maxillary fissure at the lower part of the external side.

Q. Whence is the lining membrane of the orbit derived? — *A.* From the dura mater, and periosteum.

Supercilia.

Q. Describe them. — *A.* They are situated in the superciliary ridge, formed by two arches of hairs, and are moved by the occipito-frontalis and corrugator supercilii muscles.

Palpebræ.

Q. Describe them. — *A.* They are placed transversely above and below the base of the eye, the superior one being the longest, and the two join at the outer and inner canthus.

Q. Of what are they composed? — *A.* Of common integuments. Of the orbicularis palpebrarum muscle, the tarsi cartilages which contain the ciliary glands, and the cilia or eyelashes.

Tarsi.

Q. Describe the tarsi. — *A.* These are the cartilages at the edge and in the surface of each lid. They are semilunar in shape.

Q. Which of the edges of the tarsi are the thickest? — *A.* The ciliary, which are turned towards each other.

Q. What is formed by the meeting of the ciliary edges? — *A.* A small groove, which conducts the tears to the inner canthus.

Q. What is the appearance of their inner sides? — *A.* They are grooved for the reception of the ciliary glands.

Ciliary or Meibomian Glands.

Q. Describe them. — *A.* These are situated on the inner side of the tarsi, and secrete an unctuous matter to lubricate the edges of the eyelids. They resemble numerous white lines on the edges of the lids.

Cilia or Eyelashes.

Q. Describe these. — *A.* They are rows of pencils like hairs upon the edges of the eyelids, and diverge on the opposite lids, and diminish in size from the middle to the ends of the lids.

Lachrymal Apparatus.

Q. What parts compose the lachrymal apparatus? — *A.* It is composed of the lachrymal gland, the caruncula lachrymalis,

plica semilunaris, puncta lachrymalia, canaliculi lachrymales, lachrymal sac, and ductus ad nasum.

Lachrymal Gland.

Q. Where is the lachrymal gland situated? — *A.* In the depression behind and somewhat above the external angular process of the frontal bone.

Q. What is its form? — *A.* It is somewhat flattened and divided into two lobes.

Q. What is the course of its ducts? — *A.* It has several excretory ducts, which descend almost parallel to each other through the substance of the membrane which lines the upper eyelid, and pierce it near the superior edge of the tarsus.

Caruncula Lachrymalis.

Q. What is the caruncula lachrymalis? — *A.* A little red eminence situated between the internal angle of the eyelids and the ball of the eye, and of a glandular structure.

Q. What is its use? — *A.* It secretes a yellowish oily matter, with which the hairs on its surface being coated detain any small bodies that float in the tears; it also directs and assists the tears in their course.

Q. Where is the lachus lachrymalis, and what is its use? — *A.* It is a depression between the caruncula lachrymalis, the eyelids, and eyeball. It collects the tears to pass into the puncta lachrymalia.

Plica Semilunaris.

Q. Where is the plica semilunaris, and what is its form? — *A.* It is situated between the caruncula lachrymalis and the ball of the eye, and resembles the figure of a crescent.

Q. What is the direction of its cornua? — *A.* They are turned toward the puncta lachrymalia.

Q. What is its use? — *A.* To direct the tears towards the puncta.

Puncta Lachrymalia.

Q. What are the puncta lachrymalia? — *A.* Two small orifices situated one on the edge of each eyelid, very near the inner angles, opposite to the cornua of the plica semilunaris, and precisely opposite to each other.

Q. How are they formed? — *A.* A minute cartilaginous circle surrounds them, and a fine membrane lines their orifices.

Q. What is their use? — *A.* To suck up the tears, and convey them to the lachrymal ducts.

Canaliculi Lachrymales.

Q. What are the canaliculi lachrymales? — *A.* Two minute canals, sometimes called lachrymal ducts.

Q. What is their situation? — *A.* Between the puncta lachrymalia and the lachrymal sac.

Q. What is their direction? — *A.* The superior first ascends, then gradually descends; the inferior first descends, then gradually ascends; they then meet and form a common tube, which opens into the lachrymal sac.

Lachrymal Sac.

Q. Where is the lachrymal sac situated? — *A.* Immediately below the inner canthus of the orbit, in a bony groove, or fossa, on the side of the upper part of the nose.

Q. How is this groove formed? — *A.* By the nasal process of the superior maxillary and lachrymal bones superiorly; and by the os maxillare, lower part of the os lachrymale, and upper portion of the inferior turbinated bone inferiorly.

Q. What is the form of the lachrymal sac? — *A.* It is an oblong membranous bag.

Q. Where is the lachrymal sac crossed by the tendon of the orbicularis palpebrarum? — *A.* About one-fourth of its edge is above the tendon of the orbicularis palpebrarum, and the rest below it.

Q. Where do the lachrymal ducts open? — *A.* Immediately behind the tendon of the orbicularis.

Q. Where does the ductus ad nasum commence? — *A.* From its lower part.

Ductus ad Nasum.

Q. Where is the ductus ad nasum situated? — *A.* It descends from the lachrymal sac into the nose in a bony groove.

Q. How is this groove formed? — *A.* By the inferior part of the os lachrymale, and superior part of the inferior turbinated bone.

Q. Where does the ductus ad nasum terminate? — *A.* Underneath and behind the anterior extremity of the inferior turbinated bone.

Q. What is the course of the tears? — *A.* They are secreted by the lachrymal gland, and are poured, by its excretory ducts, over the anterior surface of the eye, which, in the movements of the eyelids, they everywhere moisten; the puncta lachrymalia absorb them; they are conveyed by the lachrymal ducts to the lachrymal sac, and through the ductus ad nasum they pass into the nose.

Muscles of the Eye.

Q. What is the origin, insertion, and use of the levator palpebræ superioris? — *A.* Origin, upper edge of foramen opticum. Insertion, superior border of tarsal cartilage, and into superior palpebral sinus of conjunctiva behind palpebral ligament. Use, to raise the upper lid by drawing it to the bottom of the orbit.

Q. What is the origin, insertion, and use of the rectus superior, rectus inferior, rectus internus, and rectus externus? — *A.* They all arise from the optic foramen, and are inserted in the sclerotica behind the cornea, a quarter of an inch. The superior raises the eye; the inferior depresses it; the internus turns it in, and the externus turns it out.

Q. What is the origin, insertion, and use of the obliquus superior? — *A.* Origin, on the inner side of the levator. Insertion, sclerotic coat between the superior and external recti. It draws the eyeball forwards and towards the internal canthus, and directs the pupil towards the cheek.

Q. What is the origin, insertion, and use of the obliquus inferior? — *A.* Origin, orbital edge of superior maxillary bone above infra-orbital foramen. Insertion, sclerotic coat behind the transverse axis of eye and between the sclerotic coat and external rectus. Use, to cause the eye to revolve on its axis, and turns the cornea towards the nose.

Globe of the Eye.

Q. What is the form of the globe of the eye? — *A.* Nearly of a spherical figure.

Q. Of what is the globe of the eye composed? — *A.* Of membranes, or coats, filled with humours, or fluids, which support its form.

Coats of the Eye.

Q. How many coats has the eye? — *A.* Seven, viz., the tunica conjunctiva, tunica sclerotica, cornea, tunica choroides, iris, retina, and tunica jacobi.

Q. What is the tunica conjunctiva? — *A.* A very thin transparent mucous membrane, which connects the eyelids to the globe of the eye, and may be considered as common to both.

Q. What is its situation, and how is it divided? — *A.* It covers the anterior part of the ball of the eye, and the inner side of the eyelids; and is divided into the conjunctiva palpebrabrum, and the conjunctiva oculi.

Q. How is it connected to the ball of the eye? — *A.* By cellular membrane.

Q. Where does it adhere most closely? — *A.* Over the cornea.

Q. Where is the tunica sclerotica situated? — *A.* It is the most external, and by far the most dense coat of the eye; it envelopes all the ball of the eye, except the portion anteriorly occupied by the cornea; and posteriorly it is pierced by the optic nerve.

Q. What is its structure? — *A.* Fibrous.

Q. Where are the muscles which move the eyeball attached to this coat? — *A.* Towards its anterior part.

Q. What is the use of the sclerotica? — *A.* It bounds the form of the eye, and protects and supports the parts which it contains.

Q. What is the cornea? — *A.* The transparent anterior part of the globe of the eye, and is firmly connected to the edge of the sclerotica, and appears like a watch-glass fixed in the edge of the case.

Q. What is its form and situation? — *A.* Circular, and more convex than the rest of the ball; and is divisible into several lamella, between which a transparent fluid is noticed.

Q. What is the use of the cornea? — *A.* It collects and bends inwards the rays of light reflected from surrounding objects.

Q. What is the choroid coat, and where is it? — *A.* It is the most vascular coat of the eye; and is placed immediately within the sclerotic coat.

Q. Where does it commence and terminate? — *A.* At the entrance of the optic nerve; and terminates near the edge of the cornea, forming a whitish circle of some firmness, called the ciliary circle, and by which it adheres to the sclerotica.

Q. What is remarkable at its anterior edge? — *A.* It appears thrown into numerous regular folds, called ciliary processes.

Q. What is the pigmentum nigrum? — *A.* A black or dark brown secretion, which covers the internal surface of the choroid coat.

Q. What are the bloodvessels of this coat of the eye? — *A.* The ciliary arteries, after piercing the sclerotica, ramify copiously in this membrane; its veins take a contorted course, and are called vasa vorticosa.

Q. What is the use of the choroid coat? — *A.* It is the vascular coat of the eye, allowing the ramification of vessels and secreting the pigmentum nigrum.

Q. What is the iris, and where is it situated? — *A.* It is a circular membrane, with an opening through its centre, forming an imperfect septum across the cavity of the eye; and it is attached to the ciliary circle in its whole circumference.

Q. What is the hole in its middle called? — *A.* The pupil, which is lessened or augmented by the movements of the iris.

Q. What name has been given to the posterior side of the iris? — *A.* It has been called uvea.

Q. What is the structure of the iris? — *A.* It is supposed to consist of a radiated and circular layer of muscular fibres; its arteries, from the ciliary, form by anastomosis two circles, — one near the circumference, called zona major, the other near the pupil, called zona minor; its veins pass to the vasa vorticosa of the choroid.

Q. What is the use of the iris? — *A.* By contracting, it excludes all superfluous rays of light, or by expanding, admits through the pupil all that pass through the cornea.

Q. Where is the tunica jacobi situated? — *A.* Between the retina and choroid coat.

Q. What is the situation of the retina? — *A.* Internal to the choroid coat.

Q. Where does it arise? — *A.* From the termination of the optic nerve.

Q. Where does it terminate anteriorly? — *A.* It extends anteriorly nearly to the ciliary circle.

Q. At what part does the optic nerve terminate? — *A.* A little to the inner side of the centre of the retina.

Q. Where is the foramen and yellow spot of Sœmmering situated? — *A.* In the axis of the globe of the eye, about a line and a half from the outer edge of the bulb of the optic nerve.

Q. What is the structure of the retina? — *A.* It is a pulpy substance, of a bluish milky hue.

Q. How is the retina supplied with blood? — *A.* By a small artery, which occupies the centre of the optic nerve.

Q. What is the use of the retina? — *A.* It perceives the picture formed upon its surface by the collection, refraction, and transmission of the rays of light.

Humours of the Eye.

Q. Of how many humours does the eye consist, and what are their names? — *A.* Of three transparent fluids of different densities; and are called the aqueous, the crystalline, and the vitreous humours.

Q. What is the aqueous humour? — *A.* A perfectly tran-

parent limpid fluid, situated behind the cornea and before the crystalline.

Q. How are the chambers of the eye formed? — *A.* They are divided by the iris into two cavities, called chambers, which communicate through the pupil.

Q. Which is the largest? — *A.* The anterior chamber.

Q. What is the use of the aqueous humour? — *A.* It transmits the rays of light, and permits the free motions of the iris.

Q. What is the vitreous humour, and where is it situated? — *A.* It is the most bulky humour of the eye; of a jelly-like consistence, yet quite transparent, and occupies all the ball of the eye behind the crystalline lens.

Q. What is its form? — *A.* Spherical, except anteriorly, where it receives the crystalline lens.

Q. By what is it enveloped? — *A.* By its peculiar capsule, called tunica vitrea, or hyaloidea, of the most delicate and transparent texture.

Q. What is its internal structure? — *A.* It is divided, by numerous septa proceeding from the inner surface of its capsule, into numerous cells.

Q. What is the use of the vitreous humour? — *A.* It fills the membranes and supports the form of the eye, and maintains the crystalline lens at a proper distance from the retina.

Q. What is the use of the crystalline lens? — *A.* It is the main instrument for concentrating the rays of light so as to make a distinct image at the bottom of the eye.

Q. Where is the crystalline lens? — *A.* It is situated in a concavity at the anterior part of the vitreous and behind the aqueous humour, opposite to the pupil.

Q. What is its form? — *A.* It resembles a lens or magnifying glass, and its posterior surface is more convex and larger than the anterior.

Q. By what is it enveloped? — *A.* It has a proper capsule, which adheres firmly to the capsule of the vitreous humour.

Q. What is its internal structure? — *A.* It consists of concentric lamellæ, and these of radii; it is of the consistence of softened gum.

Q. What is the use of the pigmentum nigrum? — *A.* It prevents the reflection of the rays of light when once they have reached the retina, and thus avoids confusion in vision.

Vessels and Nerves of the Eye.

Q. From whence are the arteries of the eye derived? — *A.* Chiefly from the ophthalmic, a branch of the internal carotid.

Q. Whence are the nerves derived? — *A.* Besides the optic, we have the third and fourth pairs, the ophthalmic or first branch of the fifth pair, the sixth pair, and twigs from the seventh pair, go to the surrounding parts and form the ciliary plexus, whose branches pierce the sclerotica, and pass to the iris.

EAR.

Q. How is the organ of hearing divided? — *A.* Into the external and internal ear.

Q. Into what parts is the external ear divided? — *A.* Into three parts, viz., the pinna, lobus, and meatus auditorius externus.

Q. What is the situation and form of the pinna? — *A.* It forms the greater part of the outer ear, and is formed of cartilage, invested by common integuments.

Q. What are its elevations? — *A.* The helix, anti-helix, tragus, and anti-tragus.

Q. Where are these situated? — *A.* The helix is the external margin; the anti-helix is the inner margin; the tragus is the small anterior protuberance; the anti-tragus is the posterior protuberance and opposite the tragus.

Q. What are the depressions on the pinna, and where are they situated? — *A.* The fossa navicularis in the bifurcation in the superior extremity of the anti-helix. The fossa innominata between the anterior and superior extremities of the helix and anti-helix. The concha is the great cavity surrounded by the anti-helix.

Q. What are the ligaments of the pinna? — *A.* A superior, an anterior, and a posterior.

Q. What is the use of the pinna? — *A.* To collect the sonorous undulations of air, and reflect them to the meatus auditorius externus.

Muscles of the Ear.

Q. What is the origin, insertion, and use of the helicis major and helicis minor? — *A.* The former is attached to the point of cartilage in front of the helix, and other extremity extends to top of latter. The latter is on the front of the helix.

Q. Where is the tragicus and the anti-tragicus? — *A.* The former is on the front surface of the tragus; the latter arises from the upper extremity of the anti-tragus, and is inserted into the inferior extremity of the anti-helix.

Q. Where is the transversus auriculæ? — *A.* On the inter-

nal surface of the pinna, arising from prominence of concha, and inserted into hollow dorsum of anti-helix.

Q. What is the origin, insertion, and use of the attollens auriculæ? — *A.* Origin, cranial aponeurosis. Insertion, upper and anterior part of cartilage of ear. Use, to raise the pinna.

Q. What is the origin, insertion, and use of the retrahens auriculæ? — *A.* Origin, mastoid process. Insertion, back part of concha. Use, to draw pinna backward.

Q. What is the origin, insertion, and use of the anterior auriculæ? — *A.* Origin, temporal fascia. Insertion, into the part of helix just above beginning. Use, to draw the pinna forward and upward.

Lobulus.

Q. What is the situation of the lobe of the ear, and its structure? — *A.* At the inferior extremity of the external ear; and consists of skin and cellular substance.

Meatus Auditorius Externus.

Q. What is its situation? — *A.* It extends from the bottom of the concha inward to the membrana tympani; then inward, forward, and upward; and is in the course a little curved downward; and is about an inch long.

Q. How is the meatus externus formed? — *A.* It consists in part of cartilage continued from the pinna, and in part of bone.

Q. Which of its portions is the longest? — *A.* In the adult the bony portion is the longest; but in the fœtus the meatus auditorius is wholly cartilaginous.

Q. What glands are situated in the cellular membrane and integuments lining the meatus externus? — *A.* It is lined by a continuation of the integuments of the concha, under which the ceruminous glands are placed, especially towards the concha, which secrete the cerumen or ear wax.

Q. What is the use of the meatus auditorius externus? — *A.* It concentrates and conveys the sound to the membrana tympani.

Q. From whence are the arteries of the external ear derived, and whence do the veins pass? — *A.* It receives its arteries anteriorly from the temporal, and posteriorly from the occipital arteries; and its veins pass to the external jugular.

Q. Whence are its nerves derived? — *A.* From the portio dura and second vertebral pair.

Internal Ear.

Q. Into what parts is the internal ear divided? — *A.* Into the tympanum, labyrinth, and meatus internus.

Q. Where is the membrana tympani? — *A.* At the bottom of the meatus externus, forming the external side of the tympanum; it is fixed in a bony groove.

Q. What is its direction and form? — *A.* It is of an oval form, placed obliquely; its upper part being turned outward, and its lower part inward. It is slightly concave externally.

Q. How is it composed? — *A.* Of two laminæ, of which the internal one is a production of the periosteum of the tympanum, and the external one of the cuticle lining the meatus externus.

Q. What bone is attached to the inside of the membrana tympani? — *A.* The malleus.

Q. What is the use of the membrana tympani? — *A.* It transmits the vibrations to the chain of bones contained in the cavity of the tympanum.

Q. Where is the cavity of the tympanum situated? — *A.* Immediately within the membrana tympani in the substance of the temporal bone.

Q. What is its form? — *A.* It is irregular, resembling a portion of a cylinder; its outer side is formed by the membrana tympani; its inner side is bony, and divides this cavity from the labyrinth; its circumference is irregular.

Q. What opening are there at the circumference of the tympanum? — *A.* One anteriorly from the Eustachian tube, and another posteriorly to the mastoid cells.

Q. By what is the cavity of the tympanum lined? — *A.* By periosteum.

Q. What are the contents of the cavity of the tympanum? — *A.* Air, and the ossicula auditus, with their muscles and ligaments.

Q. Where is the Eustachian tube situated? — *A.* It extends from the cavity of the tympanum to the root of the pterygoid process of the sphœnoid bone; here it opens into the upper part of the fauces, just behind the posterior nares.

Q. Of what parts is it composed? — *A.* Of a bony, a cartilaginous, and a membranous portion.

Q. Where is this tube the narrowest? — *A.* Its bony part is the narrowest; it expands in the form of a trumpet towards the mouth.

Q. What is the direction of the Eustachian tube? — *A.* These tubes, one for each ear, are directed from the tympanum

obliquely inwards, downwards, and forwards; so that their anterior extremities, in the fauces, are the nearest to each other.

Q. By what are they lined? — *A.* By a membrane resembling that of the nares.

Q. What is the use of the Eustachian tube? — *A.* It admits the free passage of air into and from the cavity of the tympanum, and preserving an equilibrium with the external air, and enabling the membrane of the tympanum to move freely.

Q. Into what part of the tympanum do the mastoid cells open? — *A.* Into the posterior and upper part, by a considerable aperture, and are wholly cellular.

Q. Enumerate the bones of the ear. — *A.* The malleus, the incus, the os orbiculare, and the stapes.

Q. What is the use of this chain of bones of the ear? — *A.* By their motions they multiply the vibrations they receive from the membrana tympani, and transmit them to the fluid contained in the labyrinth.

Q. What is the situation and form of the malleus? — *A.* It is placed upon the inner side of the membrana tympani, having its extremity turned downward; a short process at the top of the handle; a long process called processus gracilis, turned forward, over the inner edge of the ring of this membrane; a neck which projects inward from the handle, forming an angle with it, and surmounted by a round head, by which it is connected to the incus.

Q. What muscles are attached to the malleus? — *A.* The tensor tympani, fixed to the posterior and upper part of its handle; the laxator tympani major, attached to its long process; and the laxator tympani minor, fixed near its short one.

Q. What is the situation of the incus? — *A.* It is situated between the malleus and os orbiculare, extending backward toward the mastoid cells.

Q. What is its form? — *A.* It consists of a body, a short and a long leg; its body is articulated with the head of the malleus; its short leg rests on the opening of the mastoid cells, and its long leg bends inward and downward to the orbiculare.

Q. What is the size of the os orbiculare? — *A.* It is the smallest bone in the body, being not larger than a small pin's head.

Q. What is its situation? — *A.* It is placed between the point of the long leg of the incus and the head of the stapes.

Q. What is its form? — *A.* Flattish circular.

Q. What is the situation of the stapes? — *A.* It is placed

immediately behind the os orbiculare, and extends to the fenestra ovalis on the inner side of the tympanum.

Q. What is the form of the stapes? — *A.* It precisely resembles a stirrup.

Q. What occupies the space between the legs of the stapes? — *A.* A fine membrane, which is fixed in the groove on their inner sides.

Q. What is fixed to its head? — *A.* The stapedius muscle.

Inner Side of the Tympanum.

Q. What is the situation of the fenestra ovalis? — *A.* Toward the upper part of the inner side of the tympanum.

Q. What is the situation of the fenestra rotunda? — *A.* It is very small, placed toward the lower part, and covered by a membrane.

Q. Where is the promontory of the tympanum situated? — *A.* Immediately over the fenestra rotunda.

Q. Where is the hollow bony pyramid of the stapedius situated? — *A.* Immediately behind the fenestra ovalis, near the circumference of the tympanum, and contains the stapedius.

Q. What direction does the fallopian aqueduct assume on the inner side of the cavity of the tympanum? — *A.* It is marked by a rising, which passes first above the fenestra ovalis, then behind it and the fenestra rotunda.

Q. What is the situation of the labyrinth? — *A.* Within the substance of the petrous portion of the temporal bone.

Q. Of what parts does it consist? — *A.* Of several contorted cavities, which communicate with each other, and are divided into three, viz., the vestibulum, semicircular canals, and cochlea.

Q. What are the contents of the labyrinth? — *A.* A pulpy membrane, formed by the ramifications of the portio mollis of the seventh pair of nerves, bloodvessels, and a limpid fluid called liquor quarternius.

Q. What is the use of this fluid? — *A.* It being incompressible, transmits and conveys the undulations it receives all over the nervous membrane which lines the labyrinth.

Q. What is the situation of the vestibulum? — *A.* It occupies the middle of the labyrinth; the cochlea being placed before, and the semicircular canals behind it.

Q. What is its form? — *A.* It is of an oval figure, but irregular.

Q. What opening is there in the external side of the vestibulum? — *A.* The fenestra ovalis.

Q. What are the openings on the posterior side? — *A.*

There are six openings on its posterior side; five great openings belonging to the semicircular canals, and one very small of the aqueduct of the vestibulum.

Q. What opening is at the anterior side? — *A.* That which leads to the external or vestibular scala of the cochlea.

Q. What is the direction of the aqueduct of the vestibulum? — *A.* It passes in a curved direction backward and inward.

Q. Where is the external opening of the aqueduct of the vestibulum? — *A.* About half an inch behind the meatus internus, upon the posterior side of the os petrosum.

Q. Where are the semicircular canals situated? — *A.* Behind the vestibulum.

Q. What are their names? — *A.* The superior, posterior, and external, or horizontal.

Q. Where do they terminate? — *A.* In the vestibule by five openings; one end of the superior and another of the posterior canal meet and form a common opening.

Q. What are the ampullæ of the semicircular canals? — *A.* Each canal has one of its extremities of an elliptical form, and more expanded than the other, called its ampullæ.

Q. Where are the ampullæ of the superior and posterior canals situated? — *A.* At their separate openings.

Q. Where is the ampullæ of the external canal situated? — *A.* At its superior or external opening.

Q. Where is the cochlea situated? — *A.* Immediately before the vestibulum, with its base towards the meatus auditorius internus.

Q. What is its form? — *A.* It is a double spiral, conical canal, resembling the shell of a snail internally.

Q. By what is the spiral canal of the cochlea divided? — *A.* By a septum, partly bony and partly membranous; the bony part is called lamina spiralis, the membranous part zona mollis.

Q. What are the names of the two parts into which the canal of the cochlea is divided, and where are they situated? — *A.* They are called the gyri or scalæ. One is situated externally, opens into the vestibule, and is called scala vestibuli; the other is situated internally, terminates at the fenestra rotunda, and is called scala tympani.

Q. Where do they communicate with each other? — *A.* At the apex of the cochlea, where they wind round a conical pillar called modiolus.

Q. What is the infundibulum? — *A.* A small hollow cone surmounting the apex of the modiolus.

Q. How do the filaments of the portio mollis pass into the

scalæ? — *A.* By numerous small apertures on each side of the lamina spiralis and the modiolus.

Q. Where are the branches of the portio mollis chiefly ramified? — *A.* Upon the lamina spiralis and zona mollis.

Meatus Auditorius Internus.

Q. Where is the meatus auditorius internus situated? — *A.* On the posterior side of the os petrosum.

Q. What is its form? — *A.* It is a short tubular canal of some size, terminated by two fossulæ.

Q. What does the meatus internus contain? — *A.* The portio mollis and portio dura of the seventh pair of nerves, and a small artery.

Q. Where does the fallopian aqueduct commence, and what is its course? — *A.* From the upper part of the superior fossula, and it passes outward through the upper part of the os petrosum; then bends downward and backward, lying on the inner side of the cavity of the tympanum behind, and above the fenestra ovalis. It terminates in the foramen stylo-mastoideum.

Q. What passes through the fallopian aqueduct? — *A.* The portio dura or facial nerve.

Q. By what nerve is the portio dura joined in the fallopian aqueduct? — *A.* By a twig of the vidian nerve, through a foramen on the upper and fore part of the os petrosum; and by the chorda tympani, from the cavity of the tympanum.

Q. What is the course of the chorda tympani? — *A.* It proceeds through the cavity of the tympanum between the handle of the malleus and the long leg of the incus, and passes through the fissura glasseri.

Q. How is the portio mollis distributed? — *A.* It enters by numerous small apertures, and is spread out within the labyrinth in the form of a delicate pulpy membrane, giving a lining to it in addition to the periosteum.

Q. What is the immediate organ of hearing, that which perceives the impressions of sound? — *A.* The portio mollis.

PART II.

SURGERY.

INFLAMMATIONS.

Q. What is inflammation? — *A.* An altered action in the vessels of a part, denoted by pain, swelling, redness, and increase of heat.

Q. Does the temperature of an inflamed part ever exceed that of the blood at the source of circulation? — *A.* It does not.

Q. How have inflammations been divided? — *A.* Into healthy inflammation, or that which has for its object the reparation of injuries; and unhealthy inflammation, or that which tends to the destruction or injury of a part. They have also been divided into acute and chronic.

Q. What constitutional disturbance is frequently excited in extensive or violent inflammation? — *A.* Fever, ushered in with chill, nausea, and headache; the pulse quick and at first small, but afterwards full and hard; the tongue dry and parched; the urine scanty and highly coloured.

Q. What are the appearances of the blood drawn during inflammation — *A.* It coagulates slowly; the coagulum being firm, and having generally the buffy coat, and sometimes exhibiting a cupped appearance.

Q. Is the presence of the buffy coat a sure indication of the existence of inflammation? — *A.* It is not, being sometimes present where inflammation does not exist, and *vice versa*.

Q. What are the terminations of inflammation? — *A.* Resolution, adhesion, effusion, suppuration, ulceration, granulation, cicatrization, and mortification.

Q. How are the causes of inflammation divided? — *A.* Into chemical and mechanical.

Q. Enumerate some of the chemical causes? — *A.* Excessive heat or cold, acids, alkalies, vesicatories, rubefacients, animal poisons, the virus of specific and contagious diseases, noxious gases, and sometimes atmospheric air.

Q. Enumerate some of the mechanical causes? — *A.* Wounds of various kinds, contusions, fractures, luxations, long-continued pressure, and the presence of foreign bodies.

Q. What tissues are subject to inflammations? — *A.* Almost all, except (in the opinion of some) the cartilages in which this exemption is attributed to want of vascularity.

Q. What are the general remedies to be made use of in inflammations? — *A.* General bloodletting, purging, antimonials, mercurials, cooling drinks, abstinence from food, rest, the recumbent position with the elevation of the part affected. Opiates are in certain cases useful.

Q. What are the local remedies? — *A.* Cupping, leeching, scarification, moist fomentations, poultices, lotions, blisters; and alterative applications, as mercurial ointments, nitrate of silver, &c.

Q. How are we to be guided as to the repetition or discontinuance of bloodletting? — *A.* If the pulse rise during or immediately after bloodletting, or if the pain continue severe, with a hard and frequent pulse, we are justified in repeating bloodletting at proper intervals; but if great prostration be induced, or the coagulum of the blood be deficient in quantity, we must lay aside bleeding.

Q. What other cautions are to be observed in the treatment of inflammations? — *A.* Blisters and other counter-irritants must only be used in chronic inflammations; in acute inflammations it is best to take away sufficient blood at once to produce a decided impression upon the pulse; in chronic cases, and, according to some writers, in all inflammations of vital parts, small and frequent bleedings are to be employed.

Q. What is resolution? — *A.* The subsidence of inflammation before it has produced any morbid change of structure.

Q. What is adhesion? — *A.* It is the union of parts that have been divided, through the intervention of coagulable lymph.

Q. What is effusion? — *A.* Effusion is the pouring out of a liquid (generally serum or lymph), in the cellular membrane, or into the cavities of the body.

Q. What is suppuration? — *A.* The formation of a straw-coloured fluid called pus.

Q. Does pus ever become changed in its character and appearance? — *A.* It does.

Q. What are the appellations and characters of unhealthy pus? — *A.* Ichor, a thin acrid fluid; sanies, a bloody offensive ichor; sordes, a thick, leaden-coloured, very offensive fluid, apparently partially coagulated.

Q. What are the symptoms denoting the formation of pus? —*A.* An aggravation of all the inflammatory symptoms, followed

by rigors or shiverings, and a subsidence of pain, heat, and redness; and the sense of fluctuation in the swollen part.

Q. What is an abscess? — *A.* A collection of pus, contained in a circumscribed cavity or cyst formed by inflammation.

Q. What may render abscesses dangerous? — *A.* Their size or number, or their being situated in vital parts.

Q. How are abscesses to be treated? — *A.* Suppuration should be encouraged by warm poultices and fomentations; and as soon as fluctuation is perceived, the pus must be evacuated by puncturing the abscess with a lancet or bistoury.

Q. What constitutional means are to be employed? — *A.* Alterative medicines, generous, but unstimulating diet; with tonics, especially in chronic or extensive abscesses.

Q. What is a frequent accompaniment of extensive suppuration? — *A.* Hectic fever; characterised by chill, followed by flushes of heat, terminating in sweats frequently profuse, and particularly troublesome at night; small quick pulse; circumscribed flush of cheek; burning sensation in the palms of the hand and soles of the feet, diarrhœa, &c.

Q. How is the opinion that hectic arises from the absorption of pus disproved? — *A.* By the fact that it frequently arises from constitutional irritation where no pus exists.

Q. Can hectic be removed? — *A.* Not without removing the cause.

Q. What is the treatment to be pursued? — *A.* Palliatory; consisting chiefly of bark, wine, digitalis, opium, vegetable diet and the mineral acids.

Q. What is ulceration? — *A.* It is that process by which any portion of the body is removed in consequence of inflammation.

Q. What is granulation? — *A.* That process by which solution of continuity formed by wounds or ulceration, are repaired by the production of new substance in the form of conical elevations called granulations.

Q. How many kinds of granulations are there? — *A.* Two; healthy, of a fine red colour, of the size of a grain of wheat, covered with patches of coagulable lymph; and unhealthy, large, flat, and flabby, or of an inordinate or fungous growth.

Q. What is cicatrization? — *A.* That process, by which a wound or ulcer is covered with a new skin.

Q. What is mortification? — *A.* The loss of vitality in a part in consequence of inflammation.

Q. How has mortification been divided? — *A.* Into gangrene or incipient mortification; and sphacelus, or complete death

of the part. (This division, however, is not generally retained.)

Q. What are the signs of mortification? — *A.* Diminution of the heat and sensibility of the part, livid discoloration of the skin, with elevation of the cuticle in the form of vesicles, containing a thin serum, crepitation from air in cellular tissue, great prostration, typhoid pulse, brown tongue, low delirium, nausea, subsultus tendinum; finally, the circulation, heat, and sensibility of the part entirely cease, the skin becomes black or very dark, and the patient sinks suddenly, or sometimes recovers.

Q. Where the patient survives, what change takes place at the part affected? — *A.* A line of demarcation or separation is formed between the living and dead parts, and the sphacelated portion is separated by ulceration.

Q. What are the constitutional remedies to be adopted in the treatment of mortification? — *A.* Musk, camphor, opium, carbonate of ammonia, the mineral acids, bark, wine, and generous diet.

Q. What are the local remedies? — *A.* Warm poultices, with yeast or powdered charcoal, or carbonated water to correct the fœtor; lime water and linseed oil; blisters have also been recommended to be applied so as to cover the whole of the affected and a portion of the sound part; and also scarification of the mortified part.

Q. What is chronic mortification? — *A.* A peculiar form, generally attacking old persons; commencing in the form of a bluish spot on one of the toes, followed by separation of the cuticle, and gradual extension of the disease; sometimes accompanied by severe pain, until the patient finally sinks with the general symptoms of mortification.

Q. What is supposed to excite this disease? — *A.* It is generally attributed to ossification of the arteries.

Q. What is the treatment to be adopted? — *A.* Tonics and opiates as general remedies, and bread and milk or yeast poultices locally, and blisters.

Q. Is amputation advisable? — *A.* It is not; as it would be generally followed by mortification of the stump.

Q. What is dry mortification? — *A.* A peculiar form of mortification generally attacking the feet, which gradually lose their vitality, and become converted into a dark-coloured, dried-up mass, resembling, in appearance, a dried anatomical preparation; generally without fœtor or sloughing; although sometimes accompanied with acute burning pain.

Q. What is the prognosis of this disease? — *A.* Not so unfavourable as in chronic mortification.

Q. What is the cause of this disease? — *A.* It is not certainly known; but it has been attributed by some to the use of damaged grain, especially the secale cornutum.

Q. What method of treatment is to be pursued? — *A.* Blisters may be used, but amputation is generally the only effectual remedy.

Q. What is erysipelas? — *A.* An inflammation of the skin and subjacent cellular tissue, characterised by an exanthema or eruption, elevated, of a bright red colour, disappearing under pressure; with, sometimes, vesicles containing an amber-coloured serum.

Q. What other forms does erysipelas assume? — *A.* 1st. *Phlegmonous*, characterised by vivid redness diminishing from the centre; swelling, hardness, of burning, throbbing pain; with quick, hard pulse, and coated tongue; 2d, *œdematous*, characterized by tumefaction, not so hard as in the former variety; the skin smooth and shining, and pitting on pressure. This form attacks the scrotum and loose cellular tissue, and sometimes the face, accompanied by delirium or coma, and vomiting; and sometimes terminating in gangrene.

Q. What varieties does simple erysipelas sometimes exhibit? — *A.* It is sometimes erratic, and occasionally terminates in metastasis to some internal organ.

Q. What is the prognosis in erysipelas? — *A.* In the simple variety it is favourable, as it generally terminates in resolution and desquamation of the epidermis; in the œdematous form it is more grave, particularly when it attacks the head; in the phlegmonous form the prognosis is often very unfavourable if allowed to proceed to suppuration, the pus forming extensive sinuses under the skin, and the patient falling a victim to the constitutional disturbance.

Q. What are the causes of erysipelas? — *A.* It frequently arises without any apparent cause, when it is said to be idiopathic; but it often follows wounds or operations, when it is called traumatic erysipelas.

Q. What is the proper treatment in this disease? — *A.* Mercurials and antimonials, followed by sulphate of quinia, which has been highly recommended; opium too is often serviceable, leeching to the neighbouring sound parts is preferable to bleeding; blisters, and cold applications, as well as depletion, should be used very cautiously; mercurial ointments, acetate of lead, tincture of iodine, and nitrate of silver, are the best local applications; and in the phlegmonous form free incisions should be used to prevent the pus from burrowing in the cellular tissue.

Q. What are chilblains? — *A.* An inflammation of the feet, accompanied by redness and intense itching, and sometimes becoming ulcerated and difficult to heal.

Q. What are its causes? — *A.* Sudden transitions from heat to cold, especially in scrofulous constitutions.

Q. What remedies are recommended? — *A.* Stimulating liniments, carded cotton, alum curd, a solution of nitrate of silver, or sulphate of copper, copaiba, tincture of iodine, and, in ulcerated cases, chloride of lime in solution, lime water and linseed oil, citrine ointment, or basilicon and red precipitate.

Q. What is frostbite? — *A.* Mortification of a part from intense cold.

Q. How is it known? — *A.* By the skin becoming livid or white, and sometimes vesicating.

Q. How is it to be treated? — *A.* By rubbing the part with snow or ice water until the circulation is restored. (The application of heat is always injurious.)

Q. What is furuncle or boil? — *A.* A variety of abscess, indolent in its progress, and characterised by having a hard central core, terminating in the secretion of pus.

Q. What is its proper treatment? — *A.* Poultices, and warm fomentations until suppuration occurs, and then stimulating injections into the cavity, if it should be slow in filling up.

Q. What is anthrax? — *A.* A deep, circumscribed abscess of malignant character, terminating in gangrene.

Q. What are its causes? — *A.* It sometimes arises from contact of animals that have died of disease, but occurs often spontaneously.

Q. What is the proper treatment? — *A.* Poultices locally, and opiates until suppuration or sloughing takes place, and then the free application of caustic.

Q. What is abscess of the antrum? — *A.* A collection of fœtid unhealthy pus in the antrum maxillare.

Q. What are the symptoms? — *A.* Deep-seated, severe pain in the part of the face corresponding to the antrum.

Q. What is the cause of this affection? — *A.* Generally irritation, and ulceration into the cavity of the antrum, produced by the roots of the teeth.

Q. What is the remedy? — *A.* Extraction of the teeth producing the affection, and tapping the abscess by perforating the floor of the antrum; and after the matter has been evacuated astringent injections.

Q. Do collections of matter ever take place in the frontal sinuses? — *A.* They do.

Q. What is œzena? — *A.* A fœtid discharge, owing to peculiar inflammation of the pituitary membrane.

Q. What treatment is to be adopted in the two last affections? — *A.* Injections of a solution of chloride of lime, or fumigation with hydrargyri sulphuretum nigrum, or nitrate of silver.

Q. What are the symptoms of mammary abscess? — *A.* Swelling, severe throbbing pain and distension of the part; continuing often for weeks, and terminating in suppuration, denoted by the usual signs.

Q. What are the causes of abscess of the breast? — *A.* Cold, injuries or distension of the breast with milk.

Q. What treatment is to be pursued? — *A.* Cupping or leeching to prevent suppuration; if not possible to effect this, poultices, and opening the abscess when fluctuation is perceived. (If sinuses occur, they are to be laid open, and touched with caustic.)

Q. What are the symptoms of abscess of the liver? — *A.* Pain and swelling in the region of the liver, inability to lie upon the affected side; and, finally, fluctuation.

Q. From what causes does it arise? — *A.* From hepatitis, from injuries of the liver or obstruction of the gall ducts.

Q. How is it to be treated? — *A.* It is best to tap the abscess with a trocar or bistoury as soon as any swelling is perceived, to prevent its bursting internally, in which case it is almost invariably fatal.

Q. What caution is necessary to a patient recovering from hepatic abscess? — *A.* Not to indulge too freely in eating, as this is sometimes productive of fatal relapse.

Q. What is psoas or lumbar abscess? — *A.* A secretion of pus from the cellular substance near the psoæ muscles.

Q. What are its symptoms? — *A.* Pain in the lumbar region extending toward the thigh and in the course of the spermatic cord, sometimes attended with retraction of the testis; contraction of the flexors of the thigh; and the appearance of a fluctuating tumour under Poupart's ligament, or under the fascia lata femoris, or between the bladder and the rectum; together with hectic, or the usual signs of suppuration.

Q. What is the prognosis? — *A.* Unfavourable; the patient frequently sinking from hectic.

Q. What are the indications for treatment? — *A.* To prevent suppuration, if possible, by cupping, leeching, and blistering; and if suppuration occurs to support the constitution, and draw off the pus gradually, and at two or three sittings, by a small puncture.

Q. How are abscesses under the fascia lata femoris to be

treated? — *A.* They are to be evacuated by puncture with a lancet; and the thigh tightly bandaged.

Q. What is paronychia or whitlow? — *A.* An abscess, generally commencing in the vicinity of the nail, and travelling under the sheath of the tendons.

Q. What are its symptoms? — *A.* Acute throbbing pain, and swelling; with a very painful sense of tension in the affected part.

Q. How does the disease sometimes terminate? — *A.* In necrosis, and loss of one or more phalanges.

Q. How is it to be treated? — *A.* Blisters are sometimes useful, but the only effectual mode, generally, is to lay open the part to the bone with the knife.

Q. What other form of whitlow is there? — *A.* Onychia maligna, affecting principally the immediate vicinity of the nail, and giving rise to fungous granulations.

Q. How is this form to be treated? — *A.* The nail must be removed, and the fungus touched with sulphate of copper, and afterwards dressed with a mixture of equal parts of copaiba and tinct. opii.

Q. What are the causes of paronychia? — *A.* It arises frequently from the prick of a needle, or thorn, or spiculum of bone; but sometimes from venereal taint.

BURNS.

Q. What are the constitutional symptoms produced by a severe burn? — *A.* Great prostration, dyspnœa, and shivering, with sensation of extreme cold; followed, when reaction takes place, by considerable fever.

Q. How is a simple burn, with little or no elevation of the cuticle, to be treated? — *A.* It must be enveloped in raw cotton, or covered with a mixture of linseed oil and lime water, or of white of eggs and sweet oil, or a solution of gum arabic.

Q. What is requisite in severe or ulcerated burns? — *A.* The serum must be evacuated, and the burn dressed with a poultice, or with strips of linen or cotton covered with a solution of linseed oil and lime water, or sprinkled with powdered chalk, or zinci carbonas.

Q. When the burn is very extensive and produces great prostration, what is the proper treatment? — *A.* Carbonate of ammonia, or wine whey or other stimulants should be administered, and the burn dressed with turpentine alone, or with unguentum resinæ, or with alcohol, or solution of chloride of soda.

Q. How is the restlessness and pain to be relieved? — *A.* By opiates, after reaction has been restored.

Q. How are the fungous granulations in severe burns to be treated? — *A.* They must be removed by the knife or by caustic, and afterwards dressed with an ointment of hydrargyri oxidum rubrum.

Q. What is the prognosis in burns? — *A.* Generally favourable; but a burn comparatively slight, if covering an extent of more than half the body, is almost necessarily fatal from inability to bring about reaction.

Q. What is an *healthy* ulcer? — *A.* A granulating surface secreting pus; the granulations being firm, florid, equal in size, very slightly elevated above the surrounding surface, and covered with patches of lymph.

Q. How is this ulcer to be treated? — *A.* It should be dressed with simple cerate, or water dressings, or a light poultice applied cold; the edges are to be supported by a roller or by adhesive strips; and, if the ulcer be upon a limb, it must be kept in the horizontal position.

Q. How may *irritable* ulcer be known? — *A.* It is known by the inequality of the granulations, which are frequently dark or fiery red, extremely painful and tender, and discharging a bloody pus; with ragged and inflamed edges.

Q. Under what circumstances, and in what situation does irritable ulcer occur? — *A.* It generally occurs in persons of irritable, nervous habit, particularly high livers, and generally occupies the outside of the leg just above the ankle.

Q. What is the treatment to be adopted? — *A.* Calomel, and opium internally; rest with the limb elevated, and the application of a raw carrot poultice, or a warm bread and milk poultice, or of an ointment composed of unguentum cetacei, and unguentum hydrargyri, each half an ounce, with one drachm of powdered opium.

Q. How may the *indolent* ulcer be recognised? — *A.* By its indisposition to heal, its loose, flabby, pallid, and sometimes fungous granulations, which are dry or covered with a glairy, viscid, and cohesive matter, and with round, soft, and smooth edges.

Q. From what does this ulcer arise? — *A.* From neglect or from a shattered constitution, by which an ulcer, at first healthy, is rendered indolent.

Q. What local treatment is requisite? — *A.* The edges must be pared away, and the surface touched lightly with nitrate of silver, or a solution of nitric acid, or with a decoction of oak bark; or sprinkled with powdered rhubarb, or red precipitate;

or covered with red precipitate ointment or basilicon; and the limb elevated, and surrounded with a roller; the edges being kept near each other by adhesive strips.

Q. What constitutional means are to be used? — *A.* Mercurial alteratives, wine, carbonate of ammonia, opium, and general tonics.

WOUNDS.

Q. What is a wound? — *A.* A solution of continuity in a soft part, produced by some mechanical agent.

Q. How are wounds divided? — *A.* Into incised, contused, lacerated, punctured, penetrating, poisoned, and gunshot wounds.

Q. What is an incised wound? — *A.* A wound inflicted by a sharp-cutting instrument.

Q. What is the prognosis of incised wounds? — *A.* They are more or less dangerous in proportion to the size and number of the bloodvessels cut, and the quantity of blood lost.

Q. How are incised wounds to be treated? — *A.* If bloodvessels of any size, or which bleed profusely, be cut, they are to be drawn out by a tenaculum or artery forceps, and a ligature thrown round each extremity; the wound is then to be cleansed of blood and foreign matters, and its lips brought together by sutures or strips of adhesive plaster, or silk covered with a solution of ichthyocolla, leaving spaces between the skin for the escape of matter; or by a roller bandage.

Q. What should be done with the ends of a ligature after it has been tied? — *A.* One of them should be cut off near the knot, and the other left hanging out of the wound.

Q. What is the objection to cutting off both ends of a ligature? — *A.* The wound heals over them, but an abscess is afterwards formed for their discharge and delay is thus occasioned.

Q. How long is it, generally, before ligatures come away? —*A.* From six to twelve days.

Q. If it be impossible to take up the artery at the wounded part, what is to be done? — *A.* Compression must be made upon the main trunk or vessel, supplying the part by means of a tourniquet, or by twisting a handkerchief knotted over the vessel to be compressed, or by pressure with the hand, until the internal trunk supplying the part can be cut down upon and tied.

Q. What kind of ligatures are employed, and how are they used? — *A.* The best kind is saddler's silk, or fine packthread

which should be waxed, tied securely, and one end cut off, leaving the other hanging out of the wound to facilitate its subsequent extraction.

Q. Is it ever necessary to throw a ligature around a vein? — *A.* It is only necessary in very large veins, and is attended by considerable danger of inflammation.

Q. What method of arresting hemorrhage has been attempted to supersede the ligature? — *A.* Torsion, or twisting the inner coat of the artery by means of forceps.

Q. Is this method effectual? — *A.* It has succeeded in arteries of small size, but is not to be depended on in large vessels.

Q. From what circumstance did this operation suggest itself? — *A.* From the fact that in lacerated wounds, even of large arteries, they seldom bleed much.

Q. What other means of stopping hemorrhage are sometimes employed? — *A.* The application of cold, of sponge, powdered agaric, or brameria, and sometimes the actual cautery.

Q. When are these employed? — *A.* When the blood oozes from a surface, or profuse bleeding takes place from vessels too small to be secured.

Q. How do all these methods arrest hemorrhage? — *A.* By the formation of coagula in the mouths of the divided vessels, the inner coats of which are retracted and diminished in calibre.

Q. What kind of sutures are used? — *A.* They may be made of the same material as the ligatures, and generally in the form of the interrupted suture, or of the twisted or hare-lip suture.

Q. How is the interrupted suture made? — *A.* By arming a ligature with a curved needle at each extremity, and pushing them through each lip of the wound; the wound is then drawn together, and the ligature tied in a knot.

Q. How is the twisted suture formed? — *A.* By passing a needle or silver pin armed with a steel point, through the opposite edges of the wound, and bringing the edges together by passing the ligature alternately around each extremity of the pin, in the form of a figure of eight.

Q. What further treatment do incised wounds require? — *A.* Merely to be kept moist by a water dressing (compresses soaked in water), or by a dressing of simple cerate.

Q. What is the usual mode of union of incised wounds? — *A.* Union by the medium of the coagulable lymph of the blood without suppuration. (This is denominated *union by the first intention.*)

Q. What is a contused wound? — *A.* One inflicted by a

blunt instrument, which produces a wound with bruised edges, and with little or no hemorrhage.

Q. How are these wounds generally healed? — *A.* By granulations.

Q. How are contused wounds to be treated? — *A.* Sutures and pressure with bandages must be avoided, and union by the first intention attempted to be brought about, which however is seldom possible; in this case we must encourage suppuration by poultices, &c.

Q. What is a contusion? — *A.* A bruise without loss of continuity, indicated by discoloration from extravasation of blood beneath the skin.

Q. How is it to be treated? — *A.* By leeches, cold, lead-water, &c.

Q. What is a lacerated wound? — *A.* One which is torn rather than cut; inflicted generally by an instrument with a ragged edge.

Q. Is the hemorrhage often great in these cases? — *A.* It is not, even when large vessels are torn across.

Q. To what is this to be attributed? — *A.* To the torn edges of the artery being very favourable to the formation of a coagulum.

Q. How are lacerated wounds to be treated? — *A.* Foreign substances must be removed, and union by the first intention (which sometimes occurs in these cases), must be attempted to be brought about; and this failing, they are to be dressed with poultices or water dressings, and the general state of the constitution is to be attended to.

Q. What is a punctured wound? — *A.* One inflicted by a sharp, narrow-pointed instrument, as a thorn, a splinter of wood or bone, the point of a scalpel, &c.

Q. What is the principal danger from punctured wounds? — *A.* The formation of pus under the fascia; inflammation of the lymphatics and their glands; spasmodic twitchings, and sometimes tetanus from injury of a nerve.

Q. What is the proper treatment? — *A.* In ordinary cases a simple poultice is sufficient, with extraction of the foreign substances; if bad symptoms show themselves, we must have recourse to free incisions, to divisions of the injured nerve, to blisters, and to the administration of opium, purgatives, &c.

Q. How do penetrating differ from punctured wounds? — *A.* In extending further below the surface, and frequently giving rise to internal hemorrhage, which is very difficult or impossible to be arrested.

Q. What are poisoned wounds? — *A.* Wounds accompanied by the introduction into the system of animal or other poisons; as from the sting of the bee, the bite of a rabid dog or poisonous serpent.

Q. How should these wounds be treated? — *A.* When arising from the sting of a bee or other insect, the local application of aqua ammoniæ, or of a solution of acetas plumbi, or of the juice of onion, will generally prove sufficient; in bites of serpents, &c. the wound should be sucked by the mouth or by cups, and then the wounded part should be excised and cauterised.

Q. What is the character of the wound produced by a musket ball or similar projectile? — *A.* It is in the form of a tube, the sides of which almost invariably slough, owing to the wound being contused from the forcible introduction of a blunt instrument or ball.

Q. What is the character of the openings made by a ball? — *A.* The one at which it enters is smooth and regular, owing to the ball passing from a rare to a dense medium, and the opening by which it makes its escape is larger and ragged, owing to its passing from a dense to a rare medium.

Q. How are gunshot wounds dangerous? — *A.* By their producing extensive lacerations, fractures, and contusions, by penetrating important organs, or large bloodvessels.

Q. How are musket balls sometimes diverted from their course? — *A.* By striking obliquely upon a bone, they have been made to pursue a circular course around it and make their escape at a point opposite that at which they entered.

Q. What is the treatment of gunshot wounds? — *A.* The hemorrhage must first be arrested, and the ball extracted by means of forceps, or by an opening made immediately over it, and the wound dressed with water dressings or poultices.

Q. How may the course of a ball be ascertained? — *A.* By the finger, or by a bullet probe, or wax bougie, or if it has travelled under the skin, by a red line of inflammation appearing a day or two after.

Q. What caution is to be observed? — *A.* To avoid unnecessary probing, and not to cut down to the ball, unless it be within a little distance of the surface.

Q. What remarkable property is there belonging to a leaden bullet? — *A.* It creates little or no inflammation unless it be lodged in a bone or just beneath the skin, the parts healing readily around it.

Q. What peculiarities are exhibited by wounds and injuries of the scalp? — *A.* A remarkable tendency to erysipelatous in-

flammation, and to the development of neuralgic pains and nervous twitchings.

Q. How are these injuries to be treated? — *A.* The hair is to be shaved off from the part, and the wound treated as in ordinary cases.

Q. How are gunshot wounds of the head dangerous? — *A.* By producing fractures of the skull and injury of the brain, from which persons rarely recover.

Q. What caution must be observed? — *A.* Not to be too officious in searching for a ball that has penetrated the substance of the brain, lest we increase the mischief.

Q. Is the ball to be extracted in any case? — *A.* It may be cut down upon with the trephine, if it is known to be immediately under the bone.

Q. What sympathetic affection sometimes follows injuries of the head? — *A.* Abscess of the liver.

Q. What injuries may arise from wounds of the face? — *A.* Destruction of the eye itself; injury of the orbit, giving rise to fungus, and protrusion of the eyeball; protrusion of the iris through a wound in the cornea; amaurosis from injury of the supra-orbitar nerve; deformity from wounds of the nose, lips, and ears; salivary fistula, from division of the parotid duct; and injury of the tongue from the teeth, or fragments of a bone, or a bullet being driven into it.

Q. How should wounds of the tongue be treated? — *A.* The foreign substances should be removed, and the edges of the wound drawn together by the interrupted suture; the teeth being kept asunder to avoid injury to the tongue.

Q. What may render wounds of the neck dangerous? — *A.* Division of the carotids of the thyroid gland, or of the lingual or thyroid arteries (giving rise to sudden and fatal hemorrhage), or of the eighth pair of nerves, giving rise to dyspnœa or suffocation.

Q. What caution is to be observed in wounds in which the trachea or œsophagus is divided? — *A.* The patient should be nourished through a catheter or stomach tube to prevent the escape of the food through the sides of the wound.

Q. What deformities sometimes arise from extensive wounds of the neck? — *A.* Deformities and contractions from irregular union of the edges of the wound.

Q. How may this be prevented? — *A.* By supporting the head of the patient by a stock; through a hole in front of which, the wound should be dressed.

Q. How are wounds of the chest dangerous? — *A.* By per-

forating the heart or large vessels, or intercostal or scapular arteries, giving rise to fatal hemorrhage; or of the pleura, giving rise to collapse of the lung, to pleurisy, or emphysema of the subcutaneous cellular tissue; or of the pericardium, giving rise to pericarditis; or from the forcing of foreign bodies, as buttons, spicula of bone, or fragments of clothing into the cavity of the chest, giving rise to suppuration; or from perforation of the lung itself, giving rise to hemorrhage, to inflammation, and suppuration.

Q. Are wounds penetrating the cavities of the heart necessarily fatal? — *A.* They are, although patients have sometimes lived days or even weeks after the injury.

Q. How is profuse hemorrhage from the lungs or intercostal arteries to be treated? — *A.* Blood is to be drawn from the arm until the hemorrhage from the lung or intercostal artery be moderated; the foreign substances are then to be extracted if possible; the wounded vessel must then be secured by a compress, and the chest surrounded by a roller.

Q. How may foreign bodies be sometimes extracted? — *A.* By injections of tepid water through an opening into the chest.

Q. How are wounds of the abdomen dangerous? — *A.* From injury of the peritoneum, producing severe and obstinate inflammation; from perforation of the stomach, intestines, kidneys, liver, spleen, or large vessels; producing dangerous, and frequently fatal effusion of blood or fæces, &c., into the cavity of the peritoneum.

Q. Are wounds of the intestines or peritoneum necessarily fatal? — *A.* No; they have often been pierced by a sharp-pointed instrument or by a musket-ball, without being followed by any bad effects, owing to an effusion of lymph, which fills up the perforation and unites the sides with the adjoining parts.

Q. How may a perforation of an intestine be known? — *A.* By the escape of food or fæcal matters through the external opening or the passage of blood per anum.

Q. What are the signs indicating effusion into the cavity of the abdomen? — *A.* Great and sudden prostration, a weak wiry pulse, collapsed countenance, clammy sweat.

Q. Are wounds of the bladder generally fatal? — *A.* They are not; the wound sometimes healing with the ball remaining in the bladder.

Q. What precaution is necessary in wounds of the bladder to prevent urinous infiltration of the surrounding tissues? — *A.* A catheter should be introduced through the urethra, and allowed to remain until the wound is healed.

Q. How are wounds of the abdomen accompanied by protrusion of intestines or omentum to be treated? — *A.* The intestine must be restored; for which purpose, the wound may be somewhat dilated, if necessary.

Q. How are wounds of the intestines or bladder, requiring the suture, to be treated? — *A.* When sutures are necessary the interrupted is to be used, or the perforation, if it be not large, may be surrounded by a ligature and drawn up like the mouth of a purse, and both ends of the ligature cut off; or if the intestine be entirely severed, the edge of one portion should be invested, so that the two peritoneal surfaces may be united.

Q. How are wounds of the stomach to be treated? — *A.* The general inflammatory symptoms are to be combated, and ligatures are not to be used unless absolutely necessary; in which case, it is best to stitch the edges of the wound in the stomach to the surrounding soft parts.

Q. What becomes of the ligature? — *A.* It gradually finds its way through the coats of the intestine, and is discharged per anum.

Q. How are wounds of the liver, spleen, and kidneys to be treated? — *A.* Nothing can be done but to combat the resulting inflammation.

Q. What disagreeable effects sometimes result from wounds of the genital organs? — *A.* Sloughing of the scrotum, or fungus of the testicle.

Q. How are these to be treated? — *A.* By removing the diseased parts, and poulticing, &c.

Q. How should wounds of the penis be treated? — *A.* The arteries should be picked out and tied, or compressed by introducing a catheter into the urethra, and compressing the penis upon it by a bandage; and if the urethra be divided, the catheter should be kept there until the wound is healed, to prevent sloughing from contact of the urine.

Q. What peculiar danger attends wounds of joints? — *A.* Severe and, very often, fatal inflammation of the synovial membrane.

Q. What peculiar treatment is demanded? — *A.* The wound should be closed immediately, and the inflammation combated by general and local bleeding, blisters, purging, opiates, elevation of the limb, &c.

Q. What is frequently necessary in wounds of the joints? — *A.* Amputation of the limb.

FRACTURES.

Q. What is a fracture? — *A.* A solution of continuity in a bone.

Q. How are they produced? — *A.* By blows or other mechanical injuries applied at the part, or at a distance from it; or sometimes by violent contraction of the muscles.

Q. What disease is frequently a predisposing cause of fracture? — *A.* Fragilitas ossium.

Q. How may a fracture be detected? — *A.* By the shortening or deformity produced in the limb, by the action of the muscles upon the fragments; by crepitation or grating sound on moving the fragments upon one another, and generally by loss of power in the part.

Q. How are fractures ordinarily divided? — *A.* Into *simple*, or those where the bone is broken in a single place, without injury of any other tissue; *compound*, where the fracture communicates with an external wound; *comminuted*, where the bone is broken into small fragments; and *complicated*, where the fracture extends into a joint, or is accompanied by a wounded artery, or a dislocation.

Q. In what directions may a bone be broken? — *A.* *Transversely*, generally without much displacement; *obliquely*, with shortening of the limb; and *longitudinally*.

Q. What peculiar kind of fracture sometimes takes place in children? — *A.* Separation of the shaft of the bone from its epiphyses.

Q. How are fractured bones united? — *A.* Through the medium of lymph, poured out by the vessels of the periosteum, which finally becomes changed into callus, and then into bone, by the deposit of calcareous matter.

Q. How long is bony reunion in taking place? — *A.* Generally from forty to sixty days.

Q. What is the prognosis in fractures? — *A.* It depends very much upon the age, constitution, or habits of the patient; but is much less dangerous in simple fractures, than in any other kind.

Q. What is the general treatment applicable to fractures? — *A.* The fractured portions are to be brought together and retained in their natural position, by means of extension and counter-extension, followed by splints and bandages; and the irritation and inflammation is to be subdued by opium, and the general and local depletory measures.

Q. What is meant by extension and counter-extension? —

A. Extension is the force applied below the fracture, to draw down a fragment that has overlapped the other; counter-extension is the resistance or force by which the upper fragment is retained in its place during extension.

Q. How long should the fracture be kept bandaged? — *A.* Until reunion is perfect.

Q. How are bandages used? — *A.* In the form of rollers of cotton or flannel, or in strips, as in the many tailed bandage of Scultetus.

Q. What cautions are requisite? — *A.* They should not be applied too tight, lest mortification be produced by the pressure.

Q. What kinds of splints are used? — *A.* Wooden splints, covered or plain; splints of pasteboard, tin, leather; strips of rattan glued on leather, and hatters felt soaked in gum shellac.

Q. What is the immoveable apparatus of Seutin, or of Velpeau? — *A.* A combination of the splint and bandage, formed by applying a pasteboard splint to the limb, and enveloping it with a starched roller, which hardens it into an immoveable splint, encasing the whole limb.

Q. What are the objections to this apparatus? — *A.* Its great difficulty of removal; and the collection of pus, or the occurrence even of mortification, without being detected by the surgeon.

Q. What is sometimes formed by the failure of fractures to unite? — *A.* Pseudarthrosis, or artificial joint.

Q. How is this to be remedied? — *A.* By repeatedly rubbing the fractured ends together; or by cutting down and excising them, or by passing a seton between them, and then treating the fracture in the usual way.

Q. What special treatment is required in compound fractures? — *A.* After the fragments have been adjusted, the external wound should be covered with a poultice, or water dressing.

Q. What method is sometimes adopted to convert, as it were, a compound into a simple fracture? — *A.* Covering the wound with dry bran, to form an artificial scab.

Q. What operation is very frequently called for in complicated fractures? — *A.* Amputation.

Q. What are the effects of fracture of the bones of the nose? — *A.* Deformity; and sometimes death from the crista galli of the ethmoid being driven in upon the brain.

Q. How is the fracture to be treated? — *A.* The fragments are to be carefully adjusted in their natural situation, by means of the fingers, or by a gum catheter; and the inflammation to be subdued by general and local depletion, &c.

Q. What is the caution with regard to the introduction of foreign bodies, to preserve the shape of the nose? — *A.* They should be avoided, as productive of unnecessary irritation.

Q. How is fracture of the jaw to be treated? — *A.* The fragments are to be adjusted, and kept in place by a splint moulded to the part, and supported by a suitable bandage, and absolute rest enjoined.

Q. How are teeth loosened in fracture of the jaw to be treated? — *A.* They must not be extracted, lest the fracture be converted into a compound one.

Q. What is the prognosis of fracture of the spine? — *A.* Fractures of the spinous processes are, comparatively, free from danger; fractures of the bodies of the vertebræ are almost necessarily fatal, from the depressed bone, or extravasated blood pressing upon the spinal marrow.

Q. What is the effect of fracture above the fourth cervical vertebra? — *A.* Instant death from paralysis of the respiratory nerves.

Q. What occurs in fracture of the lower vertebræ? — *A.* If the lower cervical be injured, paralysis of the arms and difficulty of respiration take place; if the dorsal, torpor and distension of the intestines; if the lumbar, paralysis of the lower extremities, with involuntary evacuation of fæces.

Q. How is fracture of the spine to be treated? — *A.* But little can be done. Care should be taken not to turn the patient upon his face, as instant death is thus often produced; and if the bladder be paralysed, the urine must be drawn off frequently by the catheter.

Q. What are the symptoms in fracture of the ribs? — *A.* Depression, or elevation, or overlapping of the fragments, accompanied by painful or difficult respiration.

Q. What complications sometimes exist? — *A.* Wounds of the intercostal artery or emphysema.

Q. How is emphysema from fracture of the ribs to be treated? — *A.* The air must be evacuated by puncturation, and a tight roller passed around the chest.

Q. How are ordinary fractures of the ribs to be treated? — *A.* The fragments are to be adjusted, and kept in place by compresses (applied over the fracture if the fragments project, or at each extremity of the rib if they be depressed), and a roller applied over them, sufficiently tight to prevent motion of the chest.

Q. How may fracture of the sternum be detected? — *A.* By

the situation of the pain, and by the crepitation of the fragments during respiration.

Q. What treatment is to be pursued? — *A.* The patient should be kept in an upright or sitting position; the chest surrounded by a tight roller; and the inflammation and irritation subdued, by bleeding and opiates.

Q. How is fracture of the clavicle produced? — *A.* By a fall upon the clavicle, or on the elbow with the arm extended; or by a blow directly upon the part.

Q. What are the appearances exhibited? — *A.* Falling of the shoulder; inability to raise the arm above the shoulder; inclination of the head toward the affected side; and, generally, mounting of the fragment nearest the sternum upon the other.

Q. What are the indications of treatment? — *A.* To replace the fragments and retain them in their natural position.

Q. What is necessary for this purpose? — *A.* To carry the shoulder upward, outward, and backward, and support it in this position.

Q. What are the forms of apparatus generally employed for this purpose? — *A.* They are two, Desault's and Fox's.

Q. Of what does Desault's bandage consist? — *A.* Of a large wedge-shaped pad, which is placed in the axilla with the larger end uppermost, and retained there by a roller, and of two other rollers; the object of the pad and first roller being to carry the shoulder outward, and to prevent motion of the chest; the object of the other rollers being to carry the shoulder upward and outward, and retain it in that position, and to make compression over the fracture, which must be previously covered by a compress.

Q. What are the objections to this apparatus? — *A.* Its complicated nature and liability to derangement, and its difficulty of application to females, young children, or fat persons.

Q. Describe Fox's bandage? — *A.* It consists of the wedge compress and first roller of Desault, but for the other rollers a sling cut to fit the arm and forearm in a state of flexion is substituted, and fastened by tapes to a padded ring surrounding the opposite shoulder.

Q. What complication sometimes occurs in fractures of the clavicle? — *A.* Wounds of the subclavian artery or brachial plexus of nerves, by spicula of bone driven down upon them, producing violent nervous symptoms, or hemorrhage.

Q. How may the scapula be fractured? — *A.* At the acromion process, at its lower angle, or vertically through its middle.

Q. How is fracture of the acromion to be treated? — *A.* By an apparatus similar to that for fractured clavicle.

Q. How does fracture of the acromion unite? — *A.* Through the intervention of a ligament.

Q. What derangement takes place in fracture of the lower angle of the scapula? — *A.* The lower fragment is drawn forward by the action of the serratus anticus and teres minor muscles.

Q. How is it to be treated? — *A.* The fragment is to be drawn back and retained in its position by rollers and compresses.

Q. What treatment does vertical or longitudinal fracture of the scapula require? — *A.* From the fragments being retained in situ by the scapular muscles, little or no treatment is required, except, perhaps, a roller.

Q. How may the os humeri be broken? — *A.* It may be broken within the surgical neck, in its shaft, or at the condyles.

Q. What is meant by the surgical neck of the os humeri? — *A.* That part of the bone included between its tubercles, and the insertion of the latissimus dorsi and pectoralis major.

Q. How is fracture of the head or surgical neck of the os humeri to be treated? — *A.* By a pad in the axilla, similar to that in Desault's apparatus, to which the arm is secured by a roller.

Q. How is fracture of the shaft of the bone to be treated? — *A.* The fragments are to be replaced, and then a roller is to be carried round the arm and forearm, from the fingers to the axilla, and three splints applied to the outer, anterior, and posterior sides of the arm, and secured by descending turns of the roller; the pad is then to be placed in the axilla, and secured as in the previous cases.

Q. What special treatment is requisite in fracture of the condyles? — *A.* The application of Dr. Physick's angular splint, which should be removed daily, after the first four or five days, and passive motion imparted to the limb to prevent anchylosis.

Q. How may fracture of the olecranon be recognised? — *A.* By inability of the patient to extend the limb, and by the separation of the fragments.

Q. How is it to be treated? — *A.* The upper fragment is to be drawn down, and retained in contact with the lower by means of a figure of 8 bandage, and the limb kept extended by a long splint placed in front of the elbow-joint.

Q. What is produced in fracture of the coronoid process? — *A.* Dislocation of the ulna backwards upon the humerus.

Q. How is it to be treated? — *A.* The parts must be restored to their natural situation by extension and counter-extension; and retained so, with the arm flexed, by means of bandages.

Q. How are fractures of the radius and ulna to be treated? — *A.* The fragments are to be replaced, and the inequalities of the limb filled up by compresses; these are loosely covered by a roller from the fingers to the elbow; and over this are placed two flat splints, extending from the elbow beyond the fingers; and these are to be secured by descending turns of the roller, and the arm supported in a sling; taking care that the thumb appears between the splints in a vertical position.

Q. Why should not the ascending turns of the roller be drawn tightly? — *A.* Lest the interosseous space be obliterated, and deformity result.

Q. What danger is to be apprehended from injuries of the bones composing the wrist joint? — *A.* Inflammation terminating in anchylosis, or giving rise to constitutional symptoms requiring amputation of the forearm.

Q. How should they be treated? — *A.* By adjustment of the fragments; by splints, rest, and antiphlogistics.

Q. What is the prognosis in fractures of the pelvis? — *A.* Very unfavourable.

Q. To what bad effects do they give rise? — *A.* To extensive collections of pus, paralysis of the bladder, &c.

Q. What treatment is to be pursued? — *A.* Rest, the use of the catheter, if required, and general depletory measures.

Q. How are fractures of the thigh divided? — *A.* Into fractures of the neck within the capsular ligament; fractures of the neck without the capsular ligament; fracture of the trochanters; fracture of the shaft; and of the condyles.

Q. What are the peculiarities of fracture of the neck within the capsular ligament? — *A.* It generally takes place in aged persons, particularly females, and from very slight causes; and from deficiency of circulation is incapable of bony reunion.

Q. What are the signs of this kind of fracture? — *A.* Shortening of the limb one or two inches by the contraction of the glutæi muscles; eversion of the knee and foot, by the rotators of the thigh; loss of rotundity of the hip; inability to stand upon the fractured limb; absence of pain while in the recum-

bent position; and want of crepitus except when the femur is drawn down to its original length.

Q. What sometimes obscures the diagnosis? — *A.* The failure of the muscles to produce shortening and eversion, for some time after the receipt of the injury.

Q. What is the prognosis in this species of fracture? — *A.* Very unfavourable; recovery seldom taking place for several months, or without permanent lameness, and the accident frequently proving fatal.

Q. What treatment is proper? — *A.* The only treatment advisable is to keep the limb extended, and supported upon pillows.

Q. How may fracture of the neck of the femur, external to the capsular ligament, be known? — *A.* By its taking place earlier in life than fracture within the capsule; by being produced by much greater violence; by the crepitus discernible without drawing down the limb; by the greater degree of pain; and by the extravasation of blood, which generally occurs in these fractures; as well as by eversion of the foot and knee, and loss of rotundity of the hip, as in the former fracture.

Q. What is the prognosis? — *A.* Bony reunion takes place slowly, requiring several months for its completion.

Q. How may the other fractures of the thigh be recognised? — *A.* By the shortening of the limb, eversion of the knee and foot, and by the local deformity, crepitation, and pain.

Q. What are the indications to be fulfilled in treating fractures of the thigh? — *A.* To overcome the shortening by means of extension and counter-extension; and to coapt and retain the fragments in their proper position.

Q. What are the principal kinds of apparatus used for this purpose? — *A.* The double-inclined plane; Desault's apparatus modified by Dr. Physick; Hartshorne's modification of Desault's; and Hagedorn's modified by Dr. Gibson.

Q. How are extension and counter-extension accomplished by the double-inclined plane? — *A.* Extension is accomplished by the weight of the leg, and counter-extension by the weight of the body; acting upon opposite planes.

Q. What are the objections to this apparatus? — *A.* It allows too much freedom of motion, and consequent risk of deformity.

Q. What are the essential parts of Dr. Physick's modification of Desault's apparatus? — *A.* It consists of three splints, one for the inner side of the thigh (extending from the perineum to the foot); one for the front of the thigh (extending the length of the thigh itself); and of a long splint for the outside of the

thigh (extending from just below the axilla to beyond the foot), at the upper end of which is a hole morticed, to receive the counter-extending band from the perineum, and having at its lower end a projecting block, over which is passed a handkerchief fastened around the ankle and foot, and secured to the lower end of the splint, to accomplish extension.

Q. What are the peculiarities of Hartshorne's splint? — *A.* It consists of a long external splint, extending from just below the armpit, beyond the foot; and a shorter splint for the inside of the thigh, padded at its upper end, where it comes in contact with the perineum; these are joined together at their lower extremity by a cross-piece, and extension is accomplished by means of a sliding foot-board regulated by a screw; while counter-extension is made by the short padded splint in the perineum.

Q. What are objections to both Physick's and Hartshorne's splint? — *A.* The pressure on the perineum, producing excoriations and sometimes sloughing.

Q. What is the peculiar principle of Hagedorn's apparatus? — *A.* Counter-extension is kept up by the limb of the sound side, and the pelvis is confined so as to preclude all motion.

Q. Of what does it consist as modified by Dr. Gibson? — *A.* Of two long splints (one for each side of the body), extending from the axilla to beyond the foot; and of a foot-board, through which the lower end of both splints are passed, and which is screwed at the proper distance by means of pegs passing through the splints.

Q. How is it applied? — *A.* The limb is first adjusted by means of extension, counter-extension, and coaptation; the feet are secured by means of straps and gaiters to the foot board, which is perforated for that purpose, padding or cushions being interposed to take off the pressure; the foot-board is then fastened at the proper distance from the extremity of the splints, bags of bran or tow placed so as to take off pressure; and the thighs firmly secured to the splints, and the splints to the body by rollers.

Q. What is also advisable in most cases? — *A.* The application of light pasteboard splints, one in front and the other behind the fracture.

Q. How should the patient be raised, so as to be enabled to pass his fæces, &c.? — *A.* He should be placed upon a sacking-bottom (stretched upon a frame), having a hole in the centre, by which means he may be raised without deranging the splints; or the apparatus of Jenks may be employed for the same purpose.

Q. How may fracture of the patella be detected? — *A.* By the separation of the fragments, and inability of the patient to extend the leg.

Q. How should it be treated? — *A.* The leg should be extended and elevated, and the fragments replaced and retained by a figure of 8 bandage, and a long splint applied behind the limb, and secured by a roller.

Q. What treatment is necessary to prevent anchylosis? — *A.* After six or seven weeks, passive motion must be gradually employed.

Q. How does fracture of the patella generally unite? — *A.* By means of ligamentous matter.

Q. What is apt to occur after recovery from fracture of one of the patellæ? — *A.* Fracture of the opposite one.

Q. How are the bones of the leg usually broken? — *A.* Fracture generally takes place in both bones or in the fibula alone; without shortening if the fracture be transverse, with shortening if it be an oblique fracture, or with lateral deformity if the fibula alone be fractured.

Q. How is a transverse fracture of the bones of the leg to be treated? — *A.* The fractured extremities must be adjusted, and the limb, surrounded by a pillow, and placed in a fracture box; or surrounded by a roller, or by the bandage of Scultetus and placed upon a pillow, which is supported on each side by a long splint extending from the knee beyond the foot.

Q. What apparatus is required in oblique fracture of the bones of the leg? — *A.* One which will overcome the shortening of the limb and retain it in its proper position.

Q. What is Hutchinson's apparatus? — *A.* It consists of two splints, reaching from above the knee to below the foot; perforated at the top of each splint, by four holes, and morticed at the bottom to receive a cross-bar which connects the splints together.

Q. How is it applied? — *A.* Two pieces of tape are secured on each side of the leg, just below the knee, by a few turns of a roller, leaving (on each side) four free extremities, which are passed through the holes in the upper part of the splints and tied; a handkerchief is then passed around the ankle and foot, and secured to the cross-bar.

Q. How is fracture of the fibula with lateral deformity to be treated? — *A.* By the application (to the inner side of the leg) of a cushion or pad of a wedge-shape, four inches thick at its lower or thickest extremity, and extending from the knee to just above the ankle; over the cushion a long splint must be applied,

which reaches beyond the foot; to these the leg must be secured by a roller, so that the foot may be drawn inward, in the space left below the pad or compress, and the lateral eversion of the foot thus overcome.

Q. How may fracture of the os calcis be detected? — *A.* By retraction of the detached fragment, and inability of the patient to walk.

Q. How should it be treated? — *A.* The detached fragment should be drawn down, and retained in its proper situation by a bandage.

DISLOCATIONS.

Q. What is a dislocation? — *A.* The displacement of the articulatory extremity of a bone from its natural situation.

Q. What are the general symptoms? — *A.* Deformity in the part, alteration in the length of the limb, pain, and loss of motion.

Q. With what other class of injuries are dislocations liable to be confounded? — *A.* With fractures extending into the joints.

Q. What contributes to obscure the diagnosis? — *A.* The swelling which takes place shortly after the accident, owing to extravasated blood, or to inflammation.

Q. What almost always takes place in dislocations? — *A.* Laceration of the ligament or capsule.

Q. How are dislocations sometimes complicated? — *A.* With external injuries, fractures with injuries of nerves and bloodvessels, with an external wound, and sometimes with agglutination of parts by effusion of lymph from inflammation.

Q. What is the general treatment proper in dislocations? — *A.* Replacement of the bone, and the general antiphlogistic remedies to overcome inflammation.

Q. How is the resistance of the muscles overcome? — *A.* By gradual extension; assisted, if necessary, by bleeding, warm bath, or nauseants, to produce relaxation.

Q. How may dislocation of the jaw occur? — *A.* It generally occurs from irregular muscular action; it may be of one or both condyles; and can only take place forward into the temporal fossa.

Q. How is dislocation of a single condyle known? — *A.* When one condyle only is displaced, the jaws are partially opened; the chin twisted to one side, and immovable; a projection of the corresponding coronoid process under the cheek-bone, and a corresponding hollow in front of the ear.

Q. What are the signs of luxation of both condyles? — *A.* The chin is drawn downwards and backwards; the mouth gapes; there is a projection of both the coronoid processes, and corresponding hollows in front of the ears; great pain; incapability of speaking, and dribbling of saliva from the mouth.

Q. How is this dislocation to be treated? — *A.* The thumbs of the surgeon must be defended by being wrapped with cotton or by gloves; they are then introduced into the mouth, and the ramus of the jaw depressed by pressing upon the teeth; whilst the chin is lifted upwards and backwards by the fingers.

Q. Do dislocations of the vertebra ever occur? — *A.* They do; particularly of the cervical vertebra.

Q. What is the prognosis? — *A.* Very unfavourable; the same effects being produced in fractures of the vertebra; and scarcely admitting any other than palliative treatment.

Q. What are the ways in which dislocation of the ribs may take place? — *A.* The posterior extremity may be dislocated upon the body of the vertebra; (this is very rare;) the anterior extremity of the rib may be separated from its cartilage; or the cartilage may be separated from the sternum.

Q. What treatment is to be adopted? — *A.* The patient must take a full inspiration to enlarge the diameter of the chest as much as possible; and the dislocation is then to be reduced by pressure with the fingers; and afterwards retained by compresses and a roller around the chest.

Q. How may the clavicle be dislocated? — *A.* The sternal extremity may be dislocated anteriorly, or behind the sternum; and the humeral extremity, above or below the acromion process.

Q. How is dislocation of the sternal extremity of the clavicle to be treated? — *A.* It is to be reduced by drawing the shoulders backward (by which the clavicle is drawn off from the sternum, and falls into its natural position), and kept in this position by an apparatus on the principle of Desault's.

Q. What disagreeable effect has arisen from luxation of the sternal extremity backwards? — *A.* Inability to swallow, from pressure upon the œsophagus, sometimes requiring the bone to be cut through before it can be replaced.

Q. How is the humeral extremity of the scapula generally dislocated? — *A.* Upon the acromion process.

Q. How is it to be treated? — *A.* It must be reduced by placing the knee of the operator between the patient's scapulæ, and drawing his shoulders backwards and upwards, and afterwards supporting the arm in a sling.

Q. Does complete recovery take place from this dislocation? —*A.* Patients rarely recover without some degree of deformity.

Q. How may the os humeri be dislocated? — *A. Downwards*, into the axilla; *forwards*, under the pectoral muscle; *backward*, on the dorsum scapulæ; and *partially*, the head of the bone resting against the external side of the coracoid process.

Q. How may dislocation into the axilla be recognised? — *A.* By the shoulder losing its roundness and becoming flat; by a hollow under the acromion process; by the lengthening of the limb; by the head of the bone in the axilla; by severe pain from pressure of the nerves; and by the inability to rotate the arm, or to lift it to the head.

Q. How may this dislocation be reduced? — *A.* In relaxed persons, it may often be reduced as follows; the patient must be seated in a low chair; the surgeon then, resting his foot upon the chair, should place his knee in the axilla as a fulcrum, and depress the arm, taking care to press upon the acromion process as a point of counter-extension; or the patient should be placed on a sofa or table, in a horizontal position, while the surgeon places himself opposite him; a ball of linen or other soft material is then placed in the axilla, upon which the surgeon places his heel, and, taking hold of the wrist or arm of the patient, makes traction, while the acromion process is fixed by an assistant.

Q. If these methods fail how is the dislocation to be treated? — *A.* Extension and counter-extension should be made with the arm at right angles to the body, by means of a sheet folded diagonally, passed under the axilla (which should be defended by the ball as in the former case), and held or fastened to a post or staple; a towel is then fastened to the wrist, and traction made gradually and steadily by assistants, or by pulleys; taking care to keep the acromion fixed.

Q. What is frequently necessary in reducing this luxation? —*A.* To relax the muscles by bleeding, or by the warm bath and nauseants.

Q. To what accident is the patient liable after the reduction? — *A.* To dislocation from very slight causes; the dislocation being, in these cases, easily reduced.

Q. How do the symptoms differ in dislocation under the pectoral muscle? — *A.* The head of the bone is perceived under the muscle; the pain is not so great as in the former case, owing to the axillary nerves not being pressed upon; and the arm being readily moved backwards and forwards.

Q. How is this dislocation to be reduced? — *A.* In the same manner as in the former case.

Q. What danger is to be apprehended when a considerable length of time has elapsed since dislocation? — *A.* If more than six weeks have elapsed, or if there have been considerable inflammation, greater danger will result in any attempt at reduction, from agglutination of the nerves and vessels of the joint.

Q. How is dislocation upon the dorsum scapulæ recognised, and reduced? — *A.* It is readily recognised by feeling the head of the bone, and by the motion of the arm being less confined than in either of the former dislocations.

Q. How should reduction be attempted? — *A.* In the same way as in luxation into the axilla; or by extension and counter-extension, with the arm elevated above the head.

Q. How is incomplete dislocation of the os humeri to be reduced? — *A.* In the same way as in the luxation into the axilla, except that it is also necessary to draw the shoulders backward; and afterwards to apply a bandage to keep the bone in its proper situation and to prevent motion of the scapula forwards.

Q. How may luxation take place at the elbow joint? — *A.* In five different ways; viz., the ulna and radius backwards; the ulna and radius laterally; the ulna alone backwards; the radius forwards; and the radius backwards.

Q. How is dislocation of the ulna and radius backward indicated? — *A.* By a considerable projection posteriorly, above the natural situation of the olecranon, with a depression on each side, and a projection of the extremity of the os humeri anteriorly; together with inability to flex the joint, and a fixed supination of the forearm and hand.

Q. How is reduction to be effected? — *A.* The surgeon should place his knee on the inner side of the elbow-joint of the patient, and press down the ulna and radius, while he gradually fixes the arm; or the arm may be bent around a bedpost, or over the back of a chair.

Q. What after treatment is necessary? — *A.* The arm should be supported in the bent position by a bandage and sling.

Q. How may lateral dislocation of the ulna and radius be known? — *A.* By the projection of the olecranon backwards, and by the lateral projection externally of the ulna, or of the external condyle, according as the luxation is external or internal.

Q. How may luxation of the ulna backward be known? — *A.* By the projection posteriorly of the olecranon process,

whilst the radius retains its natural situation; and by the twisting inwards of the forearm and hand.

Q. How is reduction to be effected in these last two luxations? — *A.* In the same way as in the first species.

Q. How may dislocation of the radius forwards be recognised? — *A.* The forearm is a little bent, and cannot be completely extended, and any attempt at complete flexion is prevented by the head of the radius striking against the humerus.

Q. How should reduction be attempted? — *A.* By fixing the humerus and making traction upon the hand in a state of supination.

Q. How may dislocation of the radius backward be recognised? — *A.* By the projection of the head of the radius behind, and to the outside of the external condyle of the humerus.

Q. How should it be treated? — *A.* It should be reduced, as in dislocation of the ulna and radius backwards, and afterwards the arm should be kept bent at right angles, and the bones in their proper position by means of bandages, for three or four weeks, until the torn ligaments have reunited.

Q. What way does luxation take place at the wrist? — *A.* Either the radius or ulna, or both, are projected behind or before the carpus, with tension of the flexors and extension of the hand in the former case, and *vice versâ*.

Q. How are these luxations to be reduced? — *A.* By extension and counter-extension and pressure; afterwards, the bones should be kept in their proper position by splints and bandages.

Q. What injuries are sometimes confounded with dislocation at the wrist? — *A.* Sprains and other injuries, followed by effusion.

Q. How may they be distinguished? — *A.* By the swelling taking place gradually, and generally on one side, in the latter case; where, as in dislocations, the projection takes place immediately, and both anteriorly and posteriorly.

Q. What characterizes dislocation of the thumb? — *A.* Extreme difficulty of reduction.

Q. How is reduction to be attempted? — *A.* The thumb should be defended by a piece of buckskin, and extension made with it in a flexed position, by means of a tape fastened with a close hitch; if this do not suceeed, one of the lateral ligaments should be divided by a couching needle.

Q. How may the head of the femur be dislocated? — *A.* Upwards upon the dorsum of the ilium; downwards into the foramen ovale; backwards and upwards, into the ischiatic

notch; and forwards and upwards, upon the body of the pubis.

Q. With what other accident are dislocations of the femur frequently confounded? — *A.* With fracture of the head and neck of the bone.

Q. How may they be distinguished? — *A.* By the crepitation which exists in the fracture, with the possibility of restoring the limb, by traction, to its natural length, and its immediately becoming shortened again, upon giving up traction.

Q. How may the dislocation of the head of the femur upwards be recognised? — *A.* By the appearance of the head of the bone, and the trochanter major upon the dorsum ilii, with shortening and abduction of the injured limb, with little, if any, inclination of the knee and foot inwards.

Q. How may dislocation downwards be recognised? — *A.* By the lengthening of the limb; the projection of the knee; the turning of the foot and knee outwards; and the bending of the body forwards, from the stretching of the iliacus internus and psoas muscles.

Q. How may dislocation backwards and upwards into the sciatic notch be known? — *A.* By shortening of the limb, but not to the same extent as in dislocation upon the dorsum ilii; the inward inclination of the knee and foot; and the retraction of the heel.

Q. How is the dislocation of the femur, upwards and forwards, detected? — *A.* By the shortening of the limb, the turning of the foot and knee outwards, and the appearance of a round hard tumour formed by the head of the bone under Poupart's ligament.

Q. How should luxations of the thigh be reduced? — *A.* The patient should be placed on a table upon his back; a sheet, folded diagonally, should then be placed in the perineum of the sound side, and its ends sewed to a post; another sheet is passed around the sound side of the pelvis, and its ends held by assistants; a padded belt with rings attached, should be buckled to the injured limb, just above or below the knee; to these rings, one block of the pulley should be fixed, while the other is secured to a post, and the pulley rope give in charge to assistants; the surgeon, then, standing at the injured side, directs gradual extension to be made in the proper direction, while he himself by his hands, or by a band passing around the injured thigh and over his own shoulders, lifts up the head of the bone and guides it into its socket.

Q. What delay is sometimes necessary? — *A.* It is some-

times necessary to keep up extension and counter-extension for two or three hours before the reduction can be accomplished.

Q. How may the patella be dislocated? — *A.* In three directions; upwards (from rupture of its ligament), outwards, and inwards.

Q. How is dislocation of the patella to be treated? — *A.* The leg and thigh must be elevated so as to relax the muscles, and the patella restored to its proper situation, and secured by a bandage or laced knee-cap.

Q. What dislocations may occur at the knee-joint? — *A.* Displacement of the semilunar cartilages, and luxation of the tibia forwards or backwards.

Q. How are displacements of the semilunar cartilages to be treated? — *A.* The foot must be turned outwards, and the leg flexed to relax the ligaments, and then the cartilages replaced and retained by a bandage or laced knee-cap.

Q. What treatment is proper in dislocations of the tibia from the condyles of the femur? — *A.* If the luxation be incomplete, it is easily reducible, by extension, counter-extension, and pressure; but if it be complete, the injury to the surrounding parts is so great, as to call for severe antiphlogistic treatment, and, sometimes, even to amputation.

Q. How are dislocations of the tibia and fibula from the astragalus to be treated? — *A.* In simple dislocations, the muscles should be relaxed by flexing the leg upon the thigh; extension is then to be made by the foot, and counter-extension by the thigh, and the dislocated bones pressed into their proper places, and retained by splints and bandages until the ligaments have reunited.

SPRAINS.

Q. What is a sprain? — *A.* An incomplete luxation, accompanied with stretching and more or less laceration of the ligaments of the joint, and sometimes with rupture of a tendon.

Q. What are the symptoms produced by sprains? — *A.* Violent pain, and deformity; and discoloration from extravasated blood of the joint.

Q. How should this accident be treated? — *A.* The limb should be immediately elevated and kept in a state of absolute rest by a splint.

Q. What are contraindicated? — *A.* Stimulating liniments and cold applications are hurtful in the early stage, and puncturing to evacuate extravasated blood is productive of no good, and often injurious.

Q. When may cold or warm douches or stimulating frictions be resorted to? — *A.* After inflammation has subsided entirely, they are useful to remove the stiffness of the joint.

RUPTURES OF TENDONS.

Q. How is the rupture of a tendon indicated? — *A.* A sudden snap is heard, followed by pain, loss of motion in the part, and swelling and discoloration.

Q. How should this accident be treated? — *A.* The parts should be placed in such a position as to relax the tendon, the ends of which should be brought together and retained in contact until union has taken place.

DISEASES OF THE BONES.

Caries.

Q. What is caries? — *A.* An ulceration of the bone from violence or inflammation, or from constitutional disease.

Q. What bones are most liable to this disease? — *A.* The spongy bones.

Q. What are the indications of treatment? — *A.* To keep the part in a state of absolute rest by means of splints, and to subdue the inflammatory symptoms; and to make use of appropriate constitutional remedies, where the disease arises from scrofula or syphilis.

Necrosis.

Q. What is necrosis? — *A.* The complete death of a bone, from injuries and inflammation of the periosteum.

Q. What bones are most liable to necrosis? — *A.* The shafts of the long bones, and next to these the flat bones; the tibia is the bone most frequently attacked.

Q. How is necrosis indicated? — *A.* By dull, deep-seated, but sometimes acute pain; followed by increase in size of the bone, from the formation of new bone surrounding the old one (or sequestrum), which is gradually broken down and discharged through openings externally.

Q. In what way is the new bone formed? — *A.* By secretion from the periosteum.

Q. What treatment is proper? — *A.* No treatment is of any advantage; unless the tedious discharge of the sequestrum gives rise to much constitutional irritation; in which case, an

opening should be made in the new bone, by means of a trephine, or otherwise, and the sequestrum removed.

Exostosis.

Q. What is exostosis? — *A.* An unnatural growth of bone, without malignant disease.

Q. What forms does exostosis assume? — *A.* Either a spinous, a lamellar, a tuberculated, or a circumscribed form.

Q. What inconveniences result from exostosis? — *A.* Deformities, and interference with the motion of the neighbouring joints.

Q. What treatment is proper for the cure of exostosis? — *A.* Abstinence, local pressure, leeching, and blistering, or the application of iodine, will sometimes prove efficient, if the tumour be not very large; but if the tumour be of great size, or inconvenient from its situation, it must be removed by the knife or the saw.

Spina Ventosa.

Q. What is spina ventosa? — *A.* A bony tumour, in which the interior of the bone is removed by ulceration, leaving merely a shell of bone secreted by the periosteum, divided into cells containing purulent matter.

Q. What bones are the seat of the disease? — *A.* Generally the long or cylindrical bones.

Q. How is spina ventosa to be treated? — *A.* Stimulant injections into the cavity sometimes succeed, but if the tumour be large, its removal is the only remedy.

Osteo-Sarcoma.

Q. What is osteo-sarcoma? — *A.* A tumour, or diseased growth of bone, in which its substance is changed into a mixture of bony and fleshy matter.

Q. What are its symptoms? — *A.* A dull, long-continued and deep-seated pain, accompanied with, or followed by, the appearance of a ponderous tumour upon the bone, sometimes smooth, but oftener irregular, and tuberculated; which sometimes gives rise to ulcerations through the skin, and the discharge of a fetid, sanious, or cheesy matter.

Q. What bones are attacked by this disease? — *A.* It generally attacks the long bones, but frequently, also, the bones of the upper and lower jaw.

Q. What is to be done in this disease? — *A.* In its early stages, alteratives and general and local applications may be

tried; but in general nothing less than its removal by the knife will be sufficient.

Morbus Coxarius or Coxalgia.

Q. What is meant by morbus coxarius or coxalgia? — *A.* Inflammation of the hip-joint, terminating, if not arrested, in ulceration and destruction of the head and neck of the thigh bone.

Q. In what class of persons does this disease most frequently occur? — *A.* In persons of a scrofulous diathesis or constitution.

Q. What are its symptoms? — *A.* Pain in the knee, tenderness on pressure upon the hip-joint, wasting of the limb, the patient standing and walking with the leg and thigh flexed; and after separation of the head of the bone from its shaft has taken place, shortening of the limb, from the retraction of the muscles.

Q. What plan of treatment is to be pursued in this disease? — *A.* If the disease be detected before suppuration has taken place, leeches or blisters should be applied, or issues established in the neighbourhood of the joint, and perfect rest enjoined; but if the disease has gone on to suppuration, the patient should be kept upon his back, on a mattress, and a splint carved or moulded to fit the limb in its bent position, and padded, should be applied; a tonic regimen should be adopted, and the patient purged daily, or every other day, with the pulvis purgans (a combination of jalap and bitartrate of potassa).

Q. What is necessary after the splint has been worn for some time? — *A.* To remove the splint and substitute a straighter one, owing to the straightening of the limb from the use of the splint.

Q. How long does this disease require for its cure? — *A.* From six to eighteen months.

White Swellings.

Q. What is meant by the term white swelling? — *A.* It is a generic term, used to denote any disease of the knee-joint accompanied with swelling and white colour from tension of the integuments.

Q. How are these diseases divided? — *A.* Into hydrarthrosis, or inflammation of the synovial membrane, with dropsical or serous effusion; morbid change of structure of the synovial membrane; ulceration of the cartilages of the joint; and scrofulous disease of the cancellated structure of the bones.

Q. How is inflammation of the synovial membrane known? — *A.* By pain (generally not severe); and after effusion has taken place, by swelling and fluctuation.

Q. How does this disease sometimes terminate? — *A.* In anchylosis, from effusion of lymph into the joint.

Q. How should it be treated? — *A.* By rest and elevation of the limb, and by general and local antiphlogistic means.

Q. Should the fluid ever be evacuated by tapping? — *A.* It should not, for fear of the violent inflammation which frequently follows wounds of joints.

Q. What are the symptoms of morbid change of structure of the synovial membrane? — *A.* Pain or sensation of uneasiness, stiffness, swelling, a deceptive sense of fluctuation, and sometimes the formation of abscesses, which weaken and exhaust the patient.

Q. What is the remedy? — *A.* Amputation is the only hope.

Q. How may ulceration of the cartilages be known? — *A.* It is very difficult to be distinguished from inflammation of the synovial membrane (of which it may be considered one of the terminations), except that in the ulceration of the cartilages, there is no swelling early in the disease.

Q. How is the disease to be treated? — *A.* By rest, splints, blisters, issues, &c.

Q. How does it generally terminate? — *A.* In anchylosis.

Q. How may scrofulous affections of the knee-joint be recognised? — *A.* By pain in the head of the tibia, and swelling of the knee-joint, at first without discoloration, followed, as the disease advances, by emaciation of the limb, swelling and tension of the integuments of the knee, which are white and shining and covered with varicose veins; thickening of the synovial membrane; and sometimes the discharge of matter from ulcerated openings in the joint.

Q. What is the proper treatment? — *A.* Rest, splints, iodine, and the same general treatment as in morbus coxarius.

Anchylosis.

Q. What is anchylosis? — *A.* The loss of motion in a joint.

Q. How many kinds of anchylosis are there? — *A.* Two; *complete*, where the bones of a joint are united together, or so changed by deposition of fresh matter as to be immoveable; and *incomplete*, where some motion still remains, and the rigidity is owing to the stiffening of ligaments, or the contraction of tendons, &c.

Q. What treatment is often successful in complete anchylosis? — *A.* Passive motion imparted to the joint; and stimulating liniments, and friction.

Q. How may complete anchylosis be remedied? — *A.* Complete anchylosis cannot be cured, but may sometimes be remedied by cutting through the bone near the joint, and preventing the union of the cut ends; thus forming an artificial joint.

Moveable Cartilage.

Q. What are moveable cartilages? — *A.* Small cartilaginous bodies floating in the joint, loose, or attached to a pedicle; and giving rise to severe pain, and interference with the motions of the joint, by being caught between the condyles of the femur and the head of the tibia.

Q. How should they be treated? — *A.* The knee should be bandaged tightly, or covered with a laced knee-cap to prevent the escape of these bodies; and if these prove unsuccessful, they must be extracted by excision.

Q. What cautions are necessary in this operation? — *A.* The moveable cartilage should first be secured at the upper and under part of the knee, and an incision made barely large enough to admit of the extraction of the cartilage; taking care that the incision in the skin do not correspond with that in the synovial membrane.

Q. What after measures are to be adopted? — *A.* Opiates, and elevation of the limb, and other means to prevent inflammation of the joint.

Rachialgia, Caries of the Spine, or Disease of Pott.

Q. What is the disease termed caries of the spine? — *A.* A destruction, by caries, of the bodies and cartilages of the spine.

Q. What are its symptoms? — *A.* A sense of weakness and numbness in the lower extremities; a tendency to stumble; retraction and crossing of the legs, when the patient is seated; tenderness on pressure upon the part of the spine affected; distortion of the spine from loss of substance; loss of motion in lower extremities; and symptoms of general gastric derangement; with flatulence, and sense of tightness in the præcordial region.

Q. With what other disease is caries of the spine often confounded? — *A.* With distortion of the spine from contraction of the muscles.

Q. How should spinal caries be treated? — *A.* The weight of the head should be taken off the spine by a machine contrived to support it; or the patient should be kept upon his back on a mattress, upon which he should be carried frequently in the open air; setons or caustic issues should be made on each side of the spine, at the affected part; and the bowels kept open by rhubarb, or by the pulvis purgans, as in morbus coxarius.

Hydrorachitis, or Spina Bifida.

Q. What is spina bifida? — *A.* A congenital, and frequently fatal disease, consisting of a deficiency of a part of the spinal column, and a projection at that part of the membranes of the spinal marrow in the form of a tumour filled with serum; and is generally accompanied by loss of motion in the lower extremities.

Q. What effect is sometimes produced by pressure upon the tumour? — *A.* Symptoms resembling those of compression of the brain.

Q. How should this disease be treated? — *A.* It should be punctured with a needle, and the fluid evacuated, a little at a time, and at intervals of several days.

Q. What effects have followed the sudden evacuation of the fluid? — *A.* Convulsions and speedy death.

Fragilitas Ossium.

Q. From what does fragility of the bones arise? — *A.* From deficiency of *gelatinous* and a predominance of *earthy* matter in the bone.

Q. In whom does it occur; and what treatment is proper? — *A.* Generally in aged persons, or in syphilitic cases of long standing; in the former case, all treatment is nugatory; in the latter, constitutional remedies may perhaps do good.

Mollities Ossium, and Rachitis.

Q. What is mollities ossium? — *A.* A softening of the bone, from deficiency of the earthy matter taking place in persons advanced in life.

Q. How does rachitis or rickets differ from mollities? — *A.* Rickets attacks children and infants, and the bones, after a time, generally acquire their proper strength.

Q. How should these complaints be treated? — *A.* In mollities no treatment will avail; in rachitis, tonic medicines, gener-

ous diet, gentle purging, frictions, and salt bathing will frequently accomplish a cure.

DISEASES OF THE BLOODVESSELS.

Q. How may the arteries become diseased? — *A.* From inflammation, from deposition of bony or calcareous matter between their coats, and from dilatation or aneurism.

Q. Do arteries ever ulcerate? — *A.* Rarely, except in case of calcareous degeneration of their coats, or sometimes from the application of the ligature.

Q. Are veins liable to inflammation? — *A.* Yes; much more so than arteries.

Q. From what does phlebitis or inflammation of the veins arise? — *A.* From the application of ligatures, or sometimes from wounds, as in the operation of bleeding.

Q. What are the symptoms of phlebitis? — *A.* Pain and tenderness on pressure; an indurated knotted condition of the vein, with occasionally a red streak of inflammation over its course; sometimes terminating in secretion of pus, which finds its way into the circulation, producing great prostration, a quick fluttering pulse, nausea, tympanitis, and tenderness of the abdomen, delirium and death.

Q. How may a spontaneous cure of phlebitis take place? — *A.* By obliteration of the vein from effusion of coagulable lymph.

Q. How should phlebitis be treated? — *A.* By the elevation of the affected part so as to favour the return of the blood; by leeching and blisters, or pressure upon the affected part; or by compression above the point of inflammation.

Aneurism of the Arteries.

Q. What is aneurism? — *A.* A tumour filled with blood, and communicating with the cavity of an artery or vein.

Q. How do aneurisms of the arteries usually occur? — *A.* From dilatation of all the coats of an artery, or from rupture of the internal coats and dilatation of the cellular, in which cases it is denominated true *aneurism;* or from puncture of the arteries with extravasation of blood into the surrounding tissue, when it is called *false aneurism;* the sac in the former case being formed by the coats of the artery, and in the latter by the cellular tissue.

Q. What arteries are not subject to aneurism? — *A.* The arteries of the brain, from their being destitute of a cellular coat.

Q. What general remedies are used in the treatment of aneu-

rism ? — *A.* The long continued application of cold, or pressure; and the diminution of the force of the circulation by abstinence, bloodletting, digitalis, and absolute rest.

Q. Are these means always successful? — *A.* They very frequently fail, and an operation becomes necessary.

Q. What operation was formerly practised? — *A.* The application of a ligature to the artery just above the aneurism, and afterwards evacuating the sac.

Q. Why was this abandoned? — *A.* On account of its frequent failure, owing to the diseased state of the artery in the neighbourhood of the aneurism, and the irritation excited by opening and evacuating the sac.

Q. What operation is now employed? — *A.* That of Hunter, viz., tying the artery, in a sound part of it at some distance from the sac, and between it and the heart (thus taking off the force of the circulation from the aneurism).

Q. What other operation has been subsequently proposed? — *A.* That of Brasdor; which consists in tying the artery below the sac, with the view of bringing about coagulation in it.

Q. What success has attended this operation? — *A.* It has almost uniformly increased the size of the aneurism, or failed to produce any good effect.

Q. What cautions are necessary in operating for aneurism? — *A.* The artery should be cut down to and separated from its connections to as small an extent as possible, and the ligature thrown around it by means of a crooked needle and Physick's forceps, or the common curved aneurismal needle, or by Gibson's modification of Bellocque's instrument.

Q. What are the signs of aneurism of the thoracic aorta? — *A.* Violent neuralgic pain, palpitation, dyspnœa, cough, and sense of constriction of the chest; unnatural flatness on percussion of the upper part of the chest; loud, rough and abrupt bellows murmur above the clavicles upon auscultation; loss of power, numbness of one arm, and weakness or total absence of pulsation at the corresponding wrist; with frequently sibilant respiration, croaking voice, difficulty of deglutition, and œdema, or dropsy of the serous cavities, from compression of the trachea, œsophagus, or bloodvessels; and sometimes absorption of the ribs from pressure.

Q. What peculiar form of aneurism sometimes occurs in the thoracic aorta? — *A.* Dissecting aneurism, in which the blood gradually finds its way between the coats of the artery, and separates them for a considerable distance.

Q. How may aneurism of the abdominal aorta be known?

— *A.* By the appearance of a pulsatory tumour in the abdomen, readily detected by pressure, and frequently giving rise to œdema or dropsy of the abdomen and lower extremities, and sometimes to absorption of the bodies of the vertebræ, and to consequent paralysis of the lower limbs.

Q. What treatment is suitable to aneurism of the thoracic and abdominal aorta? — *A.* An operation is inadmissible, but cures have been occasionally effected by bleeding, abstinence, digitalis, and the external application of cold and pressure; although the disease most frequently terminates in ulceration and fatal hemorrhage.

Q. How may aneurism of the carotid be known from any other tumour? — *A.* By the aneurismal tumour becoming less by pressure upon the artery below it, and by our not being able to lift the tumour from the artery.

Q. Describe the operation for carotid aneurism. — *A.* The patient should be placed in a recumbent position, with the head thrown back and the face to the sound side; an incision from two to four inches long should then be made at the inner edge of the sterno-cleido-mastoideus muscle, below the tumour, having the middle of the incision, if possible, over the omo-hyoid where it crosses the sheath of the vessels; this incision should cut through the skin, platysma myoides, and fascia superficialis colli; the head should now be bent in such a way as to relax the sterno-cleido-mastoideus, and the cellular tissue, and afterwards the fascia profunda should be raised up by a pair of forceps and divided; the omo-hyoid and descendens noni are to be carefully avoided, and the sheath of the vessels pinched up with a pair of forceps and divided for about half an inch; the par vagum and internal jugular are to be held aside, and a ligature passed gently under and around the artery, which is then to be lifted slightly and compressed, and if pulsation ceases in the tumour, the ligature is to be tied, one end cut off, and the other left hanging out of the wound, which is then brought together by adhesive straps.

Q. At what time does the ligature come away? — *A.* Generally at the end of the fifteenth day.

Q. Why should not two ligatures be applied and the artery divided between them? — *A.* They are unnecessary, and accompanied with considerable risk of ulceration and secondary hemorrhage.

Q. What vessel is tied in the operation for aneurism of the axillary artery? — *A.* The subclavian artery.

Q. How is this operation performed? — *A.* The patient should

be placed on his back, the limb of the affected side depressed as much as possible, and the head turned towards the sound side; an incision should then be made upon the upper edge of the clavicle, extending nearly its whole length, and dividing the skin; the platysma myoides, superficial fascia, and cellular tissue are next to be carefully divided; the external jugular is then held aside by a blunt hook or a curved spatula, while a ligature is passed around the artery and tied; taking care first to ascertain that we have not mistaken one of the brachial plexuses of nerves for the brachial artery.

Q. What artery is to be tied in brachial aneurism? — *A.* The brachial or humeral artery.

Q. How is this accomplished? — *A.* A tourniquet is applied by some operators to render the superficial veins visible and prevent their being wounded; an incision through the skin is then made at the inner edge of the biceps muscle, at about the middle of the arm; the fascia is next divided, and then the sheath of the vessel is opened and the vessel tied.

Q. What sometimes occurs after this operation? — *A.* It frequently is not followed by success, and the artery must be tied above and below the sac before a cure can be effected.

Q. How may inguinal aneurism be known from inguinal hernia? — *A.* By the tumour in the former case being irreducible; by its pulsation, and by its gradual increase; with numbness and obstruction of circulation in the limb.

Q. What vessel must be tied for the cure of inguinal aneurism? — *A.* The external iliac artery.

Q. How is this performed? — *A.* An incision, about six inches in length, should be made through the skin and superficial fascia of the abdomen over the course of the external iliac artery as it lies under Poupart's ligament, commencing an inch and a half from the anterior superior spine of the ilium, and extending to within half an inch of Poupart's ligament; the fibres of the external oblique and of the lower edge of the transversalis are then separated, with as little cutting as possible, raising them carefully by the forceps or by the finger passed behind them, to prevent wounding the peritoneum; the fascia transversalis should then be pinched up, and divided in the course of the spermatic cord; the finger may then be passed behind the peritoneum to the external iliac artery and vein at the edge of the psoas muscle, and the vein may be held aside by a curved spatula or blunt hook, or by the finger, while a ligature is passed around the artery by an aneurismal needle.

Q. What vessel must be tied in gluteal aneurism? — *A.* The

internal iliac artery, which may be reached in the same way as the external.

Q. What vessel must be tied in aneurism of the internal or external iliac arteries? — *A.* The common or primitive iliac, which may be reached in the same way as the iliac arteries.

Q. How may popliteal aneurism be recognised? — *A.* By the appearance of a pulsating tumour in the ham or back part of the knee-joint, producing numbness, obstruction of circulation, and sometimes œdema of the leg.

Q. What operation is required for the cure of this aneurism? — *A.* Ligature of the femoral artery.

Q. How should this be accomplished? — *A.* An incision about three inches long should be made along on the inner edge of the Sartorius muscle, commencing about three inches below Poupart's ligament; the skin and fascia being divided, the Sartorius is held to one side and the sheath of the vessel pinched up and opened, and a ligature passed around the artery, carefully avoiding the vein.

Q. What is aneurism by anastomosis? — *A.* An erectile or highly vascular tumour formed by a congeries of varicose or enlarged vessels, and frequently communicating a thrilling or pulsatory sensation to the fingers.

Q. How should these be treated? — *A.* They should be strangulated, by means of ligatures crossing each other, and thus dividing the tumour into portions, which must be tied separately.

Q. What is varicose aneurism? — *A.* A tumour arising from a communication between an artery and a vein.

Q. What are its varietes? — *A.* *Direct* varicose aneurism, where the artery and vein are in direct contact; and *indirect*, where they are separate, and communicate through a sac formed in the surrounding cellular tissue.

Q. How does this form of aneurism occur? — *A.* It generally occurs at the bend of the arm, from a lancet being pushed through the vein into the artery, in bleeding.

Q. How is it known? — *A.* By the appearance of a tumour communicating a thrilling sensation, and generally accompanied by an enlarged and tortuous condition of the vessels above the tumour.

Q. What effect has pressure? — *A.* It tends to produce the indirect form, or to aggravate it when it already exists.

Q. What operation is generally performed? — *A.* Tying the brachial artery immediately above and below the sac.

Q. To what enlargements are the veins subject? — *A.* To

a varicose, or enlarged tortuous condition, sometimes producing ulceration, or sloughing of the integuments from their pressure.

Q. What veins are most liable to this disease? — *A.* The veins of the leg; from the weight and pressure of blood upon them.

Q. What method of treatment was formerly tried? — *A.* Ligature of the vein above; but this was abandoned from its tendency to aggravate the disease, or produce phlebitis.

Q. What methods are now adopted? — *A.* Elevation of the limb; equable compression by laced bandages, or rollers; and in extensive cases, the passage of a curved needle beneath, or through the coats of the vein, and then surrounding the needle by a ligature in the form of a figure of 8, in order to produce obliteration of the cavity of the vein.

Q. What other varieties of this disease are there? — *A.* Varicocele, or enlargement of the veins of the scrotum; and circocele, or enlargement of the veins of the spermatic cord.

Q. How may these varieties be distinguished from scrotal hernia? — *A.* By the tumour in varicocele and circocele, commencing at the lower part of the scrotum and travelling up; by the enlarged and tortuous feel of the veins; and by the tumour retiring when the patient is on his back, and returning when he rises, or when pressure is made upon the cord at the external inguinal ring.

Q. What modes of treatment are pursued? — *A.* The elevation and support of the scrotum by a suspensory or bag truss; or the excision of a part of the scrotum; or passing the scrotum through a metallic ring, and then pressing the sides of the ring together.

DISEASES OF THE NERVES.

Q. What is neuralgia? — *A.* Severe lancinating or shooting pain in the course of a nerve; sometimes accompanied with heat and swelling from neuritis or inflammation of the nerve.

Q. From what causes does it originate? — *A.* From constitutional or from mechanical causes, as, in the latter case, a ligature upon a nerve by mistake, irritation from a spiculum of bone, or other foreign body.

Q. What surgical treatment is sometimes requisite? — *A.* Removal of the foreign body; or division of the nerve, or excision of a part of it.

Q. What particular form of neuralgia sometimes attacks the testicle? — *A.* Irritable testis.

Q. What are its symptoms? — *A.* Tenderness on pressure, pain in the back, and in the groin and thigh of the affected side; pain only relieved by rest in the recumbent position upon the sound side.

Q. What treatment should be pursued? — *A.* Anodynes given internally, or the application of emplastrum belladonnæ may be tried; but the only certain remedy is the division o. the external spermatic nerve.

Q. What is neuroma or painful tubercle? — *A.* A circum scribed tumour, generally extremely painful, in the substance of a nerve.

Q. What remedy is to be employed? — *A.* Extirpation or removal by the knife.

Q. What is tetanus? — *A.* Violent spasmodic contraction of the muscles, from wounds, irritations of nerves, or from constitutional causes.

Q. How is tetanus divided? — *A.* Into *idiopathic* and *traumatic;* according as it arises from constitutional causes, or from injuries; and also according to its effects, as *trismus*, or contraction of the muscles of the jaw; *opisthotonos*, or bending of the body backward; *emprosthotonos*, or forward inclination; and *tetanus lateralis*, or *pleurosthotonos*, when the body is drawn to one side.

Q. What treatment is to be pursued? — *A.* Any existing irritation should be removed; cups and counter-irritants may then be applied to the spine; the patient should be purged freely by cathartics, or by enemata thrown up per anum by means of a long stomach tube; and opium should be administered to such an extent as the case will warrant.

INJURIES AND DISEASES OF THE HEAD.

Q. How is concussion of the brain produced? — *A.* By severe falls, or by blows upon the head, by which the brain has been very much disturbed.

Q. What are its symptoms? — *A.* The patient at first is insensible, or comatose, and aroused with difficulty, and incoherent in his replies; the skin cold; the pulse small and weak; spontaneous vomiting, and involuntary evacuation of fæces sometimes occur; when reaction takes place these symptoms are sometimes followed by inflammatory symptoms, as a hard, quick pulse, hot skin, contracted pupil, violent headache, &c.

Q. How should concussion be treated? — *A.* In the first stage, or that of collapse, we should avoid bleeding, and endeavour

to bring about reaction by cold affusions, ammonia, application of warmth, &c.; avoiding all powerful or permanent stimulants, lest inflammation be excited; and when inflammatory symptoms appear, bleeding, purging, the application of cold to the head, and general antiphlogistic treatment should be adopted, according to circumstances.

Q. What are the causes of compression of the brain? — *A.* Extravasation of blood in the cavity of the cranium, depressed fracture, or the formation of matter within the skull.

Q. What are its symptoms? — *A.* Slow and labouring pulse, stertorous breathing, dilatation and insensibility of the pupils to light, relaxed limbs, complete insensibility, from which the patient cannot be roused.

Q. How should compression of the brain be treated? — *A.* By bloodletting, purging, and general antiphlogistic measures; and if the compression arise from depressed fracture, it should be elevated, or removed by the trephine, which may also be useful in evacuating extravasated blood, when compression can be relieved in no other way.

Q. How may compression from extravasation be distinguished from that produced by depressed fracture? — *A.* By the symptoms of compression occurring in the latter case immediately after the receipt of the injury, while in the former case some time usually intervenes.

Q. How are fractures of the skull divided? — *A.* Into fissure, counter-fissure, depressed, double depressed, or camerated, stellated, and punctated.

Q. What is counter fissure? — *A.* A fracture produced in a part of the skull other than that where the blow was inflicted, owing to the elasticity of the bones of the cranium (as where a blow upon the occiput is followed by a fracture at the temple where the bone is thin).

Q. What render fractures at the base of the skull particularly dangerous? — *A.* The great extravasation that generally accompany them, and the severe inflammatory symptoms that almost invariably follow.

Q. What peculiar symptoms attend this kind of fracture? — *A.* Hemorrhage from the ears.

Q. How should fractures be treated? — *A.* Upon the general antiphlogistic plan; and the trephine should not be used unless urgent symptoms of compression of the brain are present.

Q. How should depressed portions of bone, causing compression, be treated? — *A.* They should be raised, if possible,

by an elevator; or otherwise, removed by Hey's saw, or by the trephine.

Q. How is the operation of trepanning performed? — *A.* If a wound of the integuments exist, it should be dilated in such a way as may be necessary, but if the integuments be entire, a crucial or semicircular incision should be made, and the flap or flaps dissected up; the pericranium should then be divided by a moveable lancet attached to the trephine (and not rasped away by a raspatory); the surgeon then fixes the sliding centre-pin in the bone, and rotates the trephine until a gutter is formed, when the centre-pin should be raised, and the rotatory movement cautiously continued, frequently removing the trephine to brush away the sawings, and to ascertain, by means of a probe or toothpick, the depth to which the trephine has penetrated. As soon as the bone is sawed through, the fragment should be removed by a forceps, the sharp projections removed by means of the lenticular, and the depressed portion elevated; the coagula, if any exist, should then be suffered to escape, and the wound dressed with adhesive strips, and a light compress and bandage applied.

Q. What peculiar method is necessary to be followed in trepanning over the frontal sinus? — *A.* A large trephine must be used in cutting through the outer table, and a smaller one for the inner; owing to the irregular shape of the bone.

Q. What regions of the skull should be avoided in trepanning? — *A.* The parts immediately over the large sinuses, particularly the occipital.

Q. In what disease has trepanning been occasionally successful? — *A.* In epilepsy.

Q. How is the vacancy left in the bone by the operation of trepanning repaired? — *A.* By the thickening of the dura mater and pericranium.

Q. Are wounds of the substance of the brain necessarily fatal? — *A.* They are not; large portions of the brain having been removed by accident or by the knife without material injury.

Q. What is fungus cerebri, or hernia cerebri? — *A.* A morbid growth of granulations from the substance of the brain, or of the brain itself, protruding through a wound in the skull.

Q. How should it be treated? — *A.* It should be covered with lint soaked in liquor calcis, and over this adhesive strips daily applied to effect its gradual depression; or it may be necessary to use caustic or the knife.

INJURIES AND DISEASES OF THE EAR.

Q. How may insects or other foreign bodies be removed from the ear? — *A.* By the forceps or scoop, or by injecting oil, or milk and water into the external meatus.

Q. How should polypus of the ear be treated? — *A.* It should be seized and twisted off by a pair of forceps, and caustic applied to prevent its reproduction.

Q. How is deafness from obstruction of the Eustachian tube to be treated? — *A.* By perforating the membrana tympani with a trocar; or by catheterism of the Eustachian tube.

Q. What is otitis or otalgia? — *A.* An inflammation of the lining membrane of the tympanum, accompanied by excessive pain in the ear, fever, and, occasionally, delirium.

Q. How does this disease sometimes terminate? — *A.* The inflammation is sometimes propagated to the membrane lining the mastoid cells of the temporal bone, giving rise to collections of pus, or terminating in inflammation of the base of the brain.

Q. How should this disease be treated? — *A.* In mild cases, injections of tepid milk and water, or the introduction of a drop or two of laudanum into the ear, will sometimes give relief; in severer cases, leeches and blisters behind the ears are necessary; and if suppuration cannot be prevented, it should be evacuated by puncture as soon as formed.

DISEASES OF THE EYE AND ITS APPENDAGES.

Q. What is ectropion? — *A.* An eversion of the eyelid, owing to swelling of the conjunctiva, or from contraction produced by burns.

Q. How should it be treated? — *A.* When it is owing to swelling or relaxation of the conjunctiva, a portion of that membrane should be excised (by curved scissors), in the form of a V, and the edges tacked together by suture; and when the deformity is owing to contractions from a burn, the cicatrix should be divided.

Q. What is entropion? — *A.* An inversion of the margin of the eyelid, from inflammation, or cicatrices upon its lining membrane.

Q. How may the deformity be removed? — *A.* By excising a fold of the outer integuments, by means of a curved scissors.

Q. What is trichiasis? — *A.* An inversion of the cilia or eyelashes.

Q. What operation is necessary? — *A.* Removal of the edge of the eyelid with the roots of the cilia.

Q. To what tumours are the eyelids subject? — *A.* To hordeolum or stye, which is a furunculous tumour of the meibomian glands; and to fatty encysted tumours.

Q. How should they be treated? — *A.* The former should be treated like common furuncle or boil; and the latter should be removed by the knife.

Q. What is encanthis? — *A.* A tumour of the lachrymal caruncle, frequently malignant in its nature.

Q. How should it be treated? — *A.* The eyelids should be held apart by the fingers, and the tumour drawn forward by means of a hook, and extirpated.

Q. What are epiphora and stillicidium? — *A.* An overflowing of the tears upon the cheek, owing, in epiphora, to undue secretion of tears, or to obstruction of the lachrymal canals, or nasal duct; and in stillicidium, to defective absorption.

Q. How may obstruction of the lachrymal canals be sometimes relieved? — *A.* By dilatation with one of Anel's probes.

Q. What is xeroma? — *A.* A dry condition of the surface of the eye, from suppression, or obstructed secretion.

Q. What treatment should be adopted? — *A.* The eye should be kept moist by wet applications; and sometimes a blister to the temple will be found beneficial.

Q. What is fistula lachrymalis? — *A.* An opening in the cheek communicating with the lachrymal sac, through which the lachrymal secretions escape upon the cheek.

Q. From what does this fistula arise? — *A.* From inflammation of the lachrymal sac, or from obstruction of the ductus ad nasum.

Q. How may the obstruction of the nasal duct be removed? — *A.* By a probe, properly bent, introduced into the nasal duct from beneath the inferior meatus of the nose, or by a probe or narrow-knife introduced into the lachrymal sac, and passed downwards and slightly backwards in the course of the nasal canal, until it reaches the inferior meatus of the nose; it is then to be withdrawn and a nail-headed style worn to keep the passage open.

Q. What operation must be substituted for this, when the bony canal of the lachrymal duct is obliterated? — *A.* A perforation should be made into the nose through the os unguis, which should be supported during the operation by a piece of horn carried up the nostril.

Q. What is pterygium? — *A.* A membrane growing generally from the internal, but sometimes from the external, angle of the eye, or from both, and gradually covering the cornea.

Q. How should it be treated? — *A.* Where it consists merely of a mesh of vessels, it is often sufficient to divide the vessels supplying it; but if it be fleshy, constituting what is called a pannus, it must be lifted up by forceps or a hook, and dissected off with curved scissors.

Q. What is ophthalmia? — *A.* A conjunctivitis, or inflammation of the conjunctiva.

Q. What is the simplest form of ophthalmia? — *A.* Catarrhal, arising from exposure to heat or cold or intense light, or from mechanical injuries.

Q. What are its symptoms? — *A.* An injected state of the vessels of the conjunctiva, sometimes producing chemosis, or an elevated ring around the cornea, with pain, and intolerance of light; dryness of the eye at first, followed afterwards by a copious discharge of tears and mucus.

Q. What treatment is demanded in this affection? — *A.* General and local bloodletting, purging, blisters behind the ears, and collyria of lead water in the acute stage; but if the disease become chronic, strong astringent lotions, or the application of nitrate of silver may be necessary.

Q. What is purulent or Egyptian ophthalmia? — *A.* A very violent form of ophthalmia, accompanied by intense pain and swelling of the ball of the eye, with, in most cases, early and profuse secretion of pus, and frequently terminating in sloughing of the cornea, or in a granular condition of the conjunctiva, or in bursting of the coats of the eye and evacuation of its humours.

Q. What is gonorrhœal ophthalmia? — *A.* An aggravated and very rapid form of purulent ophthalmia, arising from contact of the matter of gonorrhœa.

Q. What is the proper treatment? — *A.* Depletion, both general and local, to as great an extent as can be borne; and mercurials should be tried in the first stage of the affection, with vapours of opium, and, as some recommend, the free application of nitrate of silver to the conjunctiva; and when suppuration has taken place, tepid injections, collyria of corrosive sublimate, or of lead water, or red precipitate or citrine ointment, or the nitrate of silver, will be useful.

Q. What is scrofulous ophthalmia? — *A.* A form of conjunctivitis almost exclusively confined to children, and indicated by moderate vascularity of the conjunctiva, copious secretion

of tears, and great intolerance of light, with little or no pain.

Q. How does this disease sometimes terminate? — *A.* In ulceration of the cornea, or specks from deposition of opaque matter in its substance.

Q. What treatment should be pursued in scrofulous ophthalmia? — *A.* Bleeding should be avoided as injurious, and tonics and alteratives administered, with the use of the salt water bath, pure air, &c.; and local applications, in the form of opiate fomentations, and after the acute symptoms have subsided, or ulcerations have taken place, collyrium of corrosive sublimate, and the application of nitrate of silver should be employed.

Q. What is psorophthalmia? — *A.* An inflammation of the edges of the eyelids, accompanied with pain, itching, and falling out of the eyelashes; frequently causing adhesion of the eyelids.

Q. From what does psorophthalmia arise? — *A.* It generally arises from measles, small-pox, or from a scrofulous diathesis.

Q. How should it be treated? — *A.* By mild astringent collyria; and when it occurs from a scrofulous constitution, the internal exhibition of iron, iodide of potassium, the use of the salt water bath, and a nutritious diet should be inculcated.

Q. What is sclerotitis? — *A.* An inflammation of the sclerotic coat of the eye, occurring in adults, and sometimes rheumatic in its character.

Q. How may it be recognised? — *A.* By a deep-seated, diffused redness of the globe of the eye, forming an elevated circle around the cornea, throbbing, or darting, or stinging pain; a sensation of fulness and distension, with occasionally an alteration in the shape of the globe of the eye; intolerance of light, and increased lachrymation.

Q. How does this disease frequently terminate? — *A.* It frequently involves the other coats of the eye, and terminates in destruction of the eye itself.

Q. What treatment is proper in this affection? — *A.* Where the affection is purely inflammatory and the patient robust, the antiphlogistic plan should be pursued; but in many cases this will be found injurious, and our principal dependence must be upon local applications of nitrate of silver, red precipitate ointment, collyria of corrosive sublimate, wine of opium, and belladonna ointment.

Q. What is keratitis or corneitis? — *A.* An inflammation of the substance of the cornea, generally attacking young persons.

Q. What are its symptoms? — *A.* The cornea gradually loses its brilliancy and transparency, and becomes covered with well-defined, elevated red patches of minute bloodvessels; and, when the neighbouring tissues are not involved, unaccompanied by increased lachrymation, or intolerance of light, and rarely with pain; but sometimes conical projection of the cornea takes place, from increased secretion of the aqueous humour.

Q. What treatment is required in simple keratitis? — *A.* Local and sometimes general depletion, and counter-irritation; or antimonials combined with quinine, or calomel and opium, may be required.

Q. What is iritis? — *A.* An inflammation of the iris, from injuries, operations, or from syphilitic or mercurial poison.

Q. How is it indicated? — *A.* By discoloration of the iris, and development of red vessels running into it from the margin of the cornea; contraction of the pupil, acute pain, and intolerance of light.

Q. How does iritis generally terminate? — *A.* In effusion of lymph (rarely in suppuration), and sometimes in obliteration of the pupil.

Q. How should iritis be treated? — *A.* In the simple form, general and local bleeding, counter-irritation, and the use of mercury, belladonna, and stramonium to subdue inflammation, and prevent adhesions; and where it arises from syphilitic taint, or abuse of mercury, the iodide of potassium will be serviceable. (The exhibition of turpentine is also strongly advised.)

Q. From what may opacity of the cornea proceed? — *A.* From partial thickening of the cornea; or from effusion of lymph between its coats, or from a cicatrix.

Q. How may it be removed? — *A.* When it is caused by a cicatrix, it is incurable; when it proceeds from thickening of the coats or from lymph between them, the application of citrine ointment, or nitrate of silver, or calomel, or finely powdered sugar blown into the eye, or the application of molasses, or weak vinegar, will often be useful.

Q. What is procidentia iritis? — *A.* A protrusion of the iris through a wound in the cornea, or through an opening in it formed by ulceration.

Q. How should it be treated? — *A.* It should be replaced, and the wound or ulcer healed as speedily as possible; or if it cannot be replaced, the protruding part may be removed by caustic.

Q. How should obliterated pupil be treated? — *A.* An arti-

ficial opening may be made by a knife or needle introduced either before or behind the iris.

Q. What name is given to effusion of pus between the layers of the cornea or in the anterior chamber? — *A.* In the former case it is called onyx, and in the latter, hypopion.

Q. What treatment is to be pursued? — *A.* Evacuation by puncture is very hazardous, and should not be attempted; but general antiphlogistic measures should be adopted.

Q. What is staphyloma? — *A.* A conical projection of the cornea, generally opaque, and sometimes preventing closure of the eyelids.

Q. How should it be treated? — *A.* The only remedy is the removal of a flap of the projecting cornea by the knife.

Q. What is cataract? — *A.* An opacity of the crystalline lens, or of its capsule, either congenital, or produced by subsequent injury or disease.

Q. How are cataracts divided? — *A.* Into capsular, lenticular, and capsulo-lenticular, according as the capsule, or lens, or both, are affected.

Q. How may cataract be detected? — *A.* When it is produced after birth by gradually increasing dimness of sight, the patient being able to see better when the pupil is expanded in a faint light, or by the application of stramonium or belladonna; and by inspection showing an opacity of the lens, which is of a white, gray, black, or mottled appearance, and increased in size in fluid cataract, and diminished when the cataract is solid.

Q. What is necessary for the cure of cataract? — *A.* The removal of the crystalline lens.

Q. What are the operations in use for this purpose? — *A.* Couching, extraction, and the absorbent operation.

Q. What is couching? — *A.* The depression of the lens from the axis of vision, by means of a straight or curved couching needle.

Q. How is couching performed? — *A.* The pupil of the eye having been previously dilated by means of belladonna or stramonium applied to the eyebrow, the sound eye should be bandaged, and the patient seated upon a low stool; an assistant then supports the head, and keeps the upper eyelid open by the fingers or by a speculum, and the surgeon, standing before the patient, depresses the lower lid and fixes the ball of the eye, while he introduces the needle from the external angle of the eye, and penetrating the sclerotica two lines behind the edge of the cornea, until the point of the needle is seen behind the lens; the capsule is then lacerated, and the lens pressed down-

wards into the vitreous humour, taking care not to withdraw the needle until it be seen whether the lens do not rise again.

Q. How is extraction performed? — *A.* The patient should be seated and the eyelids secured as in the operation for couching; the surgeon then steadies the globe of the eye with the fore and middle fingers of one hand, while with the other hand he introduces a triangular knife of Wenzel or Beer through the cornea a quarter of a line from its junction with the sclerotica externally, and carries it, with the cutting edge downward, horizontal across the anterior chamber until its point emerges in front of the internal margin of the cornea; the knife is still to be pushed forward until it cuts itself out; the flap of the cornea must now be raised with a curette, and the capsule of the lens lacerated with a needle or wire, when the lens will generally escape through the lacerations in its capsule, and through the incision in the cornea; the edges of the cornea should then be adjusted, and the eyelids secured together by adhesive strips and a light bandage.

Q. What are the disadvantages of this operation? — *A.* It is liable to be followed by considerable inflammation; and there is danger of the iris falling under the edge of the knife, or the vitreous humour being evacuated by the pressure made upon the eye to facilitate the expulsion of the lens.

Q. What treatment may be adopted to prevent the iris from falling under the edge of the knife? — *A.* Friction of the cornea during the passage of the knife.

Q. How is the operation for absorption performed? — *A.* By the anterior operation (called *keratonyxis*, or puncture of the cornea), and by the posterior operation.

Q. How is keratonyxis performed? — *A.* The pupil is dilated by belladonna or stramonium, and the patient seated and the eyelids secured as in the former operations; a sharp needle, gradually tapering towards the point, is then carried through the cornea anteriorly, near its margin, and the capsule and lens lacerated; the needle is then withdrawn, and the fragments of the lens are gradually dissolved by the aqueous humour, and absorbed.

Q. What are the difficulties and disadvantages of this operation? — *A.* The adhesion of the cornea to the needle interfering with its free motion, and the operation frequently must be repeated two or three times.

Q. How does the posterior operation differ from keratonyxis? — *A.* The needle is passed through the selerotica at the distance of a line behind its junction with the iris, and the lens and cap-

sule divided in different directions, and the fragments pushed into the anterior chamber to be dissolved by the aqueous humour.

Q. What is amaurosis? — *A.* Partial or complete loss of sight, from insensibility of the optic nerve, without any perceptible alteration in the appearance of the eye.

Q. From what causes does it arise? — *A.* From local plethora; from gastric derangement; from congestion of the brain; from general debility; or from narcotics or poisons, in which cases it is said to be functional; or it may arise from organic disease of the brain or of the eye itself, in which case it is called organic.

Q. What is the proper treatment of amaurosis? — *A.* Organic amaurosis is generally incurable; functional amaurosis may be relieved by the removal of its causes, by appropriate constitutional and local treatment; and sometimes by blisters; or by strychnine exhibited internally, or epidermically.

Q. What is glaucoma? — *A.* A disease of the hyaloid membrane and vitreous humour, characterised by a greenish, shining appearance at the bottom of the eye, usually accompanied by irregular dilatation of the pupil and loss of vision.

Q. What treatment is proper? — *A.* The disease is almost always incurable, but the liquor potassa arsenitis is said to have been sometimes useful.

Polypus of the Nose and Antrum.

Q. What is a polypus? — *A.* A soft tumour, arising from a mucous membrane.

Q. Describe polypus of the nose. — *A.* It rises, by a broad base or by a narrow neck or pedicle, from the Schneiderian membrane; and occupies the anterior or posterior nares, giving rise to laborious and noisy respiration.

Q. What peculiar effect is produced upon nasal polypus by hydrometrical changes? — *A.* The polypus enlarges very much in damp weather, and contracts again when the weather is dry.

Q. How may polypus nasi be removed? — *A.* It may be twisted off by the forceps, or removed by the knife, when it has a narrow neck or pedicle; or it may be strangulated by one or more ligatures passed around or through its substance; the ligature being generally preferred on account of the hemorrhage which frequently follows the removal by the knife or forceps.

Q. What peculiarity does fungus of the antrum exhibit? — *A.* A peculiar tendency to become malignant.

Q. What effects are produced by polypus of the antrum? —

A. Protrusion of the bones of the cheek, of the eye, and of the teeth, with great deformity.

Q. What treatment may be adopted? — *A.* If undertaken early, the diseased parts may be removed, and the patient recover; but the operation very generally fails, from extensive morbid degeneration of the surrounding tissues, and the return of the disease after the operation.

Enlargement of the Tongue.

Q. From what cause does the tongue become enlarged? — *A.* From injuries of the tongue, or the abuse of mercury giving rise to glossitis or inflammation of the tongue with enlargement; or from simple hypertrophy or excessive growth.

Q. How should enlargements of the tongue from glossitis be treated? — *A.* By leeching, free scarification of the part, and by general depletion.

Q. What operation is sometimes necessary in hypertrophy of the tongue? — *A.* Removal of part of the tongue by the knife, or by ligature passed through its middle and tied on each side.

Ranula.

Q. What is ranula? — *A.* A small tumour beneath the tongue, arising from obstruction of the ducts of the sublingual glands.

Q. From what does it derive its name? — *A.* From its appearance, which resembles the belly of a frog.

Q. What remedy is required? — *A.* Laying open the tumour, or excising a portion of it.

Epulis.

Q. What is epulis? — *A.* A tumour of the gum, arising from the sockets of the teeth, and frequently becoming malignant.

Q. What operation is required? — *A.* Removal by the knife and saw.

Enlarged Tonsils and Uvula.

Q. What treatment may be tried in enlargement of the tonsils? — *A.* Astringent gargles and powders applied locally, and the internal use of iodine; and if this be not successful, it should be removed by the knife or ligature.

Q. How long should the ligature be left on the tonsils? — *A.* For at least twenty-four hours.

Q. How should enlarged uvula be treated? — *A.* Astringents

may be tried, as in enlargement of the tonsils, and if this be unsuccessful, it should be cut off.

Q. What instruments are usually employed in removing enlarged tonsils or uvula? — *A.* The guillotine of Fahnestock, or Gibson's modification of Physick's tonsil forceps; or the tonsils may be drawn out by a double hook and cut off by a probe-pointed bistoury.

Obstructions of the Œsophagus and Trachea.

Q. How may the œsophagus be obstructed? — *A.* By foreign bodies lodged in it, and by stricture or contraction of its calibre.

Q. How should foreign substances be removed from the œsophagus? — *A.* By extracting them by means of the gullet forceps, or when this cannot be accomplished, they should be pushed down into the stomach by a probang, or a piece of sponge fastened to a piece of whalebone.

Q. How is stricture of the œsophagus to be treated? — *A.* It should be gradually dilated by the repeated introduction of the stomach tube; and if it be owing to spasm or inflammation, nauseants, and local bleeding may be useful.

Q. What caution is necessary? — *A.* When the obstruction proceeds from malignant tumours in the œsophagus, or from aneurism of the aorta, the introduction of the stomach tube ought not to be attempted, lest the disease be aggravated, or the aneurism ruptured.

Q. How may the larynx and trachea be obstructed? — *A.* By tumours from their sides; by œdema of the mucous membrane; or by the introduction of foreign bodies into their cavities.

Q. What operations are resorted to in order to remedy obstructions from the larynx and trachea? — *A.* Laryngotomy and tracheotomy.

Q. How is laryngotomy performed? — *A.* An incision is first made, through the integuments in the front of the neck, over the crico-thyroid ligament, and the divided vessels secured if necessary; the crico-thyroid ligament is then divided, and, if necessary, the incision may be carried upwards, separating the sides of the thyroid cartilage.

Q. What is sometimes necessary to enable the patient to breathe freely, in cases of obstruction of the larynx? — *A.* The introduction of a silver canula.

Q. How is tracheotomy performed? — *A.* The patient should be seated in a chair and the head thrown back; an incision is then made through the integuments, beginning below the cricoid

cartilage and carried downwards towards the sternum; the sterno-hyoid and sterno-thyroid muscles, the isthmus of the thyroid gland and the bloodvessels are pushed out of the way; the patient is then made to elongate and stretch the windpipe by imitating the action of swallowing, at which moment the surgeon pushes the knife with its back to the sternum, through the trachea, at the lower part of the incision.

Bronchocele or Goitre.

Q. What is bronchocele? — *A.* A tumour of the thyroid gland, frequently giving rise to difficulty of respiration from its pressure upon the trachea.

Q. What treatment is to be pursued? — *A.* The only reliance is upon the internal and external use of iodine; any attempts at extirpation being almost invariably followed by profuse and frequently fatal hemorrhage.

PARACENTESIS.

Q. What is meant by paracentesis? — *A.* The evacuation of a fluid from any one of the cavities of the body, by puncturing its walls.

Q. How is paracentesis of the chest performed? — *A.* The patient should be seated in an upright position, and if the matter point at any particular part, the incision should be made there; if not, an incision should be made through the integuments just above the seventh rib, and about four inches from the spine; the skin having been previously drawn up so that the opening in the integuments and that through the intercostal muscles may not be exactly over one another; an opening is then made through the intercostal muscles and pleura sufficiently large to admit a canula or a gum catheter, which must then be introduced; taking care not to evacuate too large a quantity of the fluid at one time, for fear of inducing prostration.

Q. How is paracentesis of the abdomen performed? — *A.* The patient's abdomen should be surrounded with a bandage having tapes or straps attached, or split at its extremities into several strips; the bladder should first be evacuated, and an opening then made in the linea alba, a little below the umbilicus (or in case of ovarian dropsy immediately over the diseased part), by means of a lancet, and a canula introduced, taking care to tighten the bandage as the fluid escapes, and not to evacuate the whole of the fluid at once.

POISONS IN THE STOMACH.

Q. What treatment is required when poisons have been introduced into the stomach? — *A.* They should be removed by the stomach-pump, or by emetics, or appropriate antidotes administered.

HERNIA.

Q. What is meant by hernia? — *A.* A protrusion of any viscus from its proper cavity; but the term is generally used to signify a protrusion of intestine or omentum, covered with peritoneum.

Q. What are the causes of hernia? — *A.* It is sometimes congenital, but generally arises from violent muscular exertion, or blowing wind instruments, in persons whose abdominal rings are naturally large; sometimes in females from pregnancy; or in children from violent fits of coughing or crying.

Q. Of what is the sac constituted in hernia? — *A.* Of the peritoneum, which is pushed before the intestine.

Q. How is hernia divided? — *A.* Into reducible hernia, when the protruded part returns readily into the abdomen; irreducible, when the return of the intestine or omentum is prevented by adhesion to the sac, or from great increase in their volume; and strangulated hernia, when the protruded parts are so tightly embraced as to obstruct the circulation; giving rise to twisting pain around the umbilicus, vomiting of stercoraceous matter, constipation, singultus, small quick pulse, cold clammy skin, and anxious countenance; terminating, if not relieved, in death; or in sloughing of the protrusion, and formation of artificial anus.

Q. How should reducible hernia be treated? — *A.* When it arises from adhesions, little else can be done than to support it by a bag truss; but where it arises from increased growth, depletion and abstinence may succeed. (The application of ice to the tumour has also proved successful.)

Q. How is hernia rendered *strangulated?* — *A.* By the bowel becoming distended with flatus; or by a large portion of intestine, or omentum, being forced through the ring by sudden or violent exertion.

Q. How should it be restored? — *A.* The patient should be placed so as to relax the muscles of the abdomen, and taxis should be employed gradually and steadily for half an hour; and

if this should not succeed, the stricture must be divided by the knife, and the hernia reduced.

Q. What means are sometimes resorted to, in order to facilitate restoration by taxis? — *A.* The warm bath, opium, nauseating medicines, or dashing cold water upon the tumour. (The introduction of the stomach tube into the rectum, to encourage the escape of the flatus, has also been found useful.)

Q. How may an intestinal hernia be distinguished from one containing only omentum? — *A.* By the elasticity and smoothness of the former, and the gurgling noise it produces in passing into and out of the abdomen; and the doughy, inelastic, irregular feel of the latter.

Q. What are the varieties of exomphalos or umbilical hernia? — *A.* The congenital variety, in which the omentum or intestine protrudes into the umbilical cord, and is not covered by the skin; and the variety occurring in adults, or children after birth, in which the hernia is covered by the common integuments.

Q. How should congenital umbilical hernia be treated? — *A.* The hernia should be reduced, and a truss or compress applied; or the sac and skin around the umbilicus embraced by a ligature, so as to cause sloughing of the parts included, and cicatrization of the umbilical ring.

Q. How should the reducible form of the variety occurring in adults be treated? — *A.* The parts should be restored, and a truss applied to retain them.

Q. How is the operation for strangulated umbilical hernia performed? — *A.* The patient should be placed upon a table in such a position as to relax the abdominal muscles; an incision is then made through the skin, crossing the tumour transversely at its middle; another incision is made perpendicularly to the first, so that the two unite in the form of the letter T; the flaps must then be dissected up, and the superficial fascia pinched up and divided; the hernial sac, if it has not been absorbed, should be carefully cut into and divided upon a director; the finger should then be carried within the sac to the upper part of the stricture, and a probe-pointed bistoury (with its edge covered to within an inch of its point), introduced along the finger, and the stricture divided upward in the linea alba to a sufficient extent to allow the intestine to be restored.

Q. What caution is necessary with regard to restoring an intestine that has been strangulated? — *A.* If mortification of the intestine has taken place, it should not be restored, as the patient's only chance of safety depends upon the formation of an

artificial anus; and if small mortified spots appear upon the intestine, they should be surrounded by a fine ligature before the bowel is returned.

Q. What treatment is necessary after the operation for strangulated hernia? — *A.* The patient should be kept upon his back with the muscles relaxed, until the parts are united, and a truss should be worn to prevent a recurrence of the hernia.

Q. What is an inguinal hernia? — *A.* A protrusion of bowel or omentum, or both of them, into or through the inguinal canal.

Q. What name is given to a hernia contained between the internal and external abdominal rings? — *A.* Concealed inguinal hernia.

Q. What is scrotal hernia? — *A.* A form of inguinal hernia, in which the bowel descends into the scrotum.

Q. How may scrotal hernia be distinguished from varicocele or from hydrocele? — *A.* By the disappearance of the varicocele when the patient is in the recumbent position, and its return when he rises, although the finger be kept at the abdominal ring; and from hydrocele, by the latter disease commencing at the bottom of the scrotum and increasing upwards.

Q. What is the course of inguinal hernia in escaping from the abdomen? — *A.* It enters the internal abdominal ring formed by the fascia transversalis, passing under the edges of the internal oblique and transversalis muscles, and between the cremaster and the cord; and, following the course of the cord through the inguinal canal, emerges through the external abdominal ring formed by the splitting of the fibres of the tendon of the external oblique muscle.

Q. What form the coverings of inguinal hernia? — *A.* The skin, the fascia superficialis, the cremaster muscle; and to these is added, in concealed inguinal hernia, the tendon of the external oblique, and sometimes a few fibres of the internal oblique and transversalis muscles.

Q. How should inguinal hernia be reduced? — *A.* The patient should be placed on his back, with his pelvis and legs elevated, to relax the abdominal muscles; taxis should then be tried by supporting the tumour with one hand, while, with the other hand, the tumour is gently pressed or kneaded in the direction of the abdominal ring; and after the hernia is restored, a truss should be applied over the lower part of the internal abdominal ring.

Q. How is the operation for strangulated inguinal hernia performed? — *A.* The patient is placed on his back upon a table, and the pelvis and legs supported to relax the muscles; an in-

cision is then made through the integuments over the tumour, from above downwards, nearly its entire length ; the fascia superficialis and cremaster are next to be carefully divided, and the hernial sac pinched up, and divided upon a director ; a probe-pointed bistoury, with its edge covered to within an inch of its point, must be carried (along the finger as a guide), to the edge of the stricture, which must be divided to a very slight extent in a direction directly upwards, to avoid wounding the epigastric artery which runs on the inner side of the internal ring ; and the hernia then should be returned.

Q. What after-treatment is necessary ? — *A.* The edges of the incision should then be approximated by adhesive strips or by sutures, and the patient not permitted to rise from his back until perfect union has taken place, and a truss should afterwards be worn to prevent a recurrence of the hernia.

Q. What medical treatment is necessary ? — *A.* To keep the bowels freely opened for some days after the operation, to avoid irritation and inflammation.

Q. What small artery is generally cut across in the operation for strangulated inguinal hernia ? — *A.* The *arteria ad cutem abdominis.*

Q. How does congenital hernia differ from common inguinal hernia ? — *A.* In congenital hernia, the bowel descends into the scrotum through the tunica vaginalis, before the communication between the tunica vaginalis and the abdomen is closed.

Q. What forms the hernial sac in this case ? — *A.* The tunica vaginalis, which contains also the cord, behind the protruded bowel.

Q. How does the treatment of congenital hernia differ from that of the common inguinal form ? — *A.* The reducible form may often be radically cured by means of a proper truss ; and when the operation for strangulated hernia is necessary, the incision, in the tunica vaginalis, should not be lower down than the upper part of the testicle.

Q. What is femoral hernia ? — *A.* A hernia escaping through the crural ring.

Q. What form the sides or boundaries of the crural or femoral ring ? — *A.* The os pubis posteriorly, Poupart's ligament anteriorly, the iliac vessels externally, and Gimbernat's ligament internally.

Q. What is Gimbernat's ligament ? — *A.* The external crescentric edge of the outer column of Poupart's ligament, where it is inserted into the spine of the os pubis.

Q. What is Hey's ligament ? — *A.* The superior horn of the falciform process of the fascia lata femoris.

Q. What is the course of femoral hernia? — *A.* It descends through the sheath of the vessels, on the inner side of the femoral vein, and escapes through one of the openings at the inner side of the sheath of the femoral vessels, carrying with it a portion of the loose cellular tissue of the sheath, which thus constitutes the *fascia propria.*

Q. How should taxis be made in femoral hernia? — *A.* In a downward and inward direction, until the tumour is below Poupart's ligament, and then gently upwards.

Q. How is the operation for strangulated inguinal hernia performed? — *A.* The patient should be placed upon his back with the shoulders and pelvis elevated to relax the muscles; the bladder should be emptied, and the parts shaved; an incision should then be made through the skin over the tumour, commencing a little above Poupart's ligament, and extending downwards and somewhat inwards as far as the middle of the protrusion; and this incision should be joined at right angles by another forming with it a reversed ⌊; the fascia superficialis and fascia propria should then be pinched up and carefully divided, and after them the hernial sac; a finger should now be introduced between the sac and the intestine, until it meets with the stricture, when a probe-pointed bistoury, guarded as in the operation for inguinal hernia, should be carried along the finger, and the stricture divided to a very slight extent in a direction upwards, so as to avoid the epigastric and obturator arteries.

Q. Where is the stricture situated? — *A.* Either at Hey's ligament, in the sheath of the vessels, at the mouth of the sac, or at Gimbernat's ligament.

Q. In which sex does femoral hernia most frequently occur? — *A.* In the female.

Q. How may it be distinguished from inguinal hernia? — *A.* By the direction in which an impulse is given to the tumour by coughing; and by drawing down the tumour, Poupart's ligament may be traced above it when the hernia is femoral, but not when it is inguinal.

Q. What peculiarity is required in the truss for femoral hernia? — *A.* The pad should project downward at right angles with the spring of the truss, and should press upon the opening through which the hernia escapes under Poupart's ligament, and also upon the upper part of the thigh.

Q. How is artificial anus formed? — *A.* By the sloughing of the strangulated portion of the intestine, and the adhesion of the sound parts to the neck of the sac.

Q. What prevents the passage of fæces from the upper to the

lower part of the bowel in artificial anus? — *A.* The projecting ridge formed by the contiguous walls of the upper and lower portions of the intestine that was strangulated.

Q. How may this be remedied? — *A.* Complete union of the contiguous walls forming the projecting ridge should be accomplished by passing a ligature through them, and keeping it there until the contiguous portions of intestine are united by adhesive inflammation; the projecting ridge may then be divided, in such a way as to create a communication between the upper and lower portions of intestine.

DISEASES OF THE RECTUM AND ANUS.

Q. How should stricture of the rectum be treated? — *A.* If it proceed from spasm, tepid injections, warm bath and other relaxing means should be tried, and if unsuccessful, or the stricture be permanent, dilatation should be attempted by the gradual and repeated introduction of a bougie; and it has also been recommended to notch the stricture at several points with a knife.

Q. What is fistula in ano? — *A.* An artificial canal extending alongside of the rectum, and lined by an artificial membrane which secretes pus.

Q. How are fistulæ divided? — *A.* Into internal fistula, when it communicates with the cavity of the rectum, and not externally with the skin; incomplete fistula, when it opens upon the integuments, but not internally; and complete fistula, when it communicates both with the rectum and the integuments.

Q. How should fistula in ano be treated? — *A.* Emollient poultices, perfect rest, and mild laxatives should be tried, and if these prove unsuccessful, an operation should be performed by the knife or ligature.

Q. How is the operation by the knife to be performed? — *A.* The bowels should be previously evacuated by laxatives and enemata; the patient then stoops over a table, and the buttocks are held asunder by an assistant, while the surgeon introduces a finger, lubricated with lard or oil, into the rectum, and by means of a probe passed into the fistula, he ascertains its direction and extent; a probe-pointed bistoury is then introduced through the internal orifice of the fistula into the rectum, and the finger and knife withdrawn together, dividing the parts included between them.

Q. What is necessary in incomplete fistula? — *A.* A sharp-

pointed bistoury must be used and carried through into the rectum at the upper extremity of the fistula, and cut out, as in the former case ; lint should then be interposed between the external lips of the wound, to insure its healing from the bottom ; and the patient kept quiet till union is complete.

Q. What danger attends this operation? — *A.* Profuse hemorrhage sometimes occurs from division of the large veins around the anus.

Q. How is the operation by the ligature performed? — *A.* If the fistula be incomplete, a communication must be made between it and the rectum, by a stilet carried up through a curved canula ; a ligature may then be passed from the fistula into the rectum by means of a watch-spring and canula, as recommended by Bellocque ; the ends of the ligature are then tied, at first loosely, and daily tightened until it makes its way through the skin.

Q. What is encysted rectum? — *A.* Enlargement of the lacunæ, or mucous follicles of the rectum, giving rise to irritation and pain after defecation.

Q. How should they be treated? — *A.* They should be drawn down by means of a blunt probe, and removed by a knife or scissors.

Q. What are hemorrhoids or piles? — *A.* Painful tumours in the lining membrane of the rectum near the anus, generally arising from varicosity of the veins of the rectum.

Q. What are the exciting causes of these tumours? — *A.* Constipation, the use of drastic purgatives, severe exercise, pregnancy, &c.

Q. What are the symptoms of piles? — *A.* Pain in the loins, irritation and uneasiness in the rectum, and the protrusion of smooth, round, erectile tumours, sometimes bleeding, and sometimes blind, or unaccompanied by hemorrhage.

Q. What remedial means may be employed? — *A.* Laxative diet and medicines, astringent washes and ointments, leeches, cold enemata ; and when the piles are indolent, the internal exhibition of the confectio piperis nigri.

Q. How may piles be radically removed? — *A.* By strangulating the pile by means of a ligature passed through it by a needle, and tied on both sides.

Q. What is prolapsus ani? — *A.* A protrusion, externally, of the mucous coat of the rectum, from relaxation of the parts, or from violent straining at stool.

Q. How should it be treated? — *A.* The prolapsed bowel should be restored, and supported by a proper bandage, and

laxatives, astringent washes, and ointments used to overcome the tendency to recurrence; or a portion of the prolapsed mucous membrane may be excised or removed by ligature, as in hemorrhoids.

Q. How should imperforate anus be treated? — *A.* If the anus be simply closed by a membrane, this should be opened by making an incision with a lancet or bistoury, and crossing it; but if the gut be dilated for some distance, the cul-de-sac formed by its extremity should be dissected for, carefully avoiding the bladder.

DISEASES OF THE GENITO-URINARY ORGANS.

Q. How does retention of urine differ from suppression? — *A.* In suppression of urine none is secreted, owing to some affection of the kidney, and in retention the urine is secreted and accumulates in the bladder, but the patient is unable to evacuate it.

Q. From what does retention of urine proceed? — *A.* From strictures or other obstructions of the urethra; or from paralysis, or spasm of the neck of the bladder, arising from blows upon the perineum, injuries of the spine, from cantharides, &c.

Q. What treatment should be adopted? — *A.* If spasm exist, it should be relieved by bloodletting, the warm bath, nauseating medicines, and opiate enemata, or by the introduction of a catheter.

Q. Describe the manner of introducing a catheter. — *A.* The patient should be placed in such a position as to relax the muscles of the abdomen and thighs; the surgeon then places himself on the left of the patient, and takes hold of the penis by the thumb and first two fingers of the left hand, on either side of the glans, so as not to compress the urethra; he then takes a catheter (previously warmed and oiled), between the thumb and first two fingers of his right hand, and introduces it carefully in the urethra, with the concavity of the instrument toward the abdomen; the instrument is then to be carried gradually forward through the urethra, directing the back of the instrument along the superior wall of the canal until it reaches the triangular ligament; when this is felt, the surgeon should endeavour to catch it in the concavity of the catheter; and having succeeded, he lets go the penis, and depresses the handle of the instrument between the thighs, when it passes readily into the bladder.

Q. What operation is necessary when the urethra is perma-

nently obstructed, so as not to allow of the introduction of a catheter? — *A.* Puncture of the bladder above the pubis or through the rectum.

Q. How is the bladder punctured above the pubis? — *A.* The patient is laid upon a table, and an incision is made above the pubis between the pyramidales muscles, through the integuments, until the bladder is perceptible; a puncture is then made through the bladder, by means of a long curved trocar and canula, and the urine evacuated through the canula, which must be retained by tapes and bandages.

Q. What are the objections to this operation? — *A.* The irritation created by the presence of the canula in the bladder, and the danger of the urine escaping into the cavity of the abdomen.

Q. How should puncture of the bladder from the rectum be performed? — *A.* The finger should be carried up the rectum as a guide, and the trocar carried through the coats of the rectum and bladder just above the prostate gland, where the bladder is not covered by peritoneum.

Q. What is incontinence of urine? — *A.* An inability to retain the urine in the bladder. (It passing away sometimes drop by drop, and in some cases by sudden and uncontrollable gushes.)

Q. What remedies are useful? — *A.* Tonics, cold baths, opium, blisters to the sacrum, tincture of cantharides, and strychnine.

Q. What is meant by urinary calculus? — *A.* A concretion of alkaline or earthy substances deposited by the urine.

Q. Where are urinary calculi formed? — *A.* In the kidney, or in the bladder.

Q. What are the symptoms of calculus, or stone in the kidney? — *A.* Obtuse pain in the lumbar regions, especially on stooping; tenderness on pressure; and sometimes discharge of bloody urine.

Q. How does renal calculus, or stone in the kidney, terminate? — *A.* In the passage of the calculus through the ureter into the bladder, or in ulceration and suppuration of the kidney; and sometimes the stone is discharged through an ulcerated opening into the loins.

Q. What is the treatment proper in renal calculus? — *A.* The administration of liquor potassæ, or of the carbonates of soda or magnesia, with cupping or blistering of the loins, will sometimes be useful.

Q. What symptoms are produced by the passage of a calcu-

lus along the ureters? — *A.* Sometimes no pain is experienced; but frequently the passage of a calculus is indicated by excruciating pain shooting from the loins along the course of the ureters, accompanied with frequent desire to urinate, spasmodic retraction of the testicle, nausea, vomiting, and cold perspiration.

Q. What is the proper treatment in this affection? — *A.* The warm bath, bleeding, opiate enemata, fomentation to the abdomen, and the administration of the oil of turpentine, or of the inspissated Venice turpentine, or of the tincture of phytolacca or pokeberry.

Q. How does this affection generally terminate? — *A.* The patient is generally relieved by the stone escaping from the ureter into the bladder, but sometimes death takes place from obstruction of the ureter.

Q. How may calculous deposits exist in the bladder? — *A.* Either free, or encysted.

Q. What is meant by an encysted calculus? — *A.* One contained in a pouch or sac formed by the coats of the bladder; and seldom producing severe symptoms.

Q. What are the symptoms of stone in the bladder? — *A.* Inability to use violent exercise without pain; frequent desire to urinate, and passage of bloody urine; severe cutting or scalding pain in the urethra and glans upon urinating, for which the patient compresses the glans or elongates the prepuce; violent tenesmus, and straining to evacuate the contents of the bladder; sudden stoppage of the flow of urine, caused by the stone acting as a valve and obstructing the orifice of the urethra, and sometimes the sensation of a body rolling about in the bladder.

Q. How may the existence of a stone in the bladder be demonstrated? — *A.* By sounding, or the introduction into the bladder of a steel sound.

Q. Is it possible to dissolve a calculus in the bladder? — *A.* It is not; but the administration of alkalies will frequently prevent the increase of the calculus, and diminish the irritability of the bladder, and other painful symptoms.

Q. How may calculi be removed from the bladder? — *A.* By crushing with lithotriptic instruments, and evacuating the fragments through the urethra; or by the operation of lithotomy, or sometimes, in females, by dilating the urethra.

Q. What are the varieties of instruments now employed in lithotripsy, or the operation of breaking down a stone in the bladder? — *A.* Jacobson's instrument, in which the stone is

caught, as it were, in a loop, and crushed; and Herteloup's, in which the stone is either crushed between the blades of the instrument, or broken by percussion with a hammer.

Q. What precautions are necessary before the operations for lithotripsy or lithotomy are attempted? — *A.* The patient should be prepared by low diet and perfect rest for some time before the operation; and the existence of a stone in the bladder should be previously positively ascertained by sounding the bladder, both when full and when empty with a finger in the rectum to elevate the stone if necessary.

Q. How is the operation of lithotripsy then performed? — *A.* The bladder having been previously dilated by the patient retaining his urine, or by an injection of tepid water, the instrument is introduced into the bladder, which is carefully explored until the heel of the instrument strikes the stone; the lithotripteur is then depressed alongside of the stone, its blades expanded, and the stone caught within their grasp, when the calculus may be crushed by closing the blades of the instrument, or by percussion.

Q. What are the advantages of lithotripsy compared with lithotomy? — *A.* Where the calculus is soft, lithotripsy presents by far the greatest advantages, in skilful hands; but where the operator is unskilful, it is more dangerous than lithotomy; and in cases of very large or hard calculi, it is altogether inefficient.

Q. What are the two usual methods of performing lithotomy? — *A.* The high operation, in which the stone is removed by incisions through the parietes of the abdomen; and the lateral operation, in which the stone is removed by incisions in the perineum, through the left side of the prostate gland, and of the neck of the bladder.

Q. Under what circumstances is the high operation justifiable? — *A.* When the pelvis is too narrow, or the stone too large to allow it to be extracted through the perineum; or when the prostate gland is too much diseased to admit of the lateral operation.

Q. What precautions are necessary before performing the lateral operation of lithotomy? — *A.* The patient should be prepared by rest and restricted diet; the bowels and rectum should be emptied by purgatives and enemata; the hair should be shaved off from the perineum; and the bladder distended by compelling the patient to retain his urine for two or three hours previous to the operation.

Q. How should the patient be secured? — *A.* He should be placed upon his back on a low table, with his hips and shoulders elevated, and his pelvis resting upon the edge of the table; a roller is then fastened to each wrist, and while the patient grasps the soles of his feet, his hands and feet are securely fastened together by the rollers; and the patient's legs and thighs held firmly by assistants on each side.

Q. How is the operation then performed? — *A.* The surgeon, taking his seat in front of the patient on a low stool, introduces a staff, or sound, having a groove on its convexity, into the bladder; an assistant then holds the staff with one hand, and with the other raises the scrotum and testicles out of the way of the surgeon; an incision is then made with a scalpel, commencing opposite the under part of the arch of the pubis; and continued on the left side of the *raphe*, as far as a point midway between the tuberosity of the ischium and the anus, and dividing the skin, perineal fascia, transversus perinei muscle, the perineal branch of the internal pudic artery, and some of the fibres of the levator ani and accelerator urinæ; taking care to avoid wounding the rectum, by pressing it out of the way with a finger introduced per anum; an opening, an inch in length, should then be made through the membranous part of the urethra, cutting from below upwards into the groove of the staff; the surgeon then takes hold of the staff and depresses it, and introducing a beaked knife or cutting gorget, with its beak in the groove of the staff, carries it forward through the prostate gland into the bladder, taking care not to wound the rectum; the finger is then passed into the bladder as the knife is withdrawn, and a forceps introduced along the finger as a guide, and the stone extracted.

Q. What further treatment is required? — *A.* The hemorrhage should be arrested, and the bladder syringed to clear it of all extraneous substances; the bandages should then be removed, and the patient kept upon his left side, until the wound be healed; a very large gum catheter being interposed between the lips of the wound to allow the urine to escape, and to prevent infiltration of the cellular tissue.

Q. What are the objections to the cutting gorget generally used in this operation? — *A.* The danger of its wounding the pudic artery, or of being pushed through the bladder into the rectum.

Q. What other method of performing lithotomy has been recommended? — *A.* To cut open and extract the stone through the coats of the rectum.

Q. How may stone be extracted from the bladder of the female? — *A.* By dilating the urethra, or by incision.

Q. How should lithotomy be performed upon the female? — *A.* The patient should be secured as in operating upon the male, and a straight staff passed into the urethra, and the urethra depressed; a straight bistoury is then passed along the staff, and carried obliquely downward through the urethra and neck of the bladder; or by dilating the urethra and dividing to a short distance on each side, and again dilating until the forceps can be introduced and the stone extracted.

Q. How may calculi be removed from the urethra? — *A.* By dilating the urethra, or by the urethral forceps of Sir Astley Cooper, or by the curette of Leroy D'Etiolle.

Q. What are the symptoms of inflammation of the prostate gland? — *A.* Pain, heat, and heaviness in the rectum; difficulty of passing fæces and urine, great tenderness and enlargement of the gland detected by introducing the finger *per anum*, and great pain on the introduction of the catheter.

Q. What is the treatment proper in inflammation of the prostate? — *A.* General bleeding; leeches to the perineum, or within the rectum; opiate enemata; hip-baths; and abstinence.

Q. What condition of the lining membrane of the prostate is sometimes excited by masturbation, or excessive venereal indulgence? — *A.* A granular condition, accompanied by involuntary emissions of semen, neuralgic pains, and hypochondriac symptoms.

Q. How may this condition be removed? — *A.* By passing nitrate of silver over the granular surface, by means of Lallemand's instrument.

Q. How may chronic enlargement of the prostate be known? — *A.* By its occurring almost exclusively in old men, and by a sensation of weight in the anus, frequent and painful emission of urine, and great difficulty of passing the catheter; by the discharge of a ropy mucus; and by the tumour being felt by an examination *per anum*.

Q. What are the remedies to be employed in this disease? — *A.* Mostly palliatory; as opiate injections, hip-baths, the introduction and retention of a large gum catheter; iodine, and the iodides of mercury and potassium have also been highly recommended.

Q. What is meant by stricture of the urethra? — *A.* A partial or complete closure of the urethra from spasm of its muscles, or from thickening of its coats at some particular part, by inflammation and effusion of lymph.

Q. How should spasmodic stricture be treated? — *A.* By opiate enemata, warm bath, antimonials, and bloodletting; or if nothing else will avail, puncture of the bladder.

Q. At what part of the urethra are permanent or organic strictures generally situated? — *A.* Usually just behind its bulb, but frequently in other parts of the canal.

Q. What are the symptoms of stricture of the urethra? — *A.* A difficulty in passing the urine, which issues in drops, or in a small twisted stream; sometimes nocturnal emissions; and frequently chills and other febrile symptoms.

Q. How may the situation and extent of a stricture be ascertained? — *A.* By passing a soft wax bougie into the urethra, observing the marks made upon it by the stricture; or by exploration by means of a silver ball at the extremity of a long wire.

Q. From what causes does permanent stricture arise? — *A.* Most frequently from repeated attacks of gonorrhœa; but occasionally from blows or injuries upon the part; or from the use of astringent injections.

Q. How should incomplete closure of the urethra from stricture be treated? — *A.* By gradual dilatation with flexible or metallic bougies introduced two or three times a day for several weeks, and gradually increased in size.

Q. What caution is necessary in the passage of bougies or catheters? — *A.* Not to make use of violence, lest a false passage be formed by the point of the catheter or bougie entering one of the lacunæ.

Q. How should complete obstruction of the urethra be remedied? — *A.* A catheter should be carried down to the stricture, and the urethra divided through the strictured part by an incision in the direction of its length; and the catheter retained until the parts have united over it.

Q. What are the objections to forcing the stricture with the conical sound, or by a stilet; or to removing it by the repeated application of caustic? — *A.* The first two methods are almost sure to produce lacerations and false passages; and the latter frequently produces severe constitutional symptoms, and is rarely successful.

Q. What is fistula in perineo? — *A.* An external opening in the perineum, through which the urine passes from a rupture or ulceration of the urethra.

Q. How should fistula in perineo be treated? — *A.* A catheter should be passed into the bladder, through the urethra, to draw off the urine and allow the parts to heal; and if the fistula

be caused by obliteration of the urethra, the strictured part should be divided as before recommended; and if the parts are not disposed to heal, the application of caustic or of a blister will sometimes be successful.

Q. How should effusion of urine into the cellular tissue of the scrotum be treated? — *A.* By free incisions, and in other respects, on the same principles as fistula in perineo.

Q. What is phymosis? — *A.* An inability to retract the prepuce behind the glans penis; it being either congenital, or arising from inflammation.

Q. How may it be relieved? — *A.* By circumcision or amputation of the extremity of the prepuce; or by slitting up the prepuce by means of a bistoury and director; or by simply dividing the internal mucous membrane.

Q. What caution is necessary in operating for phymosis? — *A.* The operation should not be performed when the phymosis is complicated with chancre or gonorrhœa, lest the disease be communicated to the edges of the wound.

Q. What is paraphymosis? — *A.* A strangulation of the glans penis by the retracted prepuce, owing to inflammation, or to a phymosed prepuce being forced behind the glans.

Q. How should it be treated? — *A.* By cold washes, and antiphlogistics generally, or by slitting up the prepuce with a scissors or bistoury.

Q. What is hydrocele? — *A.* A tumour of the scrotum, caused by accumulation of fluid in the cord, or in the cavity of the tunica vaginalis.

Q. How does hydrocele of the cord generally occur? — *A.* In the form of an encysted oval tumour, situated midway between the testicle and the groin.

Q. How may hydrocele of the tunica vaginalis be known? — *A.* By its beginning at the lower part of the scrotum and gradually ascending, assuming a pyriform shape; and by its being tranlucent, elastic, and imparting a sense of fluctuation to the fingers.

Q. How may hydrocele be distinguished from sarcocele and from scrotal hernia? — *A.* By the pain, heaviness, and density in sarcocele; and by the impulse communicated to the hernial tumour by coughing.

Q. What is the treatment usually employed for the cure of hydrocele? — *A.* Evacuation of the fluid by tapping the tumour with a trocar and canula, and by injecting port wine, or a solution of tannin, in the sac.

Q. What is hematocele? — *A.* An effusion of blood into

the cavity of the tunica vaginalis, or into the cellular tissue of the scrotum.

Q. How should it be treated? — *A.* By rest in the recumbent position, astringent stimulating applications; or if putrefaction of the blood take place, by free incisions and poultices.

Q. What is orchitis, or hernia humoralis? — *A.* An inflammation of the testicle, indicated by pain and swelling of the testicle, pain in the back, and in the lower part of the abdomen; with fever, nausea, and vomiting.

Q. From what causes does orchitis arise? — *A.* From blows or other injuries, but more frequently from sudden repression of gonorrhœa.

Q. How should this complaint be treated? — *A.* By supporting the testicles; by general and local bloodletting; cold lotions; or compression of the testicle by means of strips of the emplastrum ammoniacum cum hydrargyro, or of the emplastrum belladonnæ, alone, or with iodine.

DEFORMITIES.

Q. What is strabismus? — *A.* A squinting, or obliquity of the axis of one or both eyes, from contraction of the recti muscles.

Q. What are the varieties of strabismus? — *A.* Strabismus *convergens*, in which the eye is turned inwards; and strabismus *divergens*, in which the eye is turned toward the external angle of the orbit.

Q. What are the causes of strabismus? — *A.* It sometimes is symptomatic of cerebral disease, but often proceeds from ophthalmia; or is congenital, or without any assignable cause.

Q. What is the method of treatment? — *A.* When strabismus is symptomatic of cerebral disease, nothing can be done until the disease is cured; but idiopathic strabismus may in general be readily cured by division of the contracted muscle.

Q. How is the operation performed? — *A.* The sound eye should be covered by a bandage, and one assistant steadies the head and elevates the upper lid of the patient, while another assistant depresses the lower lid, and fixes the eye by means of a double hook inserted into the substance of the sclerotic coat; the operator then pinches up a small fold of the conjunctiva at the inner or outer angle of the eye (according as the strabismus is *convergens* or *divergens*), and divides it with a knife or scissors; the ocular or sclerotic fascia should then be divided until the muscle is exposed; the muscle is then drawn

forward by means of a blunt hook passed behind it, and divided by a pair of curved scissors.

Q. What caution is necessary in this operation? — *A.* The double hook should be firmly fixed in the sclerotica, but not passed through it, lest the choroid membrane or retina be injured.

Q. Is this operation attended with much hemorrhage? — *A.* The hemorrhage is very slight, and may be restrained by the application of cold water.

Q. What is meant by rhinoplasty? — *A.* The formation of a new nose by means of a flap from the forehead.

Q. How is the operation performed? — *A.* A piece of leather should be cut into the shape required, and, by means of it, the boundaries of the flap are marked upon the forehead, with the part corresponding with the apex and alæ of the nose upward; the flap should then be dissected up from the forehead, leaving an attachment at the root of the nose of some length, to allow the flap to be twisted, so as to bring the epidermoid surface externally; the remaining edges of the former nose must then be pared down, and the flaps twisted and turned down and kept in contact with the edges of the former nose, by sutures, and little oiled lint introduced into the nostrils to support the flap.

Q. What caution is necessary in dissecting the flap from the forehead? — *A.* The incisions should be carried deeply, so as to secure an abundant vascular supply, taking care to avoid the periosteum, lest exfoliation be excited.

Q. How should the wound in the forehead be treated? — *A.* The edges should be brought together as nearly as possible, and the opening treated as an incised wound.

Q. How may a loss of the columna or of one of the alæ nasi be remedied? — *A.* By a flap, in the former case, from the upper lip, and in the latter case from the cheek.

Q. What is cheiloplasty? — *A.* Restoration of a lip which has been destroyed, by means of a flap from the cheek.

Q. How may hare-lip be remedied? — *A.* By paring away the edges and rounded corners on each side of the fissure, carefully adjusting the sides, and retaining them in contact by means of hare-lip pins and the twisted suture, until union takes place.

Q. What is staphyloraphy? — *A.* An operation for the removal of fissure of the soft palate and uvula, by paring away the edges of the fissure, bringing the sides together, and retaining them in contact by sutures passed by means of curved needles or instruments contrived for the purpose.

Q. What is torticollis? — *A.* A distortion of the neck from contraction of the sterno-cleido-mastoid muscle, or from curvature of the cervical vertebræ, or from paralysis of the muscles of one side.

Q. How may this deformity be removed? — *A.* When it arises from paralysis or from disease of the bones, there is little or no hope of a cure; but wryneck from contraction of the sterno-cleido-mastoid may be removed by section of the muscle.

Q. How is this performed? — *A.* The patient's head should be inclined towards the affected side so as to relax the contracted muscle, which should then be lifted up, together with the skin covering it, and the muscle divided at its upper or lower extremity, by a bistoury passed through a puncture in the skin.

Q. What are the causes of club-foot? — *A.* It is generally congenital, but is sometimes produced by sprains, dislocations, or other injuries.

Q. In what does it consist? — *A.* In deformity, or partial luxation of the bones of the tarsus, with contraction of some muscles and ligaments, and relaxation of others.

Q. What are the varieties of club-foot? — *A.* *Varus*, or inverted club-foot, in which the patient walks upon the outer ankle; *valgus*, or the everted form, in which the patient treads upon the internal margin of the foot; the *phalangeal* form, or *pes equinis*, in which the heel is drawn up from the ground; and the *calcaneal* form, in which the toes are drawn upwards toward the anterior surface of the leg, and the patient walks upon the heel.

Q. How should club-foot be remedied? — *A.* The foot should be gradually drawn into its natural position by appropriate machinery; or if this be impracticable, the contracted tendons should be divided subcutaneously, and the foot then placed in the machine and gradually extended.

AMPUTATION.

Q. What is amputation? — *A.* The operation of cutting off a limb, or of a projecting part of the body; as the leg, the mamma, or the penis.

Q. What are the cases requiring amputation? — *A.* Gunshot or other fractures, with extensive injury of the soft parts, or of the principal artery of a limb, or involving joints, rendering the patient's recovery improbable, unless amputation be performed;

malignant tumours, especially of the joints; chronic gangrene; or ulcers threatening to exhaust the patient by their continual drain from the system.

Q. What is the difference between *primary* or immediate, and *secondary* amputation? — *A. Primary* amputation is that which is performed soon after reaction has taken place; *secondary* amputation is that in which the operation is delayed until after suppuration has occurred.

Q. What are the cautions with regard to the time of performing amputation? — *A.* Amputation should never be performed after an injury until reaction has taken place; and the primary operation is always to be preferred to the secondary; as the neighbouring joints and soft parts may become involved in the inflammation that follows reaction.

Q. What delay is necessary if mortification has already taken place? — *A.* The operation should not be attempted until the disease is arrested; otherwise mortification of the stump will ensue.

Q. What are the two methods of amputating limbs? — *A.* The circular and the flap operation.

Q. How is the circular operation performed? — *A.* The circulation of the blood is interrupted by surrounding the limb with a tourniquet, having its pad fixed over the course of the main artery; the skin and fascia are then divided by a circular cut with the amputating knife, and afterwards dissected up for two or three inches, and turned back; the muscles are next divided down to the bone by the amputating knife, in such a way as to give the stump the form of a hollow cone; the muscles are now separated from the bone, for a short distance, by the scalpel, and drawn back by means of a retractor, or by the hands of an assistant; the bone sawed through, and the spicula removed by the bone nippers; the arteries are then to be tied, taking care to avoid inclosing the nerves in the ligature; the stump sponged with warm water to remove the coagula; the muscles and integuments must be brought together over the bone, and retained by sutures and adhesive strips; leaving the ligatures hanging out at a dependant part of the stump.

Q. What additional dressings are employed? — *A.* A square piece of linen or cotton, covered with cerate, is placed over the adhesive strips, and over this a Maltese cross, formed of linen or cotton; and the whole enveloped in a roller, and the tourniquet left loosely encircling the limb, so as to be ready in case of secondary hemorrhage.

Q. How long should the dressings remain before they are

opened? — *A.* In winter, five or six days; in summer, they should be opened, and reapplied at least every three days.*

Q. What advantages does the flap operation possess over the circular? — *A.* It is more speedily performed, less painful, and provides a better covering for the stump, so as to relieve the pressure upon the extremity of the bone; and the wound generally unites by the first intention.

Q. How does the flap operation differ from the circular? — *A.* Instead of dividing the skin and muscles successively by circular cuts, one or two flaps, according as circumstances will allow, are made either by cutting from without inwards, or more generally by taking hold of the soft parts on the anterior side of the bone, and lifting them from it, while a catling, or narrow double-edged knife, is passed horizontally through the integuments and muscles immediately above the bone, bringing out the point as low as possible, and then cutting the knife outward in such a way as to form a rounded flap anteriorly; the knife is again entered behind the bone, a little below the top of the first incision, passed through the limb horizontally, and cut out so as to form a posterior flap; the flaps should then be retracted; the muscles enveloping the bone divided; the bone sawed; the arteries tied; and the flaps brought together and retained by sutures and adhesive strips, as in the circular operation.

Q. How may the operation be varied where it is desirable to save as much blood as possible? — *A.* The limb may be elevated for some time before the operation, so as to drain the blood as much as possible; and compression should be made upon the main arterial trunk by the thumbs of an assistant, without hindering the return of the blood through the veins, and not commenced until the knife is about to be introduced.

Q. How is amputation at the shoulder-joint performed? — *A.* The subclavian artery is first compressed above the clavicle where it crosses the first rib, by means of the handle of a key covered with linen or cotton; and one or two flaps, according to circumstances, are to be made by transfixion, or by cutting from the surface toward the bone; the joint being cut through after the formation of the first flap, and the second flap then formed, the arteries secured, and the stump dressed.

Q. How is amputation of the arm or forearm performed? — *A.* In the former case by the circular or double flap operation;

* Mr. Liston never applies any compresses, rollers, or other dressings to the stump over the adhesive strips, unless suppuration takes place.

compression being made in both cases by a tourniquet (or by the thumbs of an assistant), upon the brachial artery at the inner edge of the biceps muscle.

Q. How is amputation at the wrist performed? — *A.* A semilunar incision is made through the integuments over the second row of carpal bones; this flap is then pulled back, the joint opened, and the ligaments divided, and a second longer flap made below, bringing the knife out at the palm; compression being made in the same way as in amputation of the arm.

Q. How may the fingers and thumb be amputated? — *A.* By the circular operation; or by the formation of a flap; and cutting through the joint instead of sawing through the phalanges.

Q. How is amputation performed at the hip-joint? — *A.* The patient is to be secured on a table with his hip near the edge; the femoral artery is first to be compressed where it comes out of the pelvis (either by the hands of an assistant, or by throwing a ligature around it at that place); the limb is then slightly elevated, and the catling passed through the limb in front of the bone, its point entering midway between the anterior superior spinous process of the ilium and the trochanter major, and emerging on the opposite side, two or three inches from the anus; the knife should then be carried downwards and forwards, so as to form an anterior flap four inches long; this flap should be elevated, and the capsular and round ligaments of the joint divided, depressing the thigh at the same time, so as to cause the head of the bone to start from its socket; the knife should then be passed behind the head of the bone and carried downwards and backwards, so as to make a posterior flap somewhat longer than the anterior; the arteries are then to be secured and the stump dressed as in other cases.

Q. What is the result of this operation? — *A.* The operation is in most cases fatal; and should never be performed but as a last resource.

Q. How should amputation of the thigh be performed? — *A.* By horizontal transfixion, so as to make anterior and posterior flaps when the operation is performed at the upper or middle third of the limb; and by Vermale's operation, or with lateral flaps, when amputation is in the lower third.

Q. What part of the thigh is most favourable for the performance of amputation? — *A.* A point near to, and not below, its middle.

Q. How is the leg usually amputated? — *A.* By the circular operation, or with a posterior flap; cutting through the bones,

two or three inches below the tubercle of the head of the tibia.

Q. What is the objection to leaving a long stump in amputation of the leg? — *A.* It is inconvenient from its projecting so far out behind, when bent at the knee, and is not well adapted to the patient's wearing a wooden leg.

Q. Where is the foot generally amputated? — *A.* Either by Hey's operation, at the junction of the tarsal and metatarsal bones; or by Chopart's, at the junction of the ossa calcis and cuboides, and the astragalus and scaphoides.

Q. What is the most important precaution in these amputations? — *A.* To secure flaps of sufficient size to cover the stump.

Q. What is the principal objection to the operation of Chopart? — *A.* It is generally followed by retraction of the os calcis, throwing the weight of the body upon the cicatrix and anterior ends of the bones.

Q. How may amputation of the metatarsal bones and phalanges of the toes be performed? — *A.* Upon the same principles as amputations of the metacarpal bones and phalanges of the fingers.

Q. What precaution should be observed in amputation of the metatarsal bones of the great toe? — *A.* The head of the bone should be preserved if possible, as it gives attachment to the peroneus longus.

Q. For what is amputation of the breast demanded? — *A.* For carcinoma or cancer of the part, or for very great enlargement.

Q. How is the operation performed? — *A.* By making two semicircular incisions, in a direction nearly vertical, including the diseased part between them, and meeting at their points, taking care to cut down to the pectoral muscle; the skin and cellular tissue included between the incisions should then be carefully dissected up; the surgeon compressing the arteries as they are divided, and removing any enlarged gland with its absorbents and intervening cellular tissue; the arteries are then to be secured, and the edges of the wound brought together and retained in contact by sutures, adhesive strips, and bandages.

Q. What circumstances render it inexpedient to perform this operation? — *A.* The existence of several enlarged glands in the axilla, indicating that the disease is beyond the reach of the knife.

Q. How should the penis be amputated? — *A.* The penis should be grasped in the left hand, and divided by a single cut

of the knife, while an assistant, making pressure at the root of the penis, commands the hemorrhage until the arteries are picked out and tied.

Q. What precaution is necessary during the healing of the wound? — *A.* To prevent (by the introduction of bougies), the obliteration of the orifice of the urethra.

GONORRHŒA.

Q. What is gonorrhœa? — *A.* An inflammatory discharge from the mucous membrane of the urethra, glans penis, and prepuce in men, and of the urethra and vagina in women; arising from impure connection, and capable of being communicated by contact.

Q. With what other discharges is it sometimes confounded? — *A.* With blenorrhagia, or simple mucous discharge not communicable by contact, but oftener (in women) with leucorrhœa.

Q. How may vaginal gonorrhœa be distinguished from leucorrhœa? — *A.* By many it is thought impossible to do so; but on examination with a speculum per vaginam, erosions or superficial ulcers of the mucous membrane may be generally detected in gonorrhœa.

Q. Is the matter of gonorrhœa capable of giving rise to chancre, or symptoms of constitutional syphilis? — *A.* It is not.

Q. From what has the contrary opinion arisen? — *A.* From *larvated* or hidden chancres existing in the urethra at the same time with gonorrhœa.

Q. What are the principal symptoms of gonorrhœa? — *A.* Redness of the urethra, prepuce, and glans; discharge of fluid, at first thin and white, but afterwards thicker, and yellow or greenish, and of peculiar smell; scalding pain on passing the urine; sometimes tenesmus and chordee, or painful spasmodic erection of the penis.

Q. How does gonorrhœa sometimes terminate? — *A.* When not cured, it frequently degenerates into gleet, or a scanty whitish discharge, difficult to cure.

Q. How should gonorrhœa be treated? — *A.* When acute inflammation is present, leeches and general antiphlogistic remedies should be used; and after the inflammation is subdued, or the disease has assumed the chronic form, the internal administration of cubebs, copaiba, or uva ursi; or local injections of solutions of tannin (three grains to the fluid ounce), or of acetate of lead, sulphate of zinc, nitrate of silver (one to six grains to the fluid ounce), or of iodide of iron (half a grain to the fluid ounce), will be useful.

Q. Why are astringent injections prohibited in the inflammatory stage of gonorrhœa? — *A.* From the danger of producing swelled testicle.

Q. Is mercury at all necessary or useful in this disease? — *A.* It is not.

Q. What article is highly recommended as an internal remedy in the inflammatory stage of gonorrhœa? — *A.* Copaiba, in the dose of one or two drachms.

Q. What treatment is adapted to relieve or prevent chordee? — *A.* The administration of opium and camphor, in the proportion of one grain of opium to three of camphor, or of extract of hyosciamus and camphor, in the proportion of two grains of the former to three of the latter; to be taken nightly.

Q. What affections frequently result from gonorrhœa? — *A.* Phymosis, paraphymosis, strictures of the urethra, and sometimes sympathetic (not syphilitic) buboes.

Q. What is meant by balanitic or spurious gonorrhœa? — *A.* A gonorrhœal inflammation of the glans penis.

Q. What treatment is required? — *A.* Cooling lotions, or nitrate of silver passed lightly over the inflamed surface.

Q. What treatment is required in gleet? — *A.* Astringent injections; injections of a solution of the sulphate of quinine; or the passage of large bougies into the urethra.

Q. How should sympathetic buboes be treated? — *A.* By leeching, blisters, and general antiphlogistic remedies.

SYPHILIS.

Q. How is syphilis divided? — *A.* Into three stages; primary, secondary, and tertiary.

Q. In what does primary syphilis consist? — *A.* In an affection entirely local, characterised by a simple chancre or excavated sore, with elevated vertical edges, with or without an indurated margin and base; and capable of propagation by venereal intercourse, or by inoculation.

Q. What form does chancre sometimes assume? — *A.* That of a phagedenic or spreading ulcer.

Q. Do buboes ever occur in primary syphilis? — *A.* They do, both from sympathy and from absorption.

Q. How may these two kinds of bubo be distinguished? — *A.* Bubo from absorption may be known by its being deep-seated, and by its producing a chancre by inoculation with the pus taken from it: sympathetic bubo is seated in the superficial glands, and not inclined to suppuration.

Q. What is meant by secondary syphilis? — *A.* A constitutional affection following the primary; owing to absorption of the virus into the system, and characterised by scaly, pustular, or papular eruptions upon the skin, leaving copper-coloured blotches after they are healed; mucous tubercles, venereal warts, and ulcerations of the mucous membranes of the mouth, throat, and nostrils.

Q. How may secondary syphilis be transmitted? — *A.* It is incapable of being reproduced by inoculation, and can only be transmitted hereditarily.*

Q. What are the symptoms of tertiary syphilis? — *A.* Nodes; caries of the bones; deep-seated tubercles of the brain and cellular tissue; and sometimes syphilitic rheumatism.

Q. Is tertiary syphilis capable of being propagated by inoculation, or by hereditary transmission? — *A.* It is not.

Q. When does the tertiary form of syphilis occur? — *A.* Commonly long after the disappearance of the primary symptoms, and in the majority of cases after the disappearance of the secondary symptoms, or while they are still present.

Q. What is the chief indication of treatment in the simple primary ulcer or chancre? — *A.* To change the surface of the sore as soon as possible, and prevent the constitutional affection from absorption of the virus.

Q. How is this accomplished? — *A.* When the chancre is without induration it should be gently washed with a solution of tannin (or with the aromatic wine of the French Pharmacopœia), and then covered with lint, moistened in the solution; or it may be cauterised with nitrate of silver.

Q. What effect has mercury in this form of chancre? — *A.* It is productive of no good, and often increases the tendency to ulceration and secretion.

Q. What is the proper treatment of indurated chancre? — *A.* If the suppuration be abundant, the sore should be washed with the aromatic wine, and dressed with a cerate of calomel and opium, or applications of nitrate of silver or sulphate of copper may be employed.

Q. What treatment is required by the phagedenic chancre? — *A.* The application of nitrate of silver, or of nitric or muriatic acids; or if the chancre be of a sloughing character, the aromatic wine, or strong solutions of chloride of soda or lime; if very much inflamed, mild anodyne fomentations and poul-

* According to some very high authorities, mucous tubercle is the only orm in which secondary syphilis can be transmitted hereditarily.

tices; if irritable, carrot poultices, opiate cerate, or nitrate of silver, liquor potassæ arsenitis, or nitric acid may be found useful.*

Q. How should chancre in the urethra be treated? — *A.* If the accompanying gonorrhœal inflammation be not too great, they should be cauterised with nitrate of silver, by means of Lallemand's instrument; but if the inflammation be intense, it should first be moderated by antiphlogistic treatment.

Q. How should buboes from absorption be treated? — *A.* Their development should be prevented, if possible, by the application of blisters, succeeded by a strong solution of corrosive sublimate, and other antiphlogistic applications; but after ulceration, they should be treated like chancres.

Q. What is the general treatment required in secondary syphilis? — *A.* It consists in tonics, diaphoretics, baths, and general alteratives, particularly the iodide of potassium; sarsaparilla, and some recommend mercury in the form of protoiodide, particularly in the scaly form of eruption.

Q. What treatment is adapted to mucous tubercles and venereal warts? — *A.* They should be washed with pure chloride of soda (if they are not ulcerated, or if in that condition, with a solution just strong enough to be felt), and afterwards sprinkled over with calomel, or burnt out by a caustic, consisting of Hydrarg. nit. ʒj. and Acid. nitric, ʒj. applied gently to the part, and not allowed to run upon the neighbouring parts.

Q. How should ulcerations of the mucous membranes be treated? — *A.* By the application of caustics or strong astringents.

Q. What is the constitutional treatment in tertiary syphilis? — *A.* The only remedy to be relied on is the iodide of potassium.

Q. How should nodes be treated? — *A.* The pain may be mitigated by the application of extract of conium; and the nodes themselves removed by the repeated application of blisters; or by incisions over them, followed by the application of a blister.

Q. In what way may the symptoms of secondary and tertiary syphilis be imitated? — *A.* By the poisonous effects of long continued mercurial treatment.

* The aromatic wine consists of four ounces of aromatic herbs, viz.; origanum, salvia or sage, thyme, hissop, water mint (mentha hirsuta), and wormwood, digested in two pints of red wine for eight days. The opiate cerate consists of a fluid ounce of the vinum opii, to a pound of simple cerate.

CARCINOMA, OR CANCER.

Q. What is cancer? — *A.* A malignant disease affecting the eye, the lip, the mamma, the testicle, the ovaries, or the uterus; generally attacking old or middle aged persons; sometimes remaining dormant a long time, but eventually terminating (if not removed) in death.

Q. How may cancer be known? — *A.* By the gnawing character of the pain; by the puckering of the skin over the tumour, which is first indurated, and extends itself in the form of ramifications, and afterwards forms cysts, and finally ulcerates, and protrudes in the shape of a fungous, encysted tumour, discharging a fetid matter.

Q. How may this disease be removed? — *A.* Only by carefully dissecting out the whole of the part affected.

Q. What danger is to be apprehended from the use of the arsenical preparations sometimes recommended? — *A.* Fatal poisoning from absorption of the arsenic.

Q. What caution is requisite in removing a cancerous or otherwise diseased testicle? — *A.* Not to divide the cord by a single incision, but by a series of cuts; tying each artery as it is divided, lest the cord shrink within the abdomen before the hemorrhage is arrested.

FUNGUS HEMATODES.

Q. What is the character of fungus hematodes? — *A.* It is a malignant tumour, attacking any part of the body; sometimes remaining for a long time stationary, elastic, and imparting a deceptive sense of fluctuation to the touch; increasing with great rapidity, when in a state of activity, and finally ulcerating through the skin in the form of a dark red fungus, extremely vascular, and bleeding profusely when cut, or sometimes spontaneously.

Q. What treatment is proper in this disease? — *A.* The only hope of removing the disease lies in the amputation of the limb on which the tumour is situated; and even this very frequently is unsuccessful, from the return of the disease.

PART III.

PRACTICE OF MEDICINE.

FEVER.

Q. What do you understand by a fever? — *A.* A state of the system following languor, weakness, and defective appetite, with acceleration of the pulse, increased heat, great debility of limbs, and disturbance of most of the functions; with or without primary local disease.

Q. How may fevers be divided? — *A.* Into primary and secondary.

Q. What do you mean by a primary fever? — *A.* One where the local disease is consequent upon the fever.

Q. What do you mean by a secondary fever? — *A.* Where the fever is consequent upon local disease.

Q. How do you divide primary fevers? — *A.* Into intermittent, remittent and continued, eruptive and arthritic.

Q. What do you understand by an intermittent fever? — *A.* A succession of periodical paroxysms of fever, each paroxysm commencing with chills, and terminating in free perspiration, with protracted intervals of perfect freedom from fever.

Q. How are intermittents generally divided? — *A.* Into quotidians, or paroxysms every day; tertians, or paroxysms every other day; quartans, or paroxysms every fourth day; quintans, or paroxysms every fifth day,

Q. Are there any modifications of intermittents? — *A.* Yes; all these types may be doubled, &c.

Q. What are some of the premonitory symptoms of an intermittent? — *A.* Great lassitude, frequent yawning and stretching, uncomfortable weariness of the whole body, and aching in the loins and extremities.

Q. How long does this state generally last? — *A.* From two to ten days, when the characteristic paroxysms show themselves.

Q. How is each paroxysm divided? — *A.* Into three marked stages, viz., the cold, the hot, and the sweating.

Q. What are the characteristics of the cold stage? — *A.* A sense of chilliness, with feelings of languor, cold hands and

feet; with chilliness down the back; accompanied with headache and a bluish tint to the nails.

Q. What is the position of the patient? — *A.* That of an individual suffering from ordinary cold, sitting crowded upon himself.

Q. What is the state of the mind? — *A.* Ideas crowd rapidly upon the mind, but the attention is with difficulty fixed.

Q. What is the state of the præcordia? — *A.* Much oppression exists about it.

Q. How is the appetite? — *A.* Squeamish.

Q. What is the condition of the pulse? — *A.* It loses its activity and size, becoming small, contracted, frequent, and firm.

Q. What is the state of the countenance? — *A.* Parched, the features shrunk, eye dull and hollow, and cheeks livid and collapsed.

Q. How is the respiration? — *A.* Hurried, anxious, and oppressed.

Q. Are there any in whom drowsiness, if not deep coma, exists? — *A.* Yes; in those of debilitated constitution, especially if there is any tendency to plethora.

Q. What is the condition of the urine and fæces? — *A.* The urine is copious, clear, colourless, and does not deposit a sediment on cooling; the fæces are dark and bilious.

Q. How long does this stage generally last? — *A.* From half an hour to four hours.

Q. Does this stage of fever ever remain without reaction? — *A.* Yes; and then the patient is in imminent danger.

Q. When does the hot stage take place? — *A.* It immediately follows the cold, without any distinct interval.

Q. What is the state of the countenance? — *A.* Flushed and turgid.

Q. How is the surface of the body? — *A.* Dry, and the temperature is raised much above the natural standard, 105° to 110°.

Q. What is the state of the mouth? — *A.* Dry and parched, and the thirst great.

Q. How is the pulse? — *A.* Full, strong, and free.

Q. How is the respiration? — *A.* Hurried and oppressed.

Q. What is the state of the urine? — *A.* Scanty and high coloured, and does not deposit a sediment.

Q. Does the patient ever refer to any particular part as more painful? — *A.* Yes; sometimes to his head, thorax, left hypochondrium, and extremities.

Q. Does delirium ever supervene? — *A.* Yes; sometimes just before the commencement of the succeeding stage.

Q. How long does the hot stage last? — *A.* From three to twelve hours.

Q. What is the next stage? — *A.* The sweating stage.

Q. Where does the sweat appear first? — *A.* Upon the forehead, breast, arms, and legs.

Q. How is the pulse? — *A.* Full, but without harshness and frequency.

Q. How is the respiration? — *A.* Free and natural.

Q. What is now the state of the excretions? — *A.* The urine is still high-coloured, but deposits a lateritious sediment; the bowels are more easily acted upon.

Q. Do the other symptoms abate? — *A.* Yes.

Q. How long does the sweating stage continue? — *A.* From three to four hours.

Q. What is now the condition of the patient? — *A.* He is enabled frequently to return to his duties, though a feeling of lassitude and weakness still exists.

Q. What is the interval between the paroxysms called? — *A.* Apyrexia, or intermission.

Q. Is he now free from disease? — *A.* No; his countenance is sickly, and the mental and bodily powers are excited with difficulty.

Q. How is the appetite? — *A.* It is bad, and his digestion is carried on indifferently.

Q. What is the first variety of intermittent fever? — *A.* The quotidian.

Q. What is its chief characteristic? — *A.* By the intermission occurring every twenty-four hours.

Q. What is the peculiarity of this type? — *A.* The intermission being short and the paroxysm long.

Q. When do the paroxysms occur? — *A.* Generally in the morning.

Q. How is a paroxysm of quotidian ushered in? — *A.* By slight chilliness, and considerable gastric derangement.

Q. How is the pulse? — *A.* Irregular and weak.

Q. How long does this stage last? — *A.* Three hours.

Q. How is the hot stage characterised? — *A.* By thirst and general warmth, rather than great heat.

Q. How is the pulse? — *A.* It is quick, but not hard.

Q. How long does this stage last? — *A.* For two hours or more, and then a slight perspiration supervenes.

Q. How long does the paroxysm last? — *A.* From ten to twelve hours.

Q. How long does the intermission last? — *A.* From twelve to fourteen hours, but in bad cases not more than six.

Q. By what circumstances is the continuance of this form of quotidian fever modified? — *A.* By age, constitution, and season of the year.

Q. What seasons of the year are the worst for it? — *A.* The fall and winter.

Q. What habits are bad for it? — *A.* Those of weak and lax fibre.

Q. Does one paroxysm ever run into another? — *A.* Yes.

Q. What is an anticipating quotidian? — *A.* One where the paroxysm sets in two hours or more before the usual time.

Q. What is a retarding quotidian? — *A.* It is the counterpart of the anticipating.

Q. What is the next variety? — *A.* The tertian.

Q. By what is it characterised? — *A.* By the paroxysm commencing every forty-eight hours, and by its being the most frequent variety of all the types.

Q. When do the paroxysms begin? — *A.* Generally about noon, and lasts on an average about six hours.

Q. What are some of the premonitory symptoms? — *A.* An overwhelming languor, continued yawning, creeping sensation over the surface, coldness down the back, and the rigor is very intense.

Q. Are the general and lumbar pains very great? — *A.* Yes.

Q. Is there much nausea? — *A.* Yes.

Q. How long does this stage last? — *A.* Not more than an hour.

Q. How long does the hot stage last? — *A.* It is disproportionately long; it may continue for three hours.

Q. Are there any symptoms peculiar to this stage, and differing from that of other agues? — *A.* No.

Q. Is the apyrexia marked by any unpleasant symptoms? — *A.* Yes; there is much weakness and loss of appetite.

Q. Which is the least dangerous of the several types? — *A.* The tertian.

Q. For how many paroxysms does it generally continue? — *A.* For four or five.

Q. Is this form ever complicated with any chronic diseases? — *A.* Yes; those of the stomach, liver, and spleen.

Q. What are some of the irregularities of this type? — *A.* They become double, and sometimes triple tertians.

Q. What is a double tertian? — *A.* One in which the paroxysm takes place daily, so that two fits and two intermissions occur in the forty-eight hours.

Q. What does double tertian similate? — *A.* The quotidian.

Q. In what does it differ? — *A.* By the paroxysm not occuring in the morning, but more particularly in the alternate ones being similar, while those which follow each other are not so.

Q. What are some of the irregularities of the double tertian? — *A.* The cold stage is simply a rigor, and then after an hour or two great heat follows, and continues for an uncertain number of hours.

Q. What is the condition of the irregular paroxysm? — *A.* The termination is more confused and incomplete than the severe paroxysm of the previous or following day.

Q. At the completion of the fit are there any distressing symptoms remaining? — *A.* Yes; acute pain in the chest and stomach, diarrhœa, and partial suppression of urine.

Q. Are there any peculiar symptoms in the hot stage? — *A.* Yes; palpitations of the heart, cough, and vomiting, and hemorrhage from the nose.

Q. Do many of the symptoms remain after the completion of the paroxysm? — *A.* Yes; and thereby create much confusion in the course of the disease.

Q. What are the durations of the paroxysms? — *A.* They are very uncertain, having lasted in some instances from ten to twenty hours without any solution.

Q. What is a triple tertian? — *A.* One where there are three paroxysms and three intermissions in forty-eight hours.

Q. What is a quartan ague? — *A.* Where an intermission commences every seventy-two hours.

Q. How long does the paroxysm last? — *A.* From five to nine hours, and commences generally between 5 and 2 P.M.

Q. Are there any circumstances peculiar to this type? — *A.* No; except the cold stage lasting from two to three hours.

Q. When does this variety usually occur? — *A.* In the autumn.

Q. Who are most liable to it? — *A.* The old and melancholic.

Q. Is it difficult of cure? — *A.* Yes; the most difficult of all the types.

Q. Is it often fatal? — *A.* No.

Q. What are the varieties of this type? — *A.* Double quartans, triple quartans, and the duplicated quartan.

Q. Do these differ in their general characters from the same varieties of tertian? — *A.* No.

Q. What are the cold, burning, and sweating agues? — *A.* Deviations from the autumnal tertian.

Q. Are these varieties attended by much danger? — *A.* Yes.

Q. What are complicated agues? — *A.* Where one type is converted into another.

Q. What are the modifications of intermittent fever? — *A.* 1, The inflammatory; 2, the congestive; 3, the malignant.

Q. What are the characteristics of inflammatory intermittent? — *A.* By the intermissions not being free from febrile symptoms.

Q. What are the characters of the rigors? — *A.* They are strong and attended with vomiting, and the paroxysms are protracted.

Q. Which types of the disease are more likely to assume this character? — *A.* The quotidians and tertians.

Q. What are the peculiar characteristics of the congestive varieties? — *A.* A very protracted cold stage; great vertigo; deep pain in the head, followed by slight rigor.

Q. How is the pulse? — *A.* Small and weak.

Q. How is the hot stage? — *A.* Badly developed, and the system is oppressed during its whole course.

Q. Is the sweating stage well developed? — *A.* No.

Q. How is the countenance during the intermission? — *A.* Pale and contracted.

Q. How is the surface of the body? — *A.* It is colder than usual.

Q. How does the interior of the body feel to the patient? — *A.* Very hot.

Q. Does this form of ague frequently occur? — *A.* No.

Q. Who are most liable to it? — *A.* Persons of debilitated habit of body.

Q. Is it very fatal? — *A.* Yes.

Q. Where are malignant intermittents most frequently found? — *A.* In hot climates.

Q. What persons are more liable to them? — *A.* Those of broken down constitutions.

Q. How are they characterised? — *A.* After the second, third, or fourth paroxysm, the cold stage is either shorter and intense, or else much prolonged.

Q. During the hot stage is there anything peculiar? — *A.* Yes; instead of the usual phenomena, urgent symptoms of a very deleterious character appear.

Q. What is the character of the perspiration? — *A.* Fœtid.

Q. What are some of the other symptoms? — *A.* Colliquative hemorrhage and petechiæ.

Q. After which paroxysm does death generally supervene? — *A.* The third.

Q. What are some of the complications of intermittent fever? — *A.* Gastric, cerebral, pulmonary, cardiac, splenic, icteric, &c.

Q. Which is the most frequent? — *A.* Gastric.

Q. What are the symptoms?—*A.* Those of intense gastritis.

Q. How is the pulse? — *A.* Quick and small, and sometimes scarcely perceptible.

Q. When do these symptoms supervene? — *A.* After a short shivering fit, at the commencement of the hot stage.

Q. When the liver partakes in the morbid action, what is the character of the discharges? — *A.* Those of broken down flesh, or dark blood partly coagulated.

Q. What is the general condition of the patient? — *A.* The prostration is extreme and dangerous.

Q. What are the peculiarities of the cerebral complication? — *A.* Lancinating pain is felt in the frontal region, with impaired vision, and great sensibility to light, and, in short, those of meningitis.

Q. When does coma supervene? — *A.* At the end of the cold and the beginning of the hot stage.

Q. How is the pulse? — *A.* Variable.

Q. How is the countenance? — *A.* Death-like.

Q. Do the other symptoms differ in any marked degree from those of other cerebral affections? — *A.* No.

Q. When there is pulmonary complication what are the signs? — *A.* Intense pain in the chest during the paroxysm.

Q. Do the symptoms differ in any marked degree from those of ordinary pectoral affections? — *A.* No.

Q. Is this a dangerous complication? — *A.* Yes.

Q. When there is asthma coexisting, in what lies the danger? — *A.* In suffocation.

Q. When there is cardiac complication is there anything peculiar? — *A.* Nothing but the usual signs of functional or organic disease.

Q. What change takes place in the spleen? — *A.* It becomes enlarged, and bears the name of *ague cake.*

Q. Is there anything peculiar to the other visceral complications? — *A.* No.

Q. Are the nerves ever affected? — *A.* Yes; the *tic douloureux* often takes on a periodical character, and the other neuralgias are similarly influenced.

Q. Is the diagnosis in intermittent fever difficult? — *A.* No.

Q. With what diseases may it be confounded? — *A.* With remittent and hectic fever.

Q. How does it differ from the remittent? — *A.* In remittent fever the apyrexia is never complete, or the cold and sweating stages decided.

Q. How does it differ from the hectic? — *A.* In the hectic accession taking place daily and in the afternoon, and the pulse continuing small and rapid during the intermission.

Q. What is the prognosis in intermittent fever? — *A.* In temperate climates the prognosis is favourable; in hot latitudes, however, it sometimes assumes a highly unfavourable character.

Q. When death does take place, however, in the milder state, during what stage does it generally occur? — *A.* The cold.

Q. What are the symptoms? — *A.* Those of congestion.

Q. In what class of persons is death most liable to occur? — *A.* In the feeble, nervous, and depraved.

Q. What variety of intermittents are the most difficult to cure? — *A.* Those of irregular type and phenomena.

Q. Which are the more favourable, postponing or anticipating agues? — *A.* Postponing.

Q. What are some of the favourable indications in intermittents? — *A.* Scabby and humid eruptions about the mouth, and reappearance of suppressed discharges.

Q. What are some of the unfavourable signs? — *A.* Indigestion, delirium, difficult and oppressed breathing, with sighing and singultus, bloody urine, colliquative diarrhœa, &c.

Q. Which of the types are more susceptible of cure? — *A.* Tertians and quotidians.

Q. Do intermittents ever change to remittents? — *A.* Yes.

Q. How do intermittents generally terminate? — *A.* Quotidians appear to complete their course when they are not embarrassed in any way by the seventh day, tertians on the fourteenth, and quartans generally run to the sixth week.

Q. Are autumnal intermittents ever superseded by vernal? — *A.* Yes.

Q. Do they ever terminate unfavourably? — *A.* Yes; when some organ is prominently affected, and thereby deranges the general health of the patient.

Q. When does death generally ensue? — *A.* When the severity of the general disease overwhelms the vital powers, or when these are worn out by the effects of some local lesion.

Anatomical Characters. — *Q.* Do pathological investigations throw any light upon the essence of intermittent fever? — *A.* No.

Q. In cases of some standing, are not the internal organs

affected? — *A.* Yes; we find the brain, its arachnoid membrane and substance implicated; we have also gastro-enteritis, gastritis, the spleen softened and enlarged, hypertrophied and indurated, and ruptured; liver softened; gall-bladder affected.

Q. Are the thoracic organs ever affected? — *A.* Yes; we sometimes have pericarditis, pneumonitis, &c.

Q. What is the most plausible theory of the cause of intermittents? — *A.* That the vitiated fluids influence the nervous system.

Q. Are we acquainted with the laws that regulate the periodical recurrence of ague? — *A.* No.

Q. Which are the organs more frequently affected? — *A.* The liver and spleen.

Q. Does age have any influence upon the type of the disease? — *A.* Yes; the quotidian is generally in early life or advanced age; the tertian in adult; and the quartans in the adult and aged.

Q. Does sex have any influence? — *A.* Very slight.

Q. Does climate have any influence? — *A.* Yes; there being a marked difference between the agues of hot and cold climates.

Q. Does season have any influence? — *A.* Yes; the autumnal intermittents are more resisting than the vernal.

Q. What are the exciting causes of this disease? — *A.* Marsh miasm, or paludal exhalation, have generally been conceded as the cause, but these have lately been doubted.

Q. Are there any other causes? — *A.* Worms, intestinal irritation, fright, suppressed catamenia, &c.

Treatment. — *Q.* What is the first thing that should be attended to in the treatment? — *A.* The removal of the patient from malarious influence.

Q. How do you divide the treatment? — *A.* That necessary during the paroxysm, and that during the interval, and that proper to the sequelæ.

Q. Is there as a general rule anything necessary to be done during the paroxysm? — *A.* No.

Q. If, however, the cold stage should be too long or violent, what should be done? — *A.* Administer warm diluent drinks; warmth to the external surface: and sometimes opium quiets the pain and the convulsive shaking.

Q. What are the remedies which have been given to curtail the cold stage? — *A.* Emetics and opiates; bleeding has also been recommended in cases where the constitution was vigorous, tourniquets around the extremities, &c.

Q. When the hot stage arrives, how would you treat your patient? — *A.* Let the clothing be light, apartments cool, body sponged, and acidulated drinks administered.

Q. Should there be symptoms of organic disease supervening, would there be any necessity for more decided treatment? — *A.* Yes; abstraction of blood locally, by leeches or cups, or general bloodletting may be resorted to, &c.

Q. When the hot stage has subsided, what is necessary to be done? — *A.* Favour the sweating stage by the usual means.

Q. If, however, this stage should weaken the patient, what should you do? — *A.* Dry sponge the body, and replace the wet by dry clothes, and administer a gentle cordial.

Q. What is necessary to be done in the decidedly inflammatory type? — *A.* Venesection, purging, and the general plan of treatment proper in continued fever, regarding the type of the disease, and the intensity of any local affection.

Q. Should there exist any gastric symptoms how would you treat them? — *A.* By leeches, mild aperients, sinapisms, effervescing mixture, and opium combined with aromatics.

Q. If the ague is complicated with dysenteric symptoms, what must be done? — *A.* If the stools are bloody or slimy, with tormina, opiates and mild aperients will be proper, and it may be necessary to take blood from the arm, or locally, or warm fomentations may be used.

Q. In the congestive or malignant variety, can we ever wait to prepare the system? — *A.* No; but must immediately resort to tonics and stimulants.

Q. What should be given in the cold stage? — *A.* Bark, hot negus and laudanum, and hot drinks to bring on reaction.

Q. What is proper in the hot stage? — *A.* Diaphoretics and antispasmodics, the warm bath, &c.

Q. What should be done in the sweating stage? — *A.* It should be promoted by opium in combination with other diaphoretics.

Q. If there is much debility, what should be done? — *A.* Give stimulants, as camphor and ammonia, &c.

Q. What should be done during the intermission of the paroxysms? — *A.* The most strenuous means to prevent the recurrence of the paroxysm should be used.

Q. What are the indications during an intermission of any of the types? — *A.* To cleanse the system, and correct any coexisting organic disease.

Q. What are some of the remedies? — *A.* Emetics, as tart.

ant. et potas., Fowler's mineral solution, zinci sulph., absinthium, acetate and citrate of ammonia, salicene, &c.

Q. What, however, are the most decided remedies? — *A.* *Cinchona and its preparations.*

Q. Which is the best preparation? — *A.* The sulphate of quinia.

Q. Is there any determined mode of giving the sulphate? — *A.* No; practitioners generally suit their own predilections.

Q. In malignant intermittents must the quinia be largely administered? — *A.* Yes; and in frequent doses.

Q. Is there any unpleasant consequence from the administration of quinia in too large doses? — *A.* Yes; there are sometimes violent cerebral symptoms.

Q. What are some of the sequelæ of this fever? — *A.* Œdema of the feet and legs, enlargement of the liver and spleen, jaundice, dropsy, general cachexia, and dysentery.

Q. What are some of the remedies best adapted to this state of things? — *A.* Local depletion, mercurialization; and mineral acids and tonics in general cachexia.

Q. What would you do in enlargement of the spleen? — *A.* Administer quinia and iron, and sometimes some of the preparations of iodine.

Q. In dropsy, what is necessary? — *A.* Cure the original seat of the disease and cause of the dropsy.

Q. In cases of relapse, what is sometimes necessary to be done? — *A.* To produce gentle ptyalism and guard the patient from all exciting causes.

REMITTENT FEVER.

Q. What do you mean by a remittent fever? — *A.* It is that form of fever in which there are regular exacerbations and remissions of the paroxysm in the twenty-four hours.

Q. What place does this fever occupy? — *A.* A middle ground between the intermittent and continued.

Q. Do the symptoms of the forming stage of remittent fever differ in any marked degree from those in intermittent fever? — *A.* No.

Q. Are there any peculiar symptoms? — *A.* There is great sensation of weight, languor, aching in the head, back, and extremities; the bowels are inactive and mixed with bile; with an unpleasant metallic taste in the mouth; skin sallow, &c.

Q. When the disease is fully established, what do you find? — *A.* Aggravation of all the preceding symptoms, tenderness

of the epigastrium and right hypochondrium, the surface of the body is dry and above the natural standard of heat.

Q. What are the general symptoms? — *A.* A flushed and excited system, the eye is slightly tinged and restless, the pulse is frequent, small and irregular, and then full and forcible.

Q. What is the condition of the mouth and fauces? — *A.* Dry and clammy; the tongue furred, white, and sometimes brown.

Q. Is the respiration affected? — *A.* Yes; it is hurried and oppressed.

Q. Is the stomach affected? — *A.* Yes; there is nausea, and sometimes vomiting of bilious matter.

Q. What is the state of the excretions? — *A.* Those from the bowels are black and green, while the urine is scanty and tinged with bile.

Q. How long do these symptoms continue? — *A.* From five to ten hours.

Q. What then usually happens? — *A.* A gentle perspiration breaks out, with a decline of all the previous symptoms.

Q. Do these symptoms entirely subside? — *A.* No; the skin is still preternaturally warm, and the pulse irritated.

Q. How long does the remission generally last? — *A.* From two to four hours, when another paroxysm arises of equal or greater intensity, and thus continues till either convalescence or death ensues.

Q. Does this fever ever put on a very serious aspect? — *A.* Yes; there is a great diversity in its general characteristics, happening in various situations.

Q. What form does it generally assume in the intertropical climates and places where it is endemial? — *A.* A most fatal and violent one.

Q. What form does the mild remittent generally assume? — *A.* The double tertian or quotidian, but the exacerbations are more severe on alternate days.

Q. Should a mild remittent continue longer than the ninth or twelfth day, and the remissions become obscure, and the patient being now better, what would you prognosticate? *A.* — That its mild character was about changing to that of a more dangerous one.

Q. What are the marks of increased aggravation? — *A.* The tongue is more loaded and brown, and dry along the middle; delirium is more conspicuous; the skin is deeply tinged with yellow, and great heat during exacerbation; debility greater; bowels filled with gas and tender; retention of urine; morbid vigilance, &c.

Q. When remittents attack a patient suddenly and vehe-

mently, what are we to prognosticate? — *A.* A highly dangerous form of the disease.

Q. When the second paroxysm shows itself, what is its general nature? — *A.* More violent than the first, either tending to high inflammation or decided depression.

Q. After these bad symptoms, may a patient still recover? — *A.* Yes.

Q. What are some of the fatal signs? — *A.* Scarce any remission, with bloody exudation from the gums and fauces, hemorrhage from nose and bowels, great jactitation, subsultus, picking of bed clothes, and all the more malignant signs.

Q. When does death generally supervene? — *A.* From the fourth to the eighth day.

Q. What are the characteristics of the malignant variety? — *A.* It generally commences with feelings of feebleness and languor, general collapse of the vital powers, and great depression of the circulation.

Q. What then follows? — *A.* Reaction, with great pain over the eyebrows, feeling as if the skull was girt with a cord; the skin is dry and hot, and harsh.

Q. How is the countenance? — *A.* Flushed and purple, with appearance of collapse, and great pain.

Q. How is the tongue? — *A.* Clammy, and coated with yellowish fur, sometimes rough and dry, and brown.

Q. How long does this state generally continue? — *A.* Twelve hours.

Q. How long does the remission last? — *A.* Generally from five to six hours.

Q. What are now the symptoms? — *A.* Great increase of bad signs, the temperature is unequal, some parts being warm, others being cold and clammy; the eyes are glassy and sunken; blisters will not draw; breathing hurried; teeth covered with sordes; nausea.

Q. What is the next step in the disease? — *A.* Another remission; and then exacerbation, with increase of all the previous bad symptoms; and also new symptoms still more malignant occurring.

Q. Mention some of them. — *A.* Great subsultus, vibices, petechiæ, bloody discharges from all the mucous surfaces, intermitting pulse, &c.

Q. What are some of the complications of this disease? — *A.* Disorders of the liver, alimentary canal, and brain, &c.

Q. What are the symptoms of these complications? — *A.* Those of these affections when existing alone.

Q. How may this fever terminate? — *A.* By perfect recovery, or conversion into intermittent fever, or death by syncope, convulsion, or exhaustion.

Q. When does convalescence usually commence? — *A.* From the fifth to the eleventh day.

Q. What are some of the critical discharges? — *A.* Perspiration, bilious discharges, and by vesicular and pustular eruptions.

Q. When does the disease gradually abate? — *A.* From the seventh, fourteenth, and twenty-first days.

Q. When remittent fever changes to intermittent, after which paroxysm does it usually happen? — *A.* The third or seventh.

Q. What are the general *pathological characters* of remittent fever? — *A.* They are various; but the stomach, liver and brain, seem to be the most affected.

Q. What are some of the more particular marks of it? — *A.* Gastro-enterite, with slight dothinenterité; a flabby state of the liver, and of a bronze colour, and the spleen enlarged and softened; these are the main appearances.

Q. What are the causes of this fever? — *A.* The same in general as those of intermittent.

Q. Who are those most liable to it? — *A.* The same class as those of intermittents.

Q. What are the indications to be fulfilled in the treatment of this fever? — *A.* To moderate febrile action, to remove acrid and irritating matters from the prima viæ, and to obviate gastro-intestinal irritation, and restore healthy function.

Q. How would you answer the first of these indications? — *A.* By bloodletting, in decidedly marked cases; also by gentle emetics and diaphoretics.

Q. Would you, in every case of remittent fever, resort to the lancet? — *A.* No; not in the very mild varieties, or in those of decided prostration.

Q. How would you answer the second indication? — *A.* By gentle but efficient cathartics.

Q. Which are the best? — *A.* Hyd. c. mit. and col. comp. ex. in combination, and their action kept up by ol. ricini, magnes. ust., &c.

Q. How would you fulfil the third indication? — *A.* By topical depletion, sinapisms, vesicatories, demulcents, &c.

Q. How would you restore healthy function? — *A.* By alterative doses of mercury, catharcism, mild enema, cold drinks, mild diaphoretics, &c.

Q. If it is necessary, how would you bring the system speedi-

ly under the action of mercury? — *A.* By large and frequent doses.

Q. Which are the best articles to be used in great gastric irritability? — *A.* Mucilages, as gum acac., and iced acidulated drinks, and sometimes by letting the stomach rest; lime water and milk is very beneficial.

Q. How would you induce diaphoresis? — *A.* By using the liq. am. acet., mist. neut., aided by tepid and cool sponging.

Q. Should the disease seem to localise itself, what must be done? — *A.* Direct our attention and remedies to the organ particularly affected.

Q. What must be done should the fever run to malignancy? — *A.* General and local stimulation must be used; and sometimes the bark and its preparations must be resorted to.

Q. Should the diet of the patient be regulated? — *A.* Yes; great care must be paid to it; the mild and nutritive varieties are the best.

Q. During convalescence what is necessary? — *A.* Administer mild tonics, as infusions of gentian, colombo; regulate the bowels, and keep the diet simple and mild.

YELLOW FEVER.

Q. Why has this disease been termed yellow fever? — *A.* From the peculiar tinge of the surface of the body during its continuance.

Q. What are the characteristics of this fever in regard to violence? — *A.* It is very variable; sometimes being very severe, at others, again, assuming a mild form.

Q. Where does this fever prevail? — *A.* At certain seasons of the year in the West Indies, Spanish America, East Indies, coast of the Mediterranean; and in the United States, at different ports where it has been brought.

Q. What are the symptoms of yellow fever? — *A.* The attack is not always preceded by well-marked symptoms, though the disease generally commences with a sense of giddiness and pain in the back, loins, and extremities, and all the natural powers are depressed and spirits broken, without any apparent cause.

Q. How has this fever been divided? — *A.* Into three varieties; the fatal, severe, and mild.

Q. What are the peculiarities of the fatal cases? — *A.* Intense headache, accompanied with chills, shivering, pain in the limbs, back, &c.

Q. Is the heat very intense? — *A.* Not very; and is succeeded by chills, and followed by gentle perspiration.

Q. What is the condition of the countenance? — *A.* Red, animated, and sometimes swollen.

Q. How are the eyes? — *A.* Red, glistening, suffused, and smarting.

Q. What is the condition of the appetite? — *A.* The appetite is gone, and the thirst is intense.

Q. What is the state of the epigastrium? — *A.* Pain usually supervenes in fifteen or twenty hours from the onset of the disease, but it is inconsiderable.

Q. Is there nausea or vomiting? — *A.* Yes; in some cases.

Q. Are the evacuations from the bowels frequent? — *A.* No.

Q. What is the condition of the abdomen? — *A.* Soft, and not painful, except at the epigastrium.

Q. Is there much restlessness? — *A.* Yes; and sometimes great jactitation.

Q. On what day does delirium generally supervene? — *A.* Upon the last day of life.

Q. Is there much stupor or prostration? — *A.* No; excepting in a few instances.

Q. How is the pulse? — *A.* Moderately accelerated, regular, and generally bearing a relation to the heat of the surface.

Q. What is the state of the skin? — *A.* That of the chest is injected, but it gradually diminishes towards the middle of the disease, and new symptoms arise.

Q. What succeeds to the injection of the integuments of the chest? — *A.* A slight yellow tint of the part, and also of the eyes.

Q. What is the condition of the matter vomited? — *A.* From being yellow, it becomes black and brown.

Q. What is the condition of the evacuations? — *A.* Blackish in colour.

Q. What is the general condition of the patient at this time? — *A.* Uneasy feelings and great anxiety exists, the strength is diminished, the temperature of the body falls, so that the limbs are sometimes absolutely cold.

Q. What is the condition of the urine? — *A.* Sometimes suppressed.

Q. Are there ever in fatal cases symptoms of great mildness? — *A.* Yes; sometimes the patient dies, as it were, on foot, and without taking to his bed.

Q. In the second variety, or the severe cases, how do the symptoms vary from the last variety? — *A.* Only in degree.

Q. What is the condition of the stools in these cases? — *A.* Black.

Q. What is the condition of the matter vomited? — *A.* Brown or black, especially in children.

Q. Is there as much jactitation as before? — *A.* No.

Q. On what day do the symptoms abate? — *A.* On the fifth.

Q. In the last or mild variety how does the case commence? — *A.* With the preceding symptoms vastly modified.

Q. Is the diagnosis of yellow fever difficult? — *A.* No, not if it is epidemic; and also when we have present great irritability of the stomach, black vomit, and yellowness of the skin.

Q. Is there much difficulty of diagnosis in mild cases? — *A.* Yes; it sometimes resembles nothing more than mere continued fever.

Q. What is the ordinary duration of this fever? — *A.* From five to seven days.

Q. Should the patient pass the sixth day without the black vomit, what would be the prognosis? — *A.* Favourable.

Q. Are relapses uncommon? — *A.* No.

Q. Is the black vomit an equally unfavourable sign in adults and children? — *A.* No; in children it may happen and they not unfrequently recover.

Q. What are the causes of this fever? — *A.* A union of local emanations favoured by an inquinated atmosphere; or, in other words, it is an endemico-epidemic.

Q. What is the precise nature of these emanations? — *A.* We do not know.

Q. Is this disease contagious? — *A.* Great difference of opinion prevails on this point, but the majority of writers think that *it is not.*

Q. What are the pathological conditions of this disease? — *A.* The most striking are morbid alterations of the liver, it being pulpy, soft, yellow, and its structure sometimes being completely destroyed, and looking like rotten cork.

Q. Is the spleen affected? — *A.* Yes; it has been found altered similarly to the liver.

Q. What is the state of the stomach and bowels? — *A.* The stomach and bowels contain more or less of the dark matter vomited during life, and the mucous membrane has been found vascular and of a dark red colour, and in some places gangrenous.

Q. What is the supposed source of the black vomit in this disease? — *A.* To blood effused from the abraded surface of the stomach, coagulated, and floating in the gastric juice.

Q. Upon what has the yellow hue of the skin been supposed to depend? — *A.* Upon the bilious matter being deposited under the cuticle, or upon an altered condition of the blood.

Q. What are the indications for treatment in this disease? — *A.* To subdue inflammation and irritation of the system, and prevent local congestion and inflammation, and to sustain the system and prevent collapse; and when inflammation is subdued, to sustain the powers of the system.

Q. How would you answer the first indications? — *A.* By bleeding, local and general purging, and by slight mercurialization.

Q. How would you favour the second indications? — *A.* By cordials and stimulants, following ptyalism.

Q. How should bloodletting be used? — *A.* In states of high inflammatory excitement it should be used quickly and copiously in the onset.

Q. What purgative would you chiefly rely on? — *A.* Calomel, both on account of its purgative and constitutional effect.

Q. In cases of strong febrile action would you sponge the body, and use other cooling means? — *A.* Yes.

Q. Should the stomach be much irritated, how would you allay it? — *A.* By means of the usual demulcents, refrigerants, and counter-irritants.

Q. Has there been any other kinds of treatment suggested? — *A.* Yes; the more mild, or Broussais's treatment; and the decidedly tonic treatment.

Q. What is the former variety? — *A.* The soothing and less active, from the very commencement of the disease.

Q. What is the second? — *A.* By means of large doses of quinia in the incipient stage — from twenty to thirty grains.

Q. Has there been any other treatment? — *A.* Yes; the saline treatment of Dr. Stevens.

HECTIC FEVER.

Q. What is a hectic fever? — *A.* A fever of indefinite duration, with from one to two exacerbations in a day, accompanied with attenuation of body, and depending either upon suppuration or important organic derangements of structure.

Q. How is the pulse? — *A.* Frequent and varying (between 90 and 120), irritable, small, jarring, and yet compressible.

Q. How do the exacerbations occur? — *A.* Irregularly, preceded by chills, heat of skin, flushed features, and burning in

the palms of the hands and soles of the feet; and not always followed with perspiration.

Q. When does it most regularly occur? — *A.* At the morning and fore part of the night.

Q. How is the digestion? — *A.* Not unfrequently, though not invariably, disturbed.

Q. Is there much debility? — *A.* Yes; in proportion to the fever.

Q. As the disease advances, do these symptoms increase? — *A.* Yes.

Q. In advanced hectic is the appetite affected? — *A.* No; but at the very close of the disease it is much affected.

Q. Is the thirst urgent? — *A.* No.

Q. Are the excretions natural? — *A.* Yes, generally.

Q. What is the condition of the integuments? — *A.* Pale, bloodless, and blanched, with crooked nails; and during the exacerbations there is a bright red, circumscribed spot upon the cheek.

Q. Is there ever œdema of the lower extremities? — *A.* Yes.

Q. What is the duration of this disease? — *A.* It is various, depending upon the fundamental cause.

Q. Is the diagnosis of hectic of much importance? — *A.* Yes; as it modifies treatment.

Q. With what is it likely to be confounded? — *A.* With certain forms of irritative fever, dependent upon chronic internal inflammations.

Q. In such cases, however, what are the differences? — *A.* The exacerbations are more irregular, and they depend, or are connected with, the excitement of digestion.

Q. Are there any other sources of error? — *A.* Yes; sweating early in the morning, dependent generally upon debility.

Q. What are some of the causes of hectic? — *A.* Internal suppuration, and also serious organic disease.

Q. What is the treatment of hectic? — *A.* Where there is chronic inflammation simply, and that too curable by antiphlogistics, we resort to them, otherwise tonic systems of medication are to be used, and the symptoms relieved as they occur.

Q. What tonics and stimulants have been used? — *A.* Wine, mineral acids, bark, &c.

CONTINUED FEVER.

Q. What is a continued fever? — *A.* One in which the remissions are not well marked.

Q. How is it divided? — *A.* Into simple continued, typhous, and typhoid.

Q. Howi s the commencement of continued fever? — *A.* Similar to remittent.

Q. Do the symptoms vary in intensity? — *A.* Yes; we have sometimes high inflammation, at others great prostration.

Q. Is there sometimes but little tendency for the disease to localise itself? — *A.* Yes.

Q. How does uncomplicated continued fever usually terminate? — *A.* In health.

Q. When death does take place, what do we find as the cause of it? — *A.* Inflammation and congestion of some internal organ.

Q. Are the affections of the several organs particularly modified by this form of fever? — *A.* No; and consequently a minute investigation of them in this place is unnecessary.

Q. What are some of the causes of continued fever? — *A.* Vicissitudes of temperature, impure air, crude food, &c.

Q. What are the pathological characteristics of simple continued fever? — *A.* Few die of this form of disease, and when death does occur, we generally have the same signs as in remittent fever.

Q. What is the treatment of continued fever? — *A.* In simple continued fever the treatment is the same as in remittent fever.

Q. Does this fever ever run into the typhous state? — *A.* Yes; and we will now consider this type of the affection.

TYPHOUS.

Q. What is typhous fever? — *A.* Fever, with a compressible and rather frequent pulse, with extreme languor and debility, and with much disturbance of the mental functions.

Q. What are the premonitory signs of typhous? — *A.* Stupor from the first, or if the intelligence is slightly preserved, we have a dreamy, stupid condition, with inattention to surrounding objects.

Q. How are the recollections of the patient after the attack? — *A.* Confused.

Q. What are the other symptoms of the commencement of the attack? — *A.* Headache, dizziness, and tinnitus aurium, and the strength is much less broken than in typhoid.

Q. If the disease advances, what are the symptoms? — *A.* The patient becomes comatose, and delirium of the muttering

kind (if there is not great inflammatory action in the brain), supervenes, and the patient dies gradually of head symptoms.

Q. What are the external signs? — *A.* A cutaneous exanthema, extending over the whole body, measle-like in appearance, light-red at first, but after the second day (or in severe cases from the first), darker in tint.

Q. When does this rash subside? — *A.* After four or five days; but it is seen sometimes for twelve or fourteen days.

Q. Is there much thirst in typhous? — *A.* Yes.

Q. What is the state of the lungs? — *A.* Congested at the back part; depending in a great measure upon the condition of the blood.

Q. What is the impulse of the heart? — *A.* Feeble, and suggests stimulation.

Q. What is the colour of the skin? — *A.* Dull, of a dusky tint, and on the face of a deep red colour; and the blood circulates slowly through the vessels.

Q. What is the condition of the conjunctiva? — *A.* The capillary vessels of the conjunctiva are congested in typhous, and full of blood.

Q. Is the physiognomy of the patient a good diagnostic mark? — *A.* Yes.

Q. Does typhous attack all ages? — *A.* Yes; but is more severe with the aged and those in middle life.

Q. Is there anything peculiar to this disease in relation to its manner of propagation? — *A.* Yes; it is generally epidemic, and spreads by contagion and infection.

Q. What is the treatment of typhous? — *A.* In mild cases it is very simple; a slight aperient, mustard pediluvia, and effervescing mixture, or one of the other fever mixtures, are all that is required.

Q. Should the head become flushed, what is necessary? — *A.* A few wet or dry cups to the nucha, pediluvia, &c.

Q. In the close of the disease is there anything necessary? — *A.* If there is a state of collapse, a nourishing diet with slight stimulation is necessary.

Q. How long does this disease generally last? — *A.* From twenty to twenty-one days.

Q. Has there any other plan of treatment been suggested? — *A.* Yes; a decidedly purgative plan.

Q. In the treatment of this affection is sponging beneficial? — *A.* Yes; very.

Q. In cases of great prostration have flying blisters been suggested? — *A.* Yes; and with great benefit.

Q. Are tonics ever necessary at the close of this disease? — *A.* Yes.

Q. Are more stimulating articles sometimes necessary? — *A.* Yes; wine is very favourable, when it is necessary to support the force of life.

Q. Would you administer wine if the eye of the patient is red and suffused, or the skin hot? — *A.* Yes.

Q. Is opium ever used? — *A.* Yes; where there is morbid vigilance, and the like.

Q. Is camphor ever beneficial? — *A.* Yes.

Q. How would you regulate the diet? — *A.* Upon general principles, commencing with farinaceous articles, and increasing it as the disease becomes worse.

Q. What prophylactic measures would you adopt in typhous? — *A.* Ventilation, cleanliness, and good nutritious diet, with fumigation of chlorine.

TYPHOID FEVER.

Q. What is typhoid fever? — *A.* A fever bearing a general resemblance to the last variety, with pathological distinctions, existing especially in the glands of Peyer and Brunner, constituting dothinenterité.

Q. How may the symptoms of typhoid fever be classified? — *A.* Into those of the cerebral and nervous system; those of the skin; those of the abdominal viscera; and those of the thoracic organs.

Q. What are those of the first variety? — *A.* Loss of strength and prostration, occurring early in the disease, singing in the ears, vertigo, and frequently epistaxis.

Q. Are the pains in this disease as great as in remittent or intermittent fever? — *A.* No.

Q. Is there a regular chill? — *A.* No.

Q. Do the brain symptoms increase? — *A.* Yes; the patient becomes dull and stupid; and if the disease is violent, he may become comatose.

Q. Is there much delirium? — *A.* It is not invariable, though it generally shows itself at night, and in violent cases it is very great.

Q. Should there be a complication of acute meningitis, what is the condition of the mind? — *A.* We have violent raving.

Q. Is there ever coma? — *A.* Yes; in fatal cases coma generally precedes death.

Q. What is the difference in the exantheme of the two fevers? — *A.* In typhoid fever it is limited to the anterior portion of the trunk, especially the abdomen and thorax.

Q. What is the character of the eruption? — *A.* Papular; and the spots are larger than in typhous; a line in length, elliptical, elevated, and few in number, rarely exceeding thirty; and they appear later than the typhous eruption.

Q. Are the sudamina more frequent in this disease? — *A.* Yes; and appear sometimes in two crops; one early in the disease, and the other during the period of convalescence.

Q. What are the abdominal symptoms of typhoid fever? — *A.* Diarrhœa is a frequent sign; flatulence with tympanitis; pain in the abdomen, sometimes in the epigastrium, and in the right iliac fossa; and there is also great anorexia.

Q. What are the thoracic signs in this disease? — *A.* In mild cases they are moderate, but we may have the bronchial mucous membrane congested, especially the smaller tubes.

Q. How is the pulse in typhoid fever? — *A.* Not so frequent as in typhous, otherwise similar to it.

Q. What is the state of the eye? — *A.* Bright and glassy.

Q. Is typhoid fever ever infectious? — *A.* Rarely so, and rarely epidemic.

Q. Is it ever sporadic? — *A.* Yes.

Q. Does typhoid fever have a natural course? — *A.* Yes; and averages from twenty to twenty-one days.

Q. What is the general plan of treatment in this disease? — *A.* Negative and defensive. In mild cases the physician should interfere as little as possible, prescribing laxatives, dry or cut cups to the nucha, rarely blisters.

Q. What is beneficial towards the close of the disease? — *A.* Small doses of the mercurials, in combination with ipecacuanha.

Q. Are tonics or mild stimulants ever necessary? — *A.* Yes.

Q. In severe cases of typhoid, what is necessary to be done? — *A.* Modify the treatment to suit the case and answer the existing indications.

Q. What is the particular pathological state insisted upon by writers? — *A.* Thickening and change of colour, with ulceration of the glands of Peyer and Brunner.

Q. What does *Andral* enumerate as the principal circumstance of a certain diagnosis of this disease? — *A.* Youth,

cephalalgia, diarrhœa, stupor, delirium, somnolency, petechiæ (rose spots), sudamina, epistaxis, intestinal hemorrhage, cough, tendency to sloughs or eschars, fuliginous character of the mouth, and meteorism.

Q. Has an examination of the blood led to any definite results in this disease? — *A.* No; though it is thought to be less coagulable than in other morbid conditions.

Q. What colour do the patches of Peyer assume? — *A.* At about a week from the commencement of the disease we find them of a dull white, changing, as the disease advances, to a deep red colour, with all the variety of shades.

Q. Do the patches affected vary in number? — *A.* Yes; sometimes we have but one affected, at other times twenty or more; and the isolated follicles are also involved.

Q. Where does this eruption commence? — *A.* At the termination of the ilium, and proceeds upwards.

Q. When these glands ulcerate, do they ever involve more than the mucous coat? — *A.* Yes; they sometimes extend to the muscular and peritoneal.

Q. Do these patches ever cicatrize? — *A.* Yes.

Q. When does ulceration usually take place? — *A.* Sometimes before the twentieth day, and sometimes longer.

Q. Do there ever exist peculiar alterations in the mucous coats of the pharynx and œsophagus? — *A.* Yes; but of a different character from those in the stomach and intestines.

Q. Are the mesenteric glands ever affected? — *A.* Yes; they become enlarged, and sometimes softened.

Q. Has the spleen and liver been found affected? — *A.* Yes; but the lesions differ materially in different cases.

Q. What is the general estimate of the occurrence of the affection of the glands of Peyer? — *A.* In about ninety-eight in the hundred cases.

ERUPTIVE FEVERS.

Q. What are eruptive fevers? — *A.* Diseases of the skin, accompanied by lesion of the circulation.

Q. Are there any definite views in regard to the pathological relation existing between the eruption and the fever? — *A.* No; some consider the exantheme to be a true phlegmasia of the skin; others, a peculiar affection of the derm; some, but few however, consider them to be modifications of gastro-enterite, &c.

Q. In cases of eruptive fever what are the most favourable conditions? — *A.* The least amount of internal inflammation, and also of cutaneous irritation.

Q. What is there peculiar in the principal eruptive fevers? — *A.* Capability of propagation; the appearance of the eruption on the very day it was predicted, the progress of the pustules to maturation, and their strictly limited nature.

Q. Are we acquainted with the laws which govern the propagation of them? — *A.* Yes, generally.

Q. How is the character of the disease modified? — *A.* By the nature of the epidemic and by particular constitutions.

Q. What are the principal points to be borne in mind in the treatment of eruptive fevers? — *A.* Whether the disease is complicated by internal organic changes, or modified by constitutional circumstances.

Q. What are some of the greatest dangers in eruptive fevers? — *A.* The sequelæ.

MEASLES.

Q. What are the most common technical names for this affection? — *A.* Rubeola and morbilli.

Q. Are there any distinctions between these two names? — *A.* No; not among us, but among the Germans they apply morbilli to measles proper; while rubeola is applied to entirely a different affection.

Q. Has the diagnosis between measles, scarlatina, and variola, been very long settled? — *A.* No; to modern times we are indebted to the study of the distinctive marks.

Q. How would you divide measles? — *A.* Into R. vulgaris; R. sine catarrho; and R. maligna.

Q. What is thought to be the length of incubation of this disease? — *A.* From five to seven days.

Q. Do the initiatory phenomena of this disease differ from those attending catarrhal fever? — *A.* No.

Q. What are some of the first symptoms of this affection? — *A.* Chilliness and cold shivering, coryza and flow of tears; followed by nausea, anorexia, slight cough, with heaviness of the head and eyes.

Q. When does the eruption make its appearance? — *A.* From the third to the fourth day.

Q. What is its character? — *A.* We have small red spots,

distinct from each other, circular, and slightly raised from the surface, and looking like flea-bites.

Q. Where does the eruption first appear? — *A.* On the head, around the margin of the scalp, behind the ears, and gradually extends over the face, and then to the chest and limbs.

Q. What form do the patches assume? — *A.* By the confluence of the red spots they assume a crescent shape.

Q. When does the eruption generally arrive at its height? — *A.* In about thirty-six hours.

Q. What now happens? — *A.* The tumefaction and eruption disappears at about five days, and in the same order as it advanced; and other symptoms usually follow.

Q. In what form does the cuticle desquamate? — *A.* In scurf or branny scales.

Q. Does the eruption ever appear upon the mouth and throat? — *A.* Yes; and in negroes it is the spot in which we are able to detect the eruption.

Q. Does diarrhœa ever supervene? — *A.* Yes; especially in children.

Q. Are there any other discharges ever taking place? — *A.* Yes; sometimes in the female; uterine hemorrhage or epistaxis about the fourth or sixth day.

Q. Do we ever have complications in this disease? — *A.* Yes; bronchitis, pneumonia, pleuritis, tracheitis and laryngitis.

Q. Are there not sometimes peculiarities in the mode of attack in this disease? — *A.* Yes; we sometimes have the eruption anticipating its usual time of appearance; at other times we have the catarrhal symptoms existing for some time before the eruption; in some instances, the body is first covered with the rash, and sometimes, after the rash has subsided, it again appears.

Q. What is the second variety? — *A.* Rubeola sine catarrho

Q. What is there peculiar to this variety? — *A.* The eruption proceeding without catarrhal or febrile symptoms.

Q. What is the opinion of some in regard to the prophylactic powers of this form of disease? — *A.* That it is nugatory.

Q. What is the third variety? — *A.* Rubeola maligna.

Q. What is the character of this form of the disease? — *A.* The eruptive fever and the catarrh, from the first, are severe.

Q. What is the form of the fever? — *A.* It assumes the typhoid aspect; and during the whole course of the disease we have local inflammations, especially of the lungs, &c.

Q. Is there anything at the onset of the disease to warn us of the malignant character? — *A.* Nothing; excepting that the fever is violent; with greater restlessness, thirst, and heat of skin.

Q. How is the pulse? — *A.* Frequent, but soft and compressible.

Q How is the respiration? — *A.* Hurried and oppressed.

Q. How does the eruption make its appearance? — *A.* Irregularly; now appearing, and then disappearing.

Q. What is the colour of it? — *A.* Various; at one point red, at another pale, livid, and interspersed with ecchymosis and petechiæ.

Q. What is the appearance of the mouth? — *A.* The mucous membrane is dusky red or livid in appearance.

Q. What is the condition of the abdomen? — *A.* There is tenderness over the epigastrium and abdomen generally, with dark and offensive stools.

Q. Does the brain sympathise? — *A.* Yes; we have transient delirium with coma, and sometimes convulsions.

Q. What generally supervenes? — *A.* Inflammation of the lungs and brain, which does not abate with the eruption.

Q. What is the immediate cause of death in most cases? — *A.* Intense pulmonary congestion; in others, subsultus and convulsions; and, sometimes, the patient is worn out by diarrhœa and mucous discharges generally.

Q. Is this form of the affection of frequent occurrence? — *A.* No.

Q. Are the sequelæ of measles dangerous? — *A.* Yes; sometimes more so than the original disease.

Q. What are some of the sequelæ? — *A.* In scrofulous children we have the lymphatic ganglions affected; and hence, troublesome inflammation of the glands of the neck, and tabes mesenterica.

Q. What are some of the other sequelæ? — *A.* Chronic bronchitis, and tubercular disease of the lungs; troublesome diarrhœa; ophthalmia; and abscesses from the ear, and in the cellular tissue of the parotid; sometimes aphthæ on the tongue and mouth, degenerating to gangrenous ulceration, and also cutaneous affections.

Q. What are the pathological characteristics of this affection? — *A.* Death rarely occurs during the eruptive stage of measles, and hence we are ignorant of the state of the mucous membrane of the trachea and bronchi.

Q. Where do we generally find the most damage? — *A.* In the lungs, or in the bowels from protracted diarrhœa. (Laennec supposed the orthopnœa to arise from œdema of the lungs.) We also have condensation of the tissue of the lungs.

Q. What does this disease mostly resemble? — *A.* Roseola and scarlatina. It may be distinguished from the latter affection by the time intervening between the initiatory fever and the rash, by the character of the rash, and by the sequelæ.

Q. When does the eruption of measles show itself? — *A.* On the fourth day of the fever; and in scarlatina on the second.

Q. What is the difference between the rash in the two affections? — *A.* The rash of measles is crescent-shaped, while that of scarlatina is more diffused and irregular.

Q. Is there any difference in the colour of the rash in the two affections? — *A.* Yes; the rash of measles is of a raspberry hue, and that of scarlatina more of a vivid red.

Q. What are the difference of the sequelæ? — *A.* Measles has more of pneumonic symptoms, while scarlatina has generally inflammation of the serous membranes as the sequelæ.

Q. How is roseola distinguished from measles? — *A.* By the character of the rash, and by the absence of the accompanying symptoms, and also by the duration of the disease.

Q. What is the prognosis of this affection? — *A.* During the early stage it is favourable. The complications of the disease are the chief sources of danger.

Q. What are the general circumstances which must bear upon the prognosis? — *A.* The character of the epidemic, and the type of the fever prevailing at the time; and whether the season be wet or dry (dry being the more favourable); and also whether the disease follows other infantile disorders.

Q. What are the circumstances denoting danger? — *A.* Unusual violence of the eruption, especially when there are spasmodic twitching or convulsions, the late appearance of the eruption, and it being of a dark livid colour; or if the thoracic or abdominal organs are implicated, severe headache, retrocession of the rash, petechiæ, &c.

Q. Whom does this malady affect most seriously? — *A.* Adults.

Q. What is the original cause of this disease? — *A.* We know not.

Q. Is it contagious or infectious? — *A.* Both.

Q. Whom does it more frequently attack? — *A.* Children.

Q. Does it affect the system more than once? — *A.* Rarely.

Q. When is it supposed to be most contagious? — *A.* During the primary fever.

Q. What is the general treatment of measles? — *A.* Little should be done during the eruptive stage except keeping the secretions in order, and the patient in a cool room, and upon a cooling demulcent diet and drinks.

Q. Is sponging the body as beneficial in this disease as in other rashes? — *A.* No.

Q. Are the usual expectorants of much benefit in this disease? — *A.* No.

Q. What should be the principal point to which the physician should direct his attention? — *A.* The thoracic organs.

Q. Is bleeding ever proper in this affection? — *A.* Yes, if there are pulmonary complications; but it must be used with great caution.

Q. In very young children which is the better manner of taking blood, locally or generally? — *A.* Locally, by cups.

Q. Should the eruption have subsided, would you take blood as freely as if the eruption existed? — *A.* No.

Q. Does antimony or ipecacuanha ever favour the case when we have abstracted blood previously? — *A.* Yes.

Q. How would you regulate the secretions after an attack? — *A.* By small doses of mercurials, and sometimes by epispastics, astringents, and farinaceous diet.

Q. Should the rash recede after having made its appearance, what is necessary to be done? — *A.* If the retrocession follows cold, we use the warm bath, diaphoretics, and stimulating drinks.

Q. If it should have disappeared through debility, what is necessary? — *A.* Give the more diffusible stimuli, combined with mild tonics, as cinchona, sulph. acid. arom., and wine.

Q. Suppose the type to be malignant, what is necessary to be done? — *A.* Relieve the congested organs as soon as possible by venesection (if the age of the patient favours it), or by local depletion, together with good diet, and diffusible stimuli; and the other complications must be treated as in other diseases.

SCARLET FEVER.

Q. What is scarlet fever? — *A.* A febrile disease, of a contagious nature, having a scarlet efflorescence of the skin, and of the mucous membrane of the fauces.

Q. How has scarlatina been divided? — *A.* Into scarlatina simplex, scarlatina anginosa, and scarlatina maligna.

Q. What are the premonitions of scarlatina? — *A.* It is ushered in with the usual signs of fever, cold chills, nausea, hot skin, frequent pulse, and thirst.

Q. Are these symptoms generally urgent? — *A.* No.

Q. When does the eruption appear? — *A.* Generally in forty-eight hours.

Q. Where is it first seen? — *A.* Upon the face, neck, and breast, and gradually extends over the trunk.

Q. What is the character of the eruption? — *A.* We have innumerable red spots, separated by interstices of natural colour, gradually coalescing, and the redness becoming diffused.

Q. What is the feeling of the eruption? — *A.* Slightly rough to the touch.

Q. From what does this roughness arise? — *A.* From the enlargement of the cutaneous papillæ.

Q. Where is the eruption most apparent? — *A.* At the joints of the body.

Q. If a heating regimen has been resorted to, what is the state of the cutaneous surface? — *A.* Great congestion of the cutaneous vessels, and sometimes miliary vesicles appear upon different parts of the trunk.

Q. When does the rash usually decline? — *A.* Generally on the fifth day.

Q. Does there ever appear during the course of the eruption small vesicles? — *A.* Yes; about the fourth or fifth day of the efflorescence.

Q. Is this peculiar to this disease? — *A.* No; it is seen in other exanthemata.

Q. How does the efflorescence of scarlatina simplex terminate? — *A.* By desquamation of the cuticle about the end of the fifth day, commencing where the eruption first appeared, and proceeding as it commenced.

Q. What is the character of the desquamation? — *A.* Like a scurf.

Q. Are the exposed mucous surfaces affected? — *A.* Yes; they are very red and inflamed.

Q. How are the papillæ of the tongue? — *A.* Elongated and projecting through the deep coating of the tongue; and when the tongue is clean, showing themselves very prominently.

Q. How does this affection of the mucous membrane terminate? — *A.* By resolution; and the whole disease terminates in a week.

Q. What is the second variety? — *A.* Scarlatina anginosa.

Q. How is this variety characterised? — *A.* By the precursory symptoms being more violent, and by the throat becoming stiff, with uneasiness in swallowing, increasing to the second day, and becoming soon more painful and difficult.

Q. What is the state of the throat upon examination? — *A.* We have much swelling of the tonsils, uvula, and soft palate, and redness of the surface, extending to the posterior fauces.

Q. Are there ever dark patches upon the fauces? — *A.* Yes; mingled with an effusion of coagulable lymph, which may be mistaken for ulceration of the mucous membrane.

Q. Does this coagulable lymph extend to the larynx and trachea? — *A.* Not generally.

Q. Does the fever always accompany the sore throat? — *A.* No; sometimes it precedes it, at others accompanies it, and at others, again, it is delayed till the appearance of the efflorescence.

Q. What takes place upon the second or third day? — *A.* The throat becomes worse, the debility is greater, the pulse more frequent (as the febrile excitement increases), and unequal in strength, with oppression of the breathing.

Q. What is the general condition of the skin? — *A.* The temperature of the skin is much increased, rising to 106 or 108, and there is also harshness present.

Q. What is the appearance of the tongue? — *A.* At its tip and edges we have a scarlet hue, and its papillæ much elongated.

Q. What occurs towards evening? — *A.* Exacerbation of fever, much restlessness, and sometimes delirium.

Q. Is there the same regularity in this as in scarlatina simplex? — *A.* No; the eruption is sometimes delayed in appearance, and appears irregularly; at other times it appears and then recedes, and its duration is longer than the S. simplex.

Q. Does desquamation always follow? — *A.* No.

Q. When does the anginose affection subside? — *A.* Generally with the eruption, though it may continue some time after.

Q. Does this variety ever assume a more intense form? — *A.* Yes; we sometimes have acrid discharges from the nostrils and ears, followed by deafness and inflammation and suppuration of the parotid and cervical glands.

Q. To what should we be particular to direct our attention? — *A.* To the state of the internal organs; and especially the serous membranes.

Q. What is the next variety? — *A.* Scarlatina maligna.

Q. How does this form attack a patient? — *A.* Similar to the anginose variety; but its true character of lowness of type soon developes itself.

Q. What is the character of the fever? — *A.* Typhoid.

Q. How is the heat of skin and the state of the brain? — *A.* The heat of skin is less intense, and the sensorium much disturbed.

Q. What is the pulse? — *A.* Small, frequent, and irregular.

Q. How is the appearance of the eye and countenance? — *A.* Dull; with a dark red flush upon the cheeks.

Q. Is the patient at all delirious? — *A.* Yes; and that, too, of the low muttering kind.

Q. What is the condition of the tongue? — *A.* Dry and brown, or red, dry, and glazed, and bleeding at the slightest touch.

Q. Are there sordes to the teeth and lips? — *A.* Yes; and the breath is very fœtid.

Q. What is the condition of the throat? — *A.* Dusky red in appearance, and dark incrustations form upon the velum, uvula, and tonsils; and sometimes we have gangrene.

Q. Do acrid discharges ever take place? — *A.* Yes; from the nostrils; and also a viscid secretion from the fauces, impeding respiration and producing a rattling noise.

Q. Does the inflammation extend to the whole of the fauces? — *A.* Yes.

Q. What is peculiar about the rash? — *A.* Its irregular appearance, and its frequent retrocession during the eruption.

Q. What is its colour? — *A.* Paler than in the other varieties, except here and there, where the patches may be deeper in hue.

Q. Is there ever a tendency to hemorrhage from mucous surfaces? — *A.* Yes.

Q. What now becomes of the patient? — *A.* He sinks rapidly if his constitution has not been vigorous.

Q. When patients resist the first violence of the disease, do they convalesce soon? — *A.* No; but struggle through many untoward symptoms.

Q. How are some affected? — *A.* With diarrhœa, and sometimes with serous inflammation.

Q. Does scarlatina ever change in its course, from being very mild to that of a very serious character? — *A.* Yes.

Q. When and how does the malignant variety generally terminate? — *A.* In death, by the third or fourth day.

Q. How else does it sometimes terminate? — *A.* Sometimes with general anasarca.

Q. Has there been any other variety marked by authors? — *A.* Yes; scarlatina without the exantheme.

Q. How does this show itself? — *A.* Upon the mucous lining of the mouth and fauces without any efflorescence.

Q. Is it ever bad in its character? — *A.* It follows the general laws of the exantheme.

Q. What are some of the sequelæ of scarlatina? — *A.* Inflammation of the pleura, peritoneum, and sometimes of the arachnoid membrane and pericardium; and also, in some instances, we have bronchitis or gastro-enterite.

Q. Are the joints ever affected? — *A.* Yes; we sometimes have purulent deposits in the joints.

Q. Is dropsy ever a sequence? — *A.* Yes; in the form of œdema of the face, eyelids, and sometimes it is general, involving the large cavities of the body.

Q. Do we ever have dropsy in this disease from structural lesion of the kidneys? — *A.* Yes; we have what has been termed morbus Brightii.

Q. When does dropsy usually occur? — *A.* From ten to twelve days from the appearance of the rash; and sometimes earlier and sometimes later.

Q. What would indicate the approach of dropsy? — *A.* Paleness of the countenance, increased languor, loss of appetite, furred tongue, costive bowels, scanty and turbid urine, and gastric irritability.

Q. When is there greater danger from dropsy? — *A.* When there is effusion into the larger cavities.

Q. When there is effusion into the ventricles of the brain, what generally takes place? — *A.* Diminution of it in other parts of the body, and soon convulsions, coma, and death.

Q. Does the patient ever recover from dropsy? — *A.* Yes, frequently, where the kidneys are not disorganised.

Q. In which variety are we more apt to have a dropsy as sequelæ? — *A.* In the anginose.

Q. Are we acquainted with the precise pathological characteristics of scarlatina? — *A.* No; the blood, however, seems to be more particularly affected, and acts as the exciting cause.

Q. What has been discovered by *post-mortem* examinations? — *A.* In some cases we have no morbid appearance whatever; in others, again, the skin seems to suffer from great congestion of the capillaries.

Q. What do we sometimes find in S. anginosa? — *A.* Congestion of the mouth and pharynx, enlargement of tonsils, with depositions of coagulable lymph, sometimes of a dark colour.

Q. What is the state of the throat in S. maligna? — *A.* Dark livid in colour, sometimes abraded, and covered with a dark lymph.

Q. Do we ever find lesions in the thorax? — *A.* Yes; inflammation extending to the larynx, trachea, and lungs.

Q. Are the abdominal viscera ever affected? — *A.* Yes; sometimes we have intestinal inflammation, and sometimes inflammation of the peritoneum.

Q. From what cause is the appearance of the kidneys modified? — *A.* From the existence and duration of the dropsy.

Q. What is the appearance of the arachnoid membrane in fatal cases? — *A.* When there has been much delirium, we find the arachnoid vascular and opaque, and sometimes serous effusion has taken place.

Q. Is scarlatina contagious and infectious? — *A.* Yes, both.

Q. Does the same individual ever have a second attack? — *A.* Yes; but rarely.

Q. What is supposed to be the period of incubation in this disease? — *A.* From twenty-four hours to ten days.

Q. When does scarlatina generally occur? — *A.* In the autumn; but very frequently we have it during every part of the year.

Q. Do we know anything of its proximate cause? — *A.* No.

Q. Which sex is the more liable to it? — *A.* The female.

Q. What ages are most susceptible? — *A.* Youth; and the susceptibility decreases much after the thirtieth year.

Q. With what are we more liable to confound this affection? — *A.* Roseola and rubeola.

Q. How would you distinguish them? — *A.* See *Rubeola.*

Q. What is the prognosis in this disease? — *A.* In S. simplex the prognosis is favourable unless we have internal inflammation, or the type becomes changed.

Q. What is the prognosis in the anginose variety? — *A.* Favourable, unless the local inflammation is severe; and the inflammation is extending, and there is much tumefaction present.

Q. Is it favourable or unfavourable to have delirium commencing soon? — *A.* Unfavourable.

Q. What is the prognosis from the appearance of the rash? — *A.* If the rash is dark-coloured and irregular in its appearance the prognosis is unfavourable.

Q. What is the prognosis in the malignant type? — *A.* Unfavourable.

Q. What are the favourable signs? — *A.* When it happens

in young children, with no visceral inflammation, a plentiful and florid eruption, red colour of the fauces, and the exudations upon the throat disappearing, the pulse falling in frequency and increasing in power, the breathing becoming gentle countenance natural, and a gentle perspiration supervening.

Q. What are the unfavourable signs? — *A.* The reverse of the preceding appearances, and the general symptoms of failure of the powers of the system.

Q. What is the prognosis when the disease attacks pregnant or puerperal women? — *A.* Unfavourable.

Q. Does the prevailing character of the disease vary at different times? — *A.* Yes; sometimes it is decidedly mild, at others severe.

Treatment. — *Q.* What general principles must be borne in mind when entering upon the treatment of this affection? — *A.* The prevailing type of the epidemic, and of the general continued fevers of the season.

Q. Is there much interference necessary when the scarlatina is simple in form, and pursuing its course regularly? — *A.* No; the only thing required is to keep the apartments cool and ventilated, the diet mild and farinaceous, drinks cool, and the bowels gently open.

Q. What is necessary when the heat of surface is great? — *A.* To sponge the body with tepid or cool water.

Q. Is the abstraction of blood by venesection ever necessary? — *A.* Very seldom; and when necessary to take blood we had better resort to topical depletion.

Q. What should be our greatest care? — *A.* To watch the disease in its various stages, and meet untoward symptoms as they arise.

Q. What is the indication in the anginose variety of the disease? — *A.* To meet the local inflammation, and treat it upon the general rules for the treatment of fever.

Q. Should we make use of the lancet in treating the inflammations arising from this disease with as much freedom as in other affections? — *A.* No; we must be very guarded, as there is a decided poison in the system.

Q. Have emetics been used with advantage in this affection? — *A.* Yes; in the beginning, when the tongue is much coated, nausea present, and tonsils swollen.

Q. Are purgatives beneficial? — *A.* When used merely to keep the bowels in a fluid state they are, but active catharsis is prejudicial.

Q. Should we perceive the mucous membrane affected, what

will be necessary? — *A.* To prescribe some of the more mild cathartics, as ol. ricini.

Q. What should be the diet? — *A.* Spare and farinaceous

Q. Is sponging as beneficial in this variety as the mild form? — *A.* Yes; and it often induces sleep.

Q. Are gargles of much benefit? — *A.* Not much; but they may be used to detach viscid mucus.

Q. Has chlorine ever been used with advantage? — *A.* Yes. The Sol. sodæ chloridæ of the Pharmacopœia, ℥iss.; Aqua, ℥viij.; Syr. limon. ℥ij. M. Sig. Ten or twelve drops during the day. This mode is well adapted for its administration.

Q. Should visceral inflammation supervene, what is necessary? — *A.* Vigorous but cautious measures should be adopted.

Q. What diet is necessary when the fever subsides? — *A.* Tonic and nutritious.

Q. What is necessary to be done when the throat is particularly affected? — *A.* Sometimes we use local depletion and poultices externally; penciling with the argt. nit. internally, and sometimes blistering externally.

Q. Is general bloodletting ever admissible in scarlatina maligna? — *A.* No.

Q. Is it ever necessary to employ local depletion? — *A.* Yes, sometimes, but with great caution, leeching being the most proper.

Q. Is a blister to the nucha in this form ever beneficial? — *A.* Yes; especially where the cerebral symptoms are very great.

Q. Would you sponge as frequently in this form of disease as in the other forms of it? — *A.* No.

Q. Must the purgatives be administered as freely as in the other forms? — *A.* No.

Q. Are emetics ever beneficial in this variety? — *A.* Yes; in the commencement, when there is sufficient strength remaining.

Q. What is necessary if the patient appears to sink? — *A.* Administer cordials, tonics, and mineral acids.

Q. Which is the best tonic? — *A.* The preparations of bark with sulph. acid.

Q. If the pulse is frequent and feeble, and there is delirium, would you still administer tonics and stimulants? — *A.* Yes.

Q. Has the carbonate of ammonia been found useful in this disease? — *A.* Yes.

Q. What gargles have been used? — *A.* Bitter infusions, the mineral acids, the infusion of capsicum, and the argt. nit., and creosote.

Q. What treatment is found most beneficial in anasarca? — *A.* The antiphlogistic, followed by tonics.

Q. What is the state of the pulse? — *A.* It is increased in frequency and hardness.

Q. Are any of the cathartics beneficial? — *A.* Yes; repeated doses of calomel followed by a slight drastic.

Q. Is bloodletting ever necessary? — *A.* Yes, sometimes.

Q. If there is a suspicion of dropsy from renal disease, what is proper? — *A.* To cup the lumbar region, and use counter-irritation and demulcents.

Q. Which form of the diuretics is preferable? — *A.* The combinations of the alkalies with vegetable acids.

Q. Is it ever necessary to use tonics and corroboratives in this dropsy? — *A.* Yes.

Q. What is another form of disease that follows scarlatina? — *A.* A bloody and diffused cellular swelling, extending around the throat, with typhoid symptoms. *Vide* Graves and Gerhard, Lect. XIX., on Clinical Medicine.

Q. Has there anything been suggested as a prophylactic in this disease? — *A.* Yes; the belladonna. (See *Library of Practical Medicine.*)

ERYSIPELAS.

See Surgery, p. 191.

VARIOLA, OR SMALL-POX.

Q. What do you mean by variola? — *A.* An eruptive fever, propagated by contagion, running a definite course, and affecting an individual generally but once during life.

Q. Do we know anything definite concerning its origin? — *A.* No; it is lost in antiquity.

Q. Who wrote the most definite account of it? — *A.* Rhazes, an Arabian, in the tenth century.

Q. What are the most convenient divisions? — *A.* The distinct, confluent, and modified.

Q. Into how many stages is it divided? — *A.* Into four; the incubative, the eruptive, the maturative, and the period of desiccation and secondary fever.

Q. What is meant by the incubative stage? — *A.* The period between the reception of the poison and the commencement of the visible signs of the disease.

Q. What is the period of incubation? — *A.* From seven to fourteen days.

Q. On what day does the eruption show itself? — *A.* On the eleventh or twelfth day; after the usual premonitory symptoms of other eruptive fevers.

Q. When the period of incubation is short, what is the prognosis? — *A.* That the disease will be more severe.

Q. What are the symptoms of the distinct variety? — *A.* We have languor, weariness, pains in the back and extremities, pain in forehead, with flushes of heat, nausea, and epigastric tenderness.

Q. What is the general state of the system when the fever developes itself? — *A.* The skin is dry; the tongue is white in the centre, and red at the point; the bowels are torpid; the urine scanty, and of a deep red colour.

Q. Do hemorrhages ever occur? — *A.* Yes; sometimes during the first and second days of the fever.

Q. Mention other signs? — *A.* The mind becomes dejected and confused; and on the third day the tongue is usually of a bright red colour.

Q. What generally occurs in adults at about the period of the eruption? — *A.* A great tendency to perspiration, with drowsiness, and sometimes coma.

Q. What generally precedes the eruption in children? — *A.* Convulsions; and we have very little perspiration.

Q. What is the most characteristic phenomena of this fever? — *A.* Pain, and soreness to pressure of the epigastrium, with vomiting.

Q. Are the febrile symptoms increased before the eruption? — *A.* Yes.

Q. When does the eruption usually appear? — *A.* At the end of the third or the beginning of the fourth day from the commencement of the disease.

Q. Where do the pustules first develope themselves? — *A.* On the forehead and the parts about the mouth and nose; then on the upper extremities, and afterwards on the lower; and it is generally completed in twenty-four hours.

Q. What are the characteristics of the eruption? — *A.* First, red points; then, on the second day, small elevations, with inflamed bases, and the cuticle is distended by a semi-transparent, plastic lymph; and at the close of the second and third day the pustules have a central depression, as if the skin were drawn tightly over a button-mould.

Q. Do the pustules increase in size? — *A.* Yes; and their

umbilicated form increases; and on the fourth day they assume a whitish colour, and become surrounded with a pale red areola, which sometimes run into each other, and give a continuous red appearance.

Q. When does the change from the serous to the purulent character of the eruption take place? — *A.* Between the fifth and seventh days, and marks the commencement of the stage of suppuration.

Q. In the distinct variety, does the fever which accompanies the eruption increase or diminish as the eruption is completed? — *A.* It diminishes.

Q. Does the fever reappear in the suppurative stage? — *A.* Yes.

Q. As the suppuration proceeds, do the pustules change their shape? — *A.* Yes; they become spherical.

Q. What generally happens about the eighth day? — *A.* The face becomes much swollen, and the eyelids are sometimes completely closed, and, as the disease progresses, the whole body becomes swollen.

Q. What generally attends the period of suppuration? — *A.* Soreness of the fauces and secretion of viscid saliva, with great deafness; and at the close of the suppuration, a fœtid smell arises from the patient, and continues during the whole course of the eruption.

Q. What circumstances modify the secondary fever? — *A.* The copiousness of the eruption and the activity of the suppuration.

Q. In the distinct variety, how long does the secondary fever continue? — *A.* From two to three days.

Q. When do the pustules arrive at the maturative stage? — *A.* About the twelfth day, and then gradually dry away.

Q. Where does the desiccation commence? — *A.* Upon the face, and leaves a red surface, which gradually disappears; or, if the case has been severe, deep pits mark the spots where the eruption has been.

Q. What are the symptoms of the confluent variety? — *A.* The pain in the back and extremities during the eruptive fever is more severe, and all the febrile phenomena are more intense.

Q. What is the character of the eruptive fever? — *A.* It is generally inflammatory, though sometimes typhous.

Q. Do we have the same tendency to perspiration in this variety? — *A.* No; but sometimes the diarrhœa is profuse.

Q. When does the eruption appear? — *A.* Earlier in this form; and it is much more irregular in its several stages.

Q. What is the peculiarity of the eruption? — *A.* The small, red, papular points which appear at first run into each other, and form a red, tumefied, and rugose surface.

Q. What is the character of the pustules? — *A.* They are irregular in shape, and less elevated than in the distinct variety.

Q. What is the condition of the face and hands? — *A.* They are much swollen.

Q. Is there any soreness of the fauces? — *A.* Yes; and the flow of saliva is very profuse and acrid.

Q. When the suppuration is complete, are the symptoms aggravated, or not? — *A.* They are aggravated, and the secondary fever developes itself.

Q. What is the character of the matter in the pustules? — *A.* Dark in colour, and in some cases highly corrosive in character.

Q. What occurs from the eighth to the ninth day of the eruption? — *A.* The matter escapes from the pustules and hardens on the surface in brown crusts, and falls off at periods from the fifth to the fifteenth day from their formation, and are succeeded by desquamations, which leave deep marks or pits.

Q. Does the eruption attack the surface of the body only? — *A.* No; it attacks the mucous membrane of the mouth, laaynx, and trachea, producing more or less ptyalism, difficult deglutition, &c.

Q. When this disease commences as an highly inflammatory affection, what are we likely to have as an accompaniment? — *A.* Inflammation of the brain and lungs.

Q. When the brain is affected, what are the symptoms? — *A.* Delirium, coma, convulsions, and apoplexy.

Q. What are the signs of thoracic complication? — *A.* Pneumonia, pleurisy, or effusion into the lungs.

Q. What is the condition of the eyes? — *A.* Inflamed, and sometimes they are covered with pustules.

Q. When the accompanying fever is typhoid in character, what are the modifications? — *A.* We have the usual signs of a typhoid state, and the pustules appear slowly and irregularly, and sometimes recede entirely; and the suppurative stage proceeds slowly and imperfectly.

Q. What is the character of the matter in the pustules? — *A.* It is thin and watery.

Q. When the swelling of the face subsides suddenly, what have we to fear? — *A.* Death from apoplexy.

Q. When the desiccation commences, how is the fever? — *A.* Much aggravated.

Q. Does this disease ever assume a malignant form? — *A.* Yes; especially the confluent variety.

Q. What are some of the symptoms of this change? — *A.* Calor mordax, clammy and offensive perspiration, watery diarrhœa; the pustules are livid in appearance, and surrounded with a dark margin, and filled with a bloody serum; colliquative hemorrhage; and desiccation leaves dark crusts, under which we have phagedenic ulceration.

Q. When pregnant females are attacked, what occurs? — *A.* Abortion, generally.

Q. What is the most important irregularity in this disease? — *A.* The crystalline variety, when, instead of pus in the pustules, we have a colourless, transparent serum.

Q. What is the character of this variety? — *A.* Dangerous.

Q. What is the type of the secondary fever? — *A.* Typhoid.

Q. What are some of the sequelæ? — *A.* Slow and wasting fever; dropsy; cutaneous disease; ophthalmia; deafness; phthisis pulmonalis; mania; epilepsy; staphyloma, and cataract.

Q. What are some of the *post-mortem* appearances, and how are they modified? — *A.* The most general are sanguineous congestion of the brain and lungs; pustules in the pharynx, larynx, trachea, and bronchia. But these appearances are modified by the stage of the disease when death occurs.

Q. What is the appearance of the pustules on the skin? — *A.* The cuticle is natural in thickness, exposing a white and smooth surface, elevated at the edge, and depressed in the centre; and instead of the mucous coat, we have a small umbilicated disk of varied thickness; and beneath this disk the derm is of a red colour, and sometimes covered with purulent fluid.

Q. Where does the true seat of the pustule appear to be? — *A.* In the reticulated structure which lies between the cutis vera and the cuticle.

Q. What is the cause of small-pox? — *A.* A peculiar contagious substance, the essence of which we are entirely ignorant.

Q. Does age or sex modify it at all? — *A.* No; neither does climate or season.

Q. Are all individuals equally susceptible to the operation of the contagion? — *A.* No; some appear absolutely insusceptible to its attack.

Q. What has a tendency to moderate the virulence of the attack of this disease? — *A.* Reduction of the general vigour and plethora of the system.

Q. Does a single attack of this disease prevent future attacks? — *A.* Most generally, but not always.

Q. What is the prognosis in this disease? — *A.* In the distinct form it is not dangerous, but in the confluent variety danger is to be apprehended.

Q. During what period of the disease does death generally occur? — *A.* During the suppurative and desiccating stages.

Q. When is the disease most fatal? — *A.* When the pustulation is extensive, and when the complications are severe.

Q. What state of fever is most favourable? — *A.* The moderately active state, but a tendency to a low grade is the reverse.

Q. Does age modify the prognosis? — *A.* Yes; it is decidedly unfavourable in the old.

Q. What are some of the other circumstances of an unfavourable character? — *A.* Pregnancy, puberty in females, convulsions during suppuration, suppression of the urine, or great desire to pass it during the suppurative stage; and the sudden recession of the eruption after its appearance.

Q. What are the most approved treatment in this disease? — *A.* In the mild variety it is best to forbear the use of remedies, regulating the diet and temperature; but when our aid is necessary, we adopt a course similar to that in other ordinary fevers.

Q. What are generally the best remedies in the onset? — *A.* A mild emetic, followed by gentle saline laxatives, and mild diaphoretics, as ammon. acet., spirit. nitr. dulc.

Q. Should the fever be high, with great local determination, what is necessary? — *A.* Venesection, and topical bleeding over the different parts suffering.

Q. When the surface is very warm, what is necessary? — *A.* Sponging with cold water.

Q. When in children we have convulsions, what is needed? *A.* The usual applications.

Q. What should be the condition of the apartments of the patient? — *A.* Cool and well ventilated.

Q. In the typhoid form of the disease what is the treatment? — *A.* That of other typhoid affections; relieving local congestions and sustaining the vis vitæ by means of quinia and opium, and gentle tonics, and stimulating applications generally.

Q. Should the patient sink, what is necessary? — *A.* A resort to the freest use of cordials and diffusible stimuli.

Q. What are some of the best applications to the surface of the body? — *A.* Mucilages, and Kentish ointment.

Q. How would you prevent scaring? — *A.* By covering the

face with mild ointment, or camphor; puncturing the pustules, and touching them with argent. nit. on the first or second day of the eruption; opening the pustules also when filled, and washing with milk and water. The chloride of soda as a wash is also highly beneficial.

Q. Is it proper to exclude the light? — *A.* Yes.

Q. How would you prevent the eyes from being injured? — *A.* By a bag of camphor being kept before them, and the usual remedies.

Q. What gargles are the most efficient in sore throat? — *A.* Camphorated and detergent gargles.

Q. Have there any means been adopted to prevent the ravages of small-pox? — *A.* Yes; inoculation and vaccination.

Q. By whom was inoculation introduced into England? — *A.* By Lady Mary Wortley Montague.

Q. By whom in this country? — *A.* By Dr. Boylston, of Boston.

Q. In what way was inoculation performed? — *A.* By taking pus or lymph from a small-pox patient, and inserting it beneath the cutis near the insertion of the deltoid.

Q. What effect has this upon the system? — *A.* It produces a mild form of the disease, and generally protects the system.

Q. What is the treatment of the patient during the period of inoculation? — *A.* That for the mildest form of small-pox.

Q. Is this much in use at the present day? — *A.* No; it has been superseded by vaccination; and in Pennsylvania there is a penalty of $500 for inoculating.

VACCINATION.

Q. By whom was vaccination introduced? — *A.* By Dr. Jenner, on the 14th of May, 1796.

Q. Does vaccination invariably protect an individual? — *A.* Not always.

Q. What are the phenomena of vaccination? — *A.* On the third day from the insertion of the virus the wound is red and elevated; on the fifth day the cuticle is elevated into a pearl-coloured vesicle, containing a thin and perfectly transparent fluid.

Q. What is the shape of the vesicle? — *A.* Circular or oval, varying with the mode of making the vaccination.

Q. When is the vesicle in its greatest perfection? — *A.* From the eighth to the ninth day.

Q. When does the vesicle change to the pustule? — *A.* From the ninth to the tenth day, when it is surrounded by a regular areola.

Q. What is the characters of the pustule when at its height? — *A.* It is round or oval, and elevated, with a definite margin, flattened surface, and central depression, resembling a button-mould bound tightly by the skin, to which it has been aptly compared by Dr. Chapman.

Q. What is the condition of the scar left? — *A.* Small, striated, and cellulated.

Q. Is there any danger from vaccination? — *A.* No.

Q. Do we not sometimes allay local inflammation when too high? — *A.* Yes; any of the mild cooling lotions may be used.

Q. What are the characteristics of a good scab? — *A.* They are hard and compact, of a dark mahogany colour, and with a regular defined margin.

Q. In vaccinating, what is necessary to be done? — *A.* To take some of the more compact portions of the scab, soften it, and then insinuate it gently under the cutis, endeavouring to avoid bleeding in the operation.

Q. Is it necessary to make more than one point in vaccination? — *A.* No.

Q. When vaccination is practised where the system has already been infected by small-pox, is the vaccine pustule modified? — *A.* Yes, in a marked degree.

Q. Should rubeola or scarlatina supervene, would the vesicle be modified in its course? — *A.* Yes; it will be arrested, and it generally again resumes and finishes its course when the other affections have subsided.

Q. Is it ever necessary to revaccinate a patient when the virus has taken? — *A.* No.

VARIOLOID.

Q. What do you mean by varioloid, or modified small-pox? — *A.* An exantheme, closely resembling small-pox, and generally acting upon a system previously protected by vaccination.

Q. What are the symptoms of this disease? — *A.* Those of variola in a modified form, and irregular in duration.

Q. Do varioloid pustules leave depressions in the skin? — *A.* Rarely.

Q. What are some of the characteristic features of varioloid? — *A.* The eruption appears in successive clusters from the

second to the fifth day ; there is seldom complete suppuration ; the eruption is not attended by fever except in severe cases, and the desiccation occurs earlier than in regular small-pox.

Q. Does varioloid ever occur in persons who have previously been affected with variola ? — *A.* Yes.

Q. What is the treatment ? — *A.* Similar to that of small-pox.

VARICELLA.

Q. What do you understand by varicella ? — *A.* A disease vesicular in its character, and arising from a specific infection.

Q. Is an attack of varicella marked by any peculiarities ? — *A.* No ; it commences as other fevers do; and on the second or third day the eruption is disclosed.

Q. Where does the eruption first appear ? — *A.* On the face and upper extremities, and gradually covers the body.

Q. Does the eruption appear all at once ? — *A.* No ; it is in successive crops ; and while some vesicles are matured, others are just appearing.

Q. What is the appearance of the vesicle ? — *A.* It is about the size of a split pea, transparent, and covered merely with the cuticle.

Q. Is there generally any secondary fever in this disease ? — *A.* No.

Q. When does the eruption desquamate ? — *A.* In four, six, or eight days ; seldom leaving pits.

Q. Does varicella always maintain this mild character ? — *A.* No ; sometimes it is quite severe.

Q. Are individuals who have had this disease once liable to a second attack ? — *A.* Not generally.

Q. In whom do we find this disease ? — *A.* Principally in children.

Q. What is the treatment of this disease ? — *A.* Generally very little is necessary to be done ; and if anything is necessary, the treatment for variola is equally applicable here.

ARTHRITIC FEVERS.

RHEUMATISM.

Q. What are the forms in which this affection presents itself ? — *A.* The acute and chronic.

Q. Who are most liable to the acute form? — *A.* Persons from fifteen to thirty years of age.

Q. What are the symptoms of an attack? — *A.* Great pain, with much swelling of the parts, and their colour becoming of a bright rose-blush.

Q. Do the symptoms extend? — *A.* Yes; and the limbs and body generally now become very painful on motion.

Q. Does fever accompany the foregoing symptoms? — *A.* Yes; and increases with them.

Q. Is there much diaphoresis? — *A.* Yes; but the symptoms are not alleviated by it.

Q. When is the pain and fever greatest? — *A.* By night, and when the patient is warm; and the fever is then also increased.

Q. Is there anything peculiar about the odour of the perspiration? — *A.* Yes; it is sour and pungent.

Q. What is the character of the pulse? — *A.* Hard and full, seldom less than 90, and sometimes 120.

Q. What is the condition of the patient generally? — *A.* He has no appetite; great thirst; and his urine deposits, on cooling, a brick-coloured sediment.

Q. What parts of the patient suffer from this disease? — *A.* The fibrous tissue, joints, tendons, and sheaths of muscles; and effusion takes place in synovial membranes and the cellular tissue contiguous to them.

Q. When do the symptoms generally abate? — *A.* At the end of the first fortnight, by the decrease of fever, pain, and perspiration, especially at night.

Q. Do the other symptoms now abate? — *A.* Yes.

Q. Are we often troubled by exacerbations of the disease? — *A.* Yes; and complete convalescence is rarely established till the middle or end of the fourth week.

Q. In those cases where effusion takes place, what influence is had upon the pain? — *A.* The pain is moderated, unless there is great distension.

Q. When convalescence and recovery is complete, what becomes of the fluid effused? — *A.* It is rapidly absorbed; and the joints retain their natural form and motion.

Q. What occurs when the fluid is not absorbed? — *A.* The ligaments continue in a thickened state, and the motions of the joints are decidedly injured.

Q. What are some of the symptoms, of a peculiarly interesting and important character, which generally attend upon an attack of acute rheumatism? — *A.* Those denoting some important *lesion of the heart.*

Q. What are some of these symptoms? — *A.* Pain in the præcordial region, with palpitation, difficult breathing, and great oppression.

Q. How do we ascertain the peculiar character of the affection? — *A.* By auscultation and percussion.

Q. Which parts of the heart are affected? — *A.* Either the pericardium or endocardium, or both.

Q. Where does the præcordial pain generally extend? — *A.* To the left hypochondrium, and is increased by pressure in the intercostal spaces, by inspiration, and laying upon the left side.

Q. How is the pulse affected? — *A.* It is frequent, but most generally regular.

Q. Do these symptoms continue for any length of time with equal intensity? — *A.* No; they are modified, generally, in the course of the twenty-four hours, and the patient is comparatively quiet, though effusion has taken place into the pericardium, and there is decided disease existing.

Q. Do cardiac affections sometimes exist without the patient being aware of it? — *A.* Yes; and the physician is only aware of it by close physical examination, or judging from the peculiar look of the patient, and external phenomena.

Q. What are some of the morbid sounds heard when the endocardium is affected? — *A.* Modifications of the saw, or bellows' sounds, attending the systole, or diastole, or both.

Q. At what point is the sound generally the loudest? — *A.* At that point of the præcordia where the heart's impulse is felt.

Q. Which one of the sounds is generally altered? — *A.* The systolic; and at the point of impulse the diastolic sound seems lost in a prolongation of the systolic.

Q. Where, then, would you say the chief lesion lay? — *A.* In the left cavities of the heart; and probably produced by a morbid condition of the aortic valves.

Q. To what must be ascribed the want of discriminating the morbid diastolic sound? — *A.* Partly to the fact of the mitral valve being more remotely situated.

Q. May we not have the lining membrane of the heart affected without altering the sounds? — *A.* Yes.

Q. Should we then wait for the morbid sounds before we apply our remedies to the heart? — *A.* No.

Q. If the pericardium has become the seat of inflammation, do the local signs change? — *A.* Yes; and we have signs denoting effusion of lymph and serum upon the membrane.

Q. What are some of these signs? — *A.* Dulness on percussion, prominence, so that the interstices of the ribs are effaced in

the præcordia, and a rubbing sound attending the heart's action; also the distance of sound in the heart's action.

Q. Do the physical signs vary in duration? — *A.* Yes.

Q. Which symptoms disappear first, the general or physical signs? — *A.* The general.

Q. Do we generally have endocarditis with pericarditis? — *A.* Yes.

Q. What affection often complicates rheumatic pericarditis? — *A.* Pleurisy.

Q. When generally does the cardiac disease show itself? — *A.* From the eighth to the twenty-seventh day, or when the disorder is at its height.

Q. When the heart is affected, does the affection of the joints diminish? — *A.* No.

Q. What are some of the remote sequelæ of these rheumatic affections? — *A.* In pericarditis we have adhesion of the pericardium, scarcely modifying the heart's action; but in endocarditis we have narrowing of the orifices where the valves are situated, and hence impeding the action of the valves; or a roughened membrane and vegetations are produced.

Q. Is hypertrophy produced by the obstructions thus offered? — *A.* Yes.

Q. How does the case generally terminate? — *A.* In dropsy.

Q. What is the disease which mostly resembles rheumatism? — *A.* Gout, which see, p. 326.

Q. Is the pathology of the disease settled? — *A.* No.

Q. What are the lesions generally met with? — *A.* All the effects of inflammation in the region of the heart. (See *Pericarditis.*)

Q. Does there appear to be much inflammation in the joints? — *A.* Yes; and it appears also of a specific character.

Q. Which side of the heart is generally affected? — *A.* The left.

Q. What are some of the causes of rheumatism? — *A.* It may be hereditary, or produced by checked perspiration, and cold; and it sometimes appears without any assignable cause.

Treatment. — *Q.* What are the principal objects to be kept in view in the treatment of this disease? — *A.* 1, To limit the dissemination of the disease; 2, to moderate inflammation when it does occur; 3, to moderate the affection of the joints, and prevent it becoming chronic; 4, to procure sleep.

Q. How would you answer these indications? — *A.* By general bleeding, and purgatives of the saline character.

Q. Should opiates ever be used? — *A.* Yes; they are of decided benefit.

Q. Are cooling drinks beneficial? — *A.* Yes.

Q. What parts should be the subject of especial care? — *A.* The joints of the hands and feet, because they are subject to the chronic disorder.

Q. What are some of the best applications? — *A.* Leeches, lukewarm poultices, or poppy-head poultices, or blisters.

Q. Should the blisters be kept open? — *A.* No; but reapplied when necessary.

Q. What should be the diet? — *A.* Light articles, as the broths and wheys, with cooling drinks.

Q. Should there be any danger from an affection of the heart, what is necessary? — *A.* Bloodletting, either general or local; and repeated local bloodletting, by cups and leeches.

Q. Should these means be applied early? — *A.* Yes; especially when there is anything of endocarditis.

Q. When should blisters be applied? — *A.* When depletion by venesection has been carried far, and the general excitement and heat of surface is diminished.

Q. Would you keep the blistered surface open? — *A.* No; but allow it immediately to heal, and renew the blister on the return of pain.

Q. Is mercury of so great advantage as it has been reported? — *A.* No.

Q. Are cups to the spine ever beneficial in this disease? — *A.* Yes; especially when there appears a neuralgic complication.

Q. What are some of the remedies which have held a reputation in this disease? — *A.* Colchicum, calomel and opium, Dover's powder, tart. ant. et potas., cimicifuga racemosa, cinchona, green hellebore, aconite, delphinia, veratria, hyos., potas. iodid., &c.

Q. Have the warm springs of our country any beneficial tendency? — *A.* Yes.

Chronic Rheumatism. — *Q.* When does chronic rheumatism usually appear? — *A.* As a sequel to the acute, but often without any previous acute attack, and also entirely independent of it.

Q. Has it any of the characteristics of the acute disease? — *A.* Yes; the principal difference lies, however, in the less activity of the attack and the indefinite duration of the symptoms.

Q. What effect has it upon the joints? — *A.* The same as in the acute variety: ligaments become thickened, and the form of joints become changed, and their motions injured.

Q. When is the pain more acute? — *A.* By night, and worse in moist than in dry weather.

Q. In a less active form of chronic rheumatism, what are the symptoms? — *A.* The symptoms of the acute disease above enumerated are greatly modified.

Q. Does this form generally impair the health of the patient? — *A.* No.

Q. Does the heart become affected in primitively chronic rheumatism? — *A.* No.

Treatment. — *Q.* Is this form of the disease easily cured? — *A.* No.

Q. From what are we most likely to derive benefit? — *A.* From local treatment.

Q. What are some of the principal of these local means? — *A.* Local bleeding, then blistering, and dressing the blister with morphia.

Q. What are some of the general remedies? — *A.* Diaphoretics, as Dover's powder, guaiac., sarsap., camphor; and, if fever exists, first use the saline cathartics.

Q. Are warm baths beneficial? — *A.* Yes.

Q. What medicine has lately enjoyed a great reputation? — *A.* Potas. hydriod.

Q. Are frictions beneficial? — *A.* Yes.

Q. What are some of the other means? — *A.* Thermal mineral waters, and residence in warm climates.

Q. What is that variety of rheumatism called where the muscles of the loins are affected? — *A.* Lumbago.

Q. Is this very painful? — *A.* Yes; the patient is sometimes unable to move or to change his position.

Q. What is generally the cause of lumbago? — *A.* Lying on the damp earth, and by violent effort of the lumbar muscles.

Q. What is pleurodynia? — *A.* An acute pain resembling pleurisy, without the physical signs and general symptoms of pleurisy.

Q. Where is this pain generally felt? — *A.* A little below the breast, and it is increased by pressure and the usual causes.

Q. Do we have fever in pleurodynia? — *A.* Very seldom.

Q. How is pleurodynia produced? — *A.* By cold, or other general exciting causes.

Q. What is necessary to be done in these various varieties? — *A.* In lumbago we may cup the loins; narcotic liniments are also beneficial; keep the patient in bed, blister, and use the preparations of opium.

Q. What is necessary in pleurodynia? — *A.* Sinapisms, narcotic liniments, cupping, leeches, and the opiate preparations.

Q. May rheumatism attack the substance of the heart? — *A.* Yes, and cause hypertrophy.

GOUT.

Q. What do you understand by this affection? — *A.* A constitutional disease, depending upon a peculiar diathesis, and manifesting itself by local inflammation and fever.

Q. What class of society does it affect? — *A.* The rich and well fed; and attacks the male rather than the female portion of the community.

Q. Which seasons of the year is it most prevalent? — *A.* The spring and autumn.

Q. What are the symptoms of acute gout? — *A.* Disorder of the digestive functions, with flying pains, drowsiness, restlessness, &c.

Q. When does the patient first experience the greatest inconvenience? — *A.* In the ball of the great toe; and followed by great swelling, tenderness, and high colour; and afterwards it becomes œdematous.

Q. What now generally happens? — *A.* Sudden release from pain by gentle perspiration, and the patient falling into a gentle sleep.

Q. Do these symptoms return? — *A.* Yes, the next day; and so continue diminishing and increasing for from five to ten days.

Q. Does anything occur to the cuticle of the affected part? — *A.* It generally peals off.

Q. How is the condition of the patient during this time? — *A.* There is a loss of appetite with increased thirst, and the urine deposits, on cooling, an abundant brick-coloured sediment.

Q. May not local injury produce gout? — *A.* Yes.

Q. Do these attacks frequently return? — *A.* Yes; as long as we have causes existing which foster a gouty diathesis.

Q. Do these attacks ever observe periodicity? — *A.* Yes.

Q. Do we often have gouty twinges before the attack? — *A.* Yes.

Q. May not several joints suffer in succession? — *A.* Yes.

Q. Do we have effusion into the cavities of the joints? — *A.* Yes.

Q. When the effusion is great, does the patient suffer much? — *A.* Yes; and fever is induced, with all the sequelæ.

Q. How is convalescence from gout indicated? — *A.* By diminution in the febrile exacerbations, restoration of healthy urine, and return of appetite.

Q. Are not the joints sometimes left very feeble? — *A.* Yes; but time causes a strengthening of them.

Q. What is that condition in which the patient is left, when, as the fever subsides, the local affection becomes less inflammatory? — *A.* Chronic gout.

Q. What is the colour of the parts affected in this state? — *A.* They are of a natural colour, or less red than in the acute variety.

Q. What are some of the other peculiarities of this variety? — *A.* The pain in the joints are more wandering, alternating with pain and cramp in the stomach; and the patient is watchful and restless, and the limbs are disabled.

Q. How is the general health of the patient? — *A.* Much impaired; the countenance is haggard, and there is languor, debility, and depression of spirits, with the digestive functions injured.

Q. Does chronic gout invariably follow acute? — *A.* No; but it may arise chronic from the commencement.

Q. What do we find in these cases? — *A.* Chalky concretions in the joints, sometimes of a very considerable amount.

Q. In what state is this effused? — *A.* In a semifluid state, as the hydrated lithate of soda.

Q. What becomes of the more fluid parts of this? — *A.* It is absorbed, and leaves behind a hard layer of the above.

Q. Where do you find the most of these concretions? — *A.* In the joints of the hands and feet.

Q. Do these concretions cause much pain? — *A.* Yes; from the pressure of these masses upon the joints.

Q. What seems to be the principal deposition in the urine? — *A.* Lithate of soda, tinged with the purpurate of soda.

Q. What are the external parts which seem most liable to attacks of gout? — *A.* Fibrous tissue; as the aponeurosis of muscles, the sclerotica, cartilages of the nose, &c.

Q. When does gout put on its most alarming aspect? — *A.* When it attacks internal organs.

Q. When gout leaves the exterior of the body, and recedes to the internal organs, what name does it hold? — *A.* Retrocedent gout.

Q. Where does this retrocession most generally take place? — *A.* To the stomach and bowels.

Q. Do we ever have retrocession to the dura mater? — *A.* Yes; and symptoms of apoplexy or cerebral congestion appear.

Q. What are some of the symptoms of gout in the stomach? — *A.* Vomiting, hiccup, great pain, and, when the bowels are affected, profuse diarrhœa; fever is present; and if the patient is not soon relieved collapse follows, and the patient dies.

Q. What is necessary to be noticed in the two varieties of gout in the stomach? — *A.* The chronic variety is not inflammatory in its character, and the acute is; and the difference between the two may be learned from the history of the cases.

Q. With what disease is gout most likely to be confounded? — *A.* Rheumatism.

Q. From what are we to judge? — *A.* From the former history of the patient.

Q. What are some of the symptoms differing from rheumatism? — *A.* Œdema of the affected parts, and desquamation of the cuticle; this is not seen in rheumatism. The variation from day to day is greater in this than in rheumatism. There is also very little, if any, perspiration in gout, &c.

Q. What is the pathology of this disease? — *A.* It is inflammatory in character, sometimes hereditary, and chalky concretions are formed in the joints and tendons.

Q. What is this chalky concretion supposed to be dependent upon? — *A.* Upon a super-abundance of lithates in the blood.

Q. What are some of the effects of gout upon the parts attacked? — *A.* The joints are stiffened, the muscles dwindle, and the ligaments lose their elasticity.

Q. What is the character of the stomach? — *A.* It presents a very peculiar appearance, not easily described.

Q. What are some of the causes of gout? — *A.* High living, excessive use of malt liquor, and animal food, and stimulants generally.

Treatment. — *Q.* What is considered the most approved treatment? — *A.* The treatment of this affection has been very various, and with different degrees of success.

Q. In a mild attack, will a paroxysm pass off without much medical aid? — *A.* Yes.

Q. Is the old notion that an attack of gout acts as a safety-valve to the system correct? — *A.* No.

Q. Is bleeding of advantage in gout? — *A.* No; unless the patient is very plethoric.

Q. What is necessary to be done in a mild attack? — *A.* To keep the patient quiet, slight purgation, by means of magnesia, and restricting the diet to light farinaceous articles, and applying evaporating lotions to the part immediately affected.

Q. What remedy has had a great reputation in this disease? — *A.* Colchicum.

Q. Is leeching of the part affected of utility? — *A.* Yes.

Q. When pain is very severe, are opiates justifiable? — *A.* Yes.

Q. What was a famous remedy in this affection? — *A.* The Eau medicinale d'Husson.

Q. What are some of the other remedies that have been used? — *A.* Aconitia, delphinia, veratria, &c.

Q. What should be given to overcome the lithic diathesis? — *A.* The alkalies and alkaline earths.

Q. When we have chalky concretions, what remedy is of decided advantage? — *A.* Iodine.

Q. In retrocedent gout, what is necessary to be done? — *A.* Treat the symptoms as they arise, according to general rules, and endeavour to bring back, by revellents, &c., the gout to the original seat of attack.

Q. In regard to the regimen, what plan would you adopt? — *A.* Modify the diet; and if the patient has been accustomed to extraordinary stimulation, reduce the quantity of stimulus.

Q. What means would you adopt to prevent an attack? — *A.* Use gentle exercise, and pay attention to the digestive function. See *Dyspepsia.*

DISEASES OF THE RESPIRATORY ORGANS, ETC.

LARYNGITIS.

Q. What is meant by laryngitis? — *A.* An inflammation of the submucous cellular membrane of the larynx, causing œdematous effusion into it.

Q. How is this disease divided? — *A.* Into acute and chronic.

Acute Laryngitis. — *Q.* What are the symptoms of the acute variety? — *A.* It often commences as an ordinary cold; and the throat soon becomes husky, followed by tenderness, pain, constriction of the larynx, and with a difficult and prolonged sonorous respiration.

Q. What is the condition of the larynx when viewed? — *A.* It is generally red and swollen, and this extends to the epiglottis.

Q. Has the patient fever? — *A.* Yes; at first it is inflammatory, but if the respiration is much impeded, it changes to one of an opposite character.

Q. When the respiration is much impeded, what are the signs? — *A.* Anxiety of countenance, lips are livid, nostrils dilated, and the voice a whisper; and all the signs of suffocation are present.

Q. In how short a time has death been known to take place? — *A.* In seven hours from the first attack.

Q. Is there another variety of acute laryngitis? — *A.* Yes, the asthenic.

Q. What are the peculiarities of this form? — *A.* Absence of inflammatory fever, and sometimes of pain in the larynx, and difficult deglutition; but the other symptoms of the two varieties are alike.

Q. What sometimes takes place in this variety? — *A.* Œdema of the glottis; and the disease is often very rapid in its progress.

Q. What are some of the causes of acute laryngitis? — *A.* Exposure to cold and wet; or it may arise from tonsillitis, or by swallowing boiling or corroding liquids; and it often occurs in the course of the eruptive fevers.

Q. What are some of the pathological characters? — *A.* Injection and thickening of the lining membrane, and œdema of the cellular tissue; inflammation of the epiglottis, with the production of serum and pus in the cellular tissue; and in the œdematous variety the folds of the glottis are so distended as nearly to close the orifice.

Q. What are some of the diagnostic marks of this affection? — *A.* Hissing respiration, the seat of pain, the visible condition of the epiglottis, and absence of pectoral signs, distinguish it from disease of the chest. External abscesses may lead us sometimes in the error, if not on our guard. It may also be distinguished from spasmodic affections by want of fever, and suddenness of the attack, &c.

Q. What is the prognosis in this disease? — *A.* Unfavourable, especially when the disease has lasted long, and the difficulty of breathing has increased.

Q. What are some of the most untoward signs? — *A.* Lividity of countenance, and obtuseness of the faculties from impeded circulation.

Treatment. — *Q.* Does this disease require early and energetic treatment? — *A.* Yes; none more so.

A. What are the indications? — *A.* 1, To prevent effusion by reducing inflammatory action; 2, when effusion has taken place, to prevent obstruction which it causes to respiration from producing mortal injury to the functions; 3, to promote the removal of the effused matter.

Q How would you answer the first of these? — *A.* By free bloodletting, but not to syncope; leeches and cups, locally, and repeated bloodletting, if necessary; calomel and tart. ant., as an alterative; counter-irritation to side of neck; inunction with the hydrarg. ungt., &c.

Q. If notwithstanding all that has been done the symptoms increase, what is necessary? — *A.* The operation of bronchotomy.

Q. How long a time should bronchotomy be postponed? — *A.* Sometimes for not more than thirty minutes, especially when the danger is imminent.

Q. What is sometimes necessary? — *A.* To apply counter-irritation to the top of the chest, especially if there are any signs of bronchitis.

Q. What is the most suitable treatment for the asthenic variety? — *A.* To put the system as quick as possible under the influence of mercury, and apply counter-irritation and depletion to prevent effusion.

Q. What is necessary to be done in some of those cases? — *A.* To resort immediately to bronchotomy.

Q. What are some of the sequelæ of this disease? — *A.* Asthenic bronchitis, pneumonia, arachnitis, &c.

Chronic Laryngitis. — *Q.* Which is the more common, this or the acute variety? — *A.* This.

Q. To what does this affection often succeed? — *A.* To a neglected catarrh, in those exposed to the vicissitudes of weather.

Q. What are some of the symptoms of this affection? — *A.* Hoarseness and husky cough; soreness in larynx, felt by local pressure or swallowing; change of voice; increased sensibility of the larynx, from slight causes; and sometimes purulent expectoration.

Q. Does the respiration become affected? — *A.* Yes; and the difficulty of breathing appears more at night; and we have sometimes the dyspnœa increasing continually until death takes place.

Q. What disease do we generally have in combination with this? — *A.* Tubercles in the lungs.

Q. What are some of the causes? — *A.* It may arise from the acute variety, or from frequent catarrhal inflammation, especially in the intemperate; also from anything that may act as a continual stimulus to the organ.

Q. What are some of the pathological characters? — *A.* Redness and roughness of the mucous lining; thickening of the submucous tissue; contraction of the ligaments, and general degeneration of the muscles; ulceration of the mucous and submucous tissues, and sometimes necrosis of the cartilages.

Q. What are the principal diagnostic marks? — *A.* Permanent change of voice and peculiar cough, hissing breathing, and pain or tenderness of the larynx on pressure.

Q. What is the prognosis of this affection? — *A.* In mild cases and good constitution it is favourable, but in scrofulous habits, and where we have tubercles, it is bad.

Treatment. — *Q.* What are the indications for treatment? — *A.* To subdue chronic inflammation, to remove its bad effects, to relieve urgent symptoms as they arise, and to improve the general health.

Q. What is the first thing requisite? — *A.* A perfect rest of the parts, and protection from irritating particles in the air.

Q. Is local bleeding ever necessary? — *A.* Yes; by leeches applied at the sides of the larynx.

Q. Is counter-irritation beneficial? — *A.* Yes.

Q. How would you modify diseased texture, and promote absorption of the effused part? — *A.* By a mercurial course, if there are no tubercles.

Q. If mercury is hurtful, what other remedy would you apply? — *A.* Iodine.

Q. What are some of the local applications? — *A.* Argt. nit., cupri sulph., hyd. c. corros., applied by means of a brush or strong solution, &c.

Q. What is necessary to relieve urgent symptoms? — *A.* When spasmodic cough is present, we use belladonna, camphor, ether, and opium, &c.

Q. How would you answer the third indications? — *A.* By alterative tonics, good diet, and air.

TRACHEITIS.

Q. What is the common name for tracheitis? — *A.* Croup.

Q. What are the symptoms of this affection? — *A.* The first signs are not distinctive, and seem essentially those of the catarrhal kind.

Q. When the affection is at all developed, what do we have? — *A.* Stridulous respiration; a cough, of a rough, barking, ringing kind, followed by sonorous respiration, and the voice is very hoarse.

Q. What are some of the other symptoms? — *A.* Intense excitement of the circulation, hot skin, flushed face, anxious countenance, &c.

Q. When do these symptoms generally occur? — *A.* At night; and then we have a slight remission, and an exacerbation, with increase of symptoms, on the next night, &c.

Q. If the disease continues, is the respiratory function much impeded? — *A.* Yes; it becomes almost entirely stopped.

Q. Is there cough present? — *A.* Yes; and sometimes, in the act of coughing, the patient discharges a thick, tenacious substance from the trachea.

Q. Does the voice become changed? — *A.* Yes; it becomes hoarse and whining, and sometimes suppressed.

Q. How long a time may elapse before the disease reaches its height? — *A.* Sometimes in twenty-four hours, and sometimes in several days.

Q. What generally marks the stage of collapse? — *A.* Failure of the vital powers; difficulty of breathing being undiminished; pulse weak, thready, and irregular; cough more suppressed; voice gone; face swollen and livid; skin cold and clammy; and, if in an infant, we may have convulsions.

Q. May patients recover even in this stage? — *A.* Yes; by the throwing up of the albuminous exudation.

Q. Are there many varieties of this? — *A.* Yes; the sthenic and asthenic.

Q. Who do these varieties attack? — *A.* The sthenic attacks the robust and plethoric; the asthenic, the debilitated.

Q. In whom does the spasmodic form of inflammatory croup occur? — *A.* In irritable children, and those of a nervous temperament.

Q. What are the pathological characteristics? — *A.* In early death we find injection of the mucous membrane of the larynx, trachea, and bronchi; and, at a more advanced stage, we have albuminous concretion upon the mucous membrane; and, in very inflammatory cases, we have this membrane thick and tenacious; and sometimes the lungs are also implicated.

Q. Has there yet been any satisfactory account of the nature of croup? — *A.* No; many and various opinions have been advanced, but the question is yet unsettled.

Q. What are the diagnostic marks of this disease? — *A.* The peculiar sound of the breathing, cough, and altered voice; and when the disease is far advanced, we may diagnosticate it from disease of the lungs, by the intercostal spaces being well filled up in breathing, and by a good sound on percussion; and it may be distinguished from spasm of the glottis, and hysterical affections, by fever being present, and the general history of the case.

Q. What are the causes of this disease? — *A.* Exposure to cold and wet; eating indigestible articles; and sometimes it appears to be hereditary.

Q. Who are more frequently attacked? — *A.* Children, from one to six years.

Q. What is the prognosis? — *A.* Very unfavourable, especially if it is not attacked vigorously, and when it occurs in very young patients.

Treatment. — *Q.* What are the indications for treatment? — *A.* To diminish febrile action, to prevent formation of false membrane and albuminous exudation in the air passages; and when these have formed, to promote their expulsion, and to subdue spasm; and lastly, to support the powers of life in the latter stages, so as to prevent spasm, and to enable the trachea to throw off the matters exuded.

Q. How would you answer the first indication?—*A.* By an emetic of tart. ant. et ipecac. warm bath, and mercurial purgative.

Q. If the symptoms do not yield, what then is necessary? — *A.* Bloodletting freely; and leeching, and cupping.

Q. What is necessary in the second stage? — *A.* Still to pursue the antiphlogistic course, by administration of antimonials and mercurials, frequently repeated. Blisters have been recommended, but must be used with caution. Counter-irritation is highly beneficial.

Q. How is the second indication answered? — *A.* By emetics and expectorants.

Q. Which are the best? — *A.* While the pulse is full, tart. ant. is excellent; and when the inflammatory symptoms have subsided, squills and vin. ipecac. are good.

Q. Are alkaline medicines beneficial? — *A.* Yes.

Q. Are inhalations beneficial? — *A.* Yes.

Q. How would you assist in reducing spasm? — *A.* By means of antispasmodics, internally and externally.

Q. In the last stage, when we have prostration, what is necessary? — *A.* Administration of stimulants and cordials, as burnt brandy, ammonia, &c.

Q. What should guide you in the treatment of the modifications of croup? — *A.* General principles.

Q. Is tracheotomy of any advantage in croup? — *A.* Not generally.

Q. Are relapses frequent in this disease? — *A.* Yes; and we should watch our patient carefully.

Q. Do we ever apply substances immediately to the throat? — *A.* Yes, sometimes; and those, too, that are applicable to chronic laryngitis.

LARYNGISMUS STRIDULUS.

Q. What is the history of this affection? — *A.* The attack comes on during sleep; the child starts suddenly; struggles for breath; face flushed, and swollen, and purple; and after repeated efforts, we have long inspiration, accompanied with a hooping or crowing noise.

Q. What sometimes cause these attacks? — *A.* Irritation or tossing in the air by the nurse, or sudden exposure to cold air.

Q. At what period does this generally attack children? — *A.* During the period of dentition, and it may occur frequently during the day.

Q. What sometimes is the state of the hands and feet? — *A.* They are convulsively contracted, and the thumbs convulsively clenched on the palms of the hands, and the great toe drawn in; and sometimes general spasm is present.

Q. Is this a nervous affection? — *A.* Yes.

Q. What is the prognosis? — *A.* Various, as the disease may depend upon different causes; if it proceeds from intestinal or dental irritation, it will disappear as these are relieved; but if it depends upon cerebral influence, the danger is greater.

Q. What may be done to relieve the spasm? — *A.* Dash cold water in the face; blow in the ear; use the antispasmodics; tobacco enema, &c.

Q. How would you prevent it? — *A.* By removing the cause of irritation, improve the general health and tone of the nervous system.

Q. Is the dietetic management of importance? — *A.* Yes; great.

Q. Is change of air beneficial? — *A.* Yes.

Q. Are adults ever troubled with spasm of the glottis? — *A.* Yes.

Q. What are some of the causes of this disease? — *A.* Pressure upon the larynx and trachea, or upon the nerve, from foreign bodies in the larynx or œsophagus; from aneurism of the arteria innominata, &c.

Q. What is the prognosis? — *A.* Unfavourable, as long as the original affection is of serious import.

Q. What is necessary to be done? — *A.* To observe perfect quiet, and the use of antispasmodics.

Q. Do we ever have anything like croupy affections in females? — *A.* Yes; especially the hysterical.

Q. What is necessary for relief? — *A.* The remedies proper for hysteria; the use of cold douche; spirits of ammonia to nostrils, &c.

Q. What are some of the morbid productions in the larynx and trachea? — *A.* Hypertrophy of cartilages; ossification of cartilages; tubercles; polypoid, and other tumours.

Q. Do foreign bodies ever escape into the larynx and trachea? — *A.* Yes.

Q. How would you dislodge them? — *A.* By an emetic, or the means pointed out by the surgeon.

BRONCHITIS.

Q. Under what head are catarrhs usually treated? — *A.* Under that of bronchitis; they being generally the milder forms of bronchitis.

Q. To what disease has the term bronchitis been applied? — *A.* To the various diseases of the respiratory organs.

Q. Is this correct? — *A.* No; the term should be exclusively applied to inflammation of the bronchial mucous membrane.

Q. How has bronchitis been divided? — *A.* Into the acute and chronic.

Q. How are the symptoms of these varieties divided? — *A.* Into local and general.

Q. What are the general signs? — *A.* Febrile excitement, enfeebled strength, &c.

Q. What are the local signs? — *A.* Cough, expectoration, soreness of the chest, and change in the respiratory murmur.

Q. What kind of a rhonchus do you have at the commencement? — *A.* Sonorous; and this is heard more especially in the larger tubes, while in the smaller tubes we have sibilant, or whistling.

Q. Are these sounds always heard? — *A.* No.

Q. Is feebleness of respiration a more constant sign? — *A.* Yes.

Q. What is the condition of the chest when percussed? — *A.* Clear during the first stage, but becomes rather dull as the disease advances and the tubes become filled.

Q. What marks the second stage? — *A.* That of secretion.

Q. What sounds have we now? — *A.* The moist mucous, and subcrepitant, varying with the tubes affected.

Q. What is the character of the expectoration? — *A.* At first it has nothing peculiar, but as the disease advances to resolution, or passes on to the chronic form, we have it then transparent, consisting of thin mucus; or thick, opaque, and of a whitish colour.

Q. Is purulent matter ever mixed with it? — *A.* Yes, if the disease is very intense.

Q. As the disease diminishes, what takes place? — *A.* The sputa diminishes gradually.

Q. What are the general signs? — *A.* Chilliness, followed by fever; the pulse is from 80 to 90 in the minute; with thirst, anorexia, and headache.

Q. What is the duration of acute bronchitis? — *A.* A few days; and generally terminates favourably.

Q. What is the pathological characters of this affection? — *A.* We find the mucous membrane alone involved, with injection of the mucous membrane, ecchymosis, thickening, and induration.

Q. Is there any difference in anemic patients? — *A.* Yes, the membrane is found pale and opaque.

Q. Are ulcerations frequent? — *A.* No.

Q. Is there ever an effusion of lymph and formation of false membrane? — *A.* Yes.

Q. Do we ever have serous effusion in the submucous cellular tissue? — *A.* Yes; and consequent œdema.

Q. When this disease occurs as a primary affection, or, on the contrary, as a secondary, what is the prognosis? — *A.* When primary, and the disease of only partial extent, it is favourable; but when it depends upon a secondary affection, as tubercles, it is unfavourable.

Q. What is the treatment of this affection? — *A.* When the patient is of full habit, and much fever, the lancet is decidedly indicated, and antiphlogistics generally and counter-irritants; but in mild cases, we resort to nauseating and stimulant diaphoretics and expectorants.

Q. Which are considered the best diaphoretics? — *A.* The vegetable.

Q. What other articles are sometimes used? — *A.* Combination of tart. ant. et ipecac.

Q. Are cough mixtures beneficial? — *A.* Yes.

Q. What are the general constituents of a cough mixture? — *A.* A narcotic, a nauseating or stimulating ingredient, and some mucilaginous matter.

Q. What are some of the modifying circumstances in the treatment of this disease? — *A.* Age, and the previous general health of the patient.

Q. What two periods of life are peculiarly liable to this affection? — *A.* That of childhood and old age.

Q. What is the peculiarity in children? — *A.* Its tendency to spread and pass into lobular pneumonia.

Q. Which lung is more apt to be affected? — *A.* The right.

Q. What are the physical signs in lobular pneumonia? — *A.* Very slight, dry rhonchi; and we have subcrepitant rhonchus heard nearly always. The sound on percussion is clear, except when the tubes have been closed for some time.

Q. What are the other symptoms? — *A.* Loose cough, orthopnœa, flushing of the whole face, of a purplish hue, great febrile excitement, and cerebral symptoms.

Q. What is the best treatment? — *A.* Local depletion, when necessary; nauseating expectorants, as ipecacuanha in syrup, and if much mucus is present in the tubes, sufficient to produce emesis; squills are also beneficial; sinapisms, &c.

Q. Would you not frequently change the position of the child? — *A.* Yes; never allowing it to remain more than two hours in the same posture.

Q. In taking blood, what should guide you? — *A.* The paleness of the patient, and not the pulse; and in leeching, you should always be present.

Q. What are the peculiarities of bronchitis in old men? — *A.* In its attacking the smaller tubes and simulating pneumonia, and hence has been called *peripneumonia notha.*

Q. From what does the patient suffer? — *A.* From dyspnœa, especially if the patient labours under emphysema.

Q. Should your patient be robust, and you are called early, what is necessary to be done? — *A.* To resort immediately to venesection.

Q. When secretion has taken place, and the patient is reduced, what is the danger in bleeding? — *A.* It prevents the expectoration, and causes greater dyspnœa.

Q. What are the remedies, then, on which we rely? — *A.* Vegetable emetics, in small doses, and expectorants of a stimulating character, such as serpentaria or carb. ammon.

Q. When the secretion is lymph-like and tubular in form, what remedies are best adapted to the case? — *A.* Emetics and expectorants, and sometimes a resort to the mercurials.

Q. To what diseases is acute bronchitis a usual accompaniment? — *A.* To measles, typhoid fevers, and most of the exanthematous affections.

Q. What affections peculiarly favour the development of bronchitis? — *A.* Disease of the heart and lungs.

Chronic Bronchitis. — *Q.* From what does this form originate? — *A.* Sometimes it is chronic from its commencement; at others it follows the acute variety.

Q. There are several varieties, what is the character of the common mucous catarrh? — *A.* A secretion of white mucus, sometimes puriform, and in irregular shreds.

Q. What is the character of the febrile excitement? — *A.* Generally mild, and greater at night than day.

Q. What are the physical signs? — *A.* Moist rhonchus, now subcrepitant, and now coarse mucous; and the respiration is sometimes loud and at others feeble; the latter generally preponderating.

Q. By what, however, is our diagnosis made more sure? — *A.* By the absence of the signs which other affections of the chest present.

Q. What disease often follows in the wake of this disease? — *A.* Tuberculous phthisis.

Q. What is the treatment in this form of bronchitis? — *A.* That of acute bronchitis; and a free use of some of the balsamic preparations.

Q. What should be our advice in regard to hygienic means? — *A.* If the disease is at all acute, confine your patient to the house; and if not acute, allow him to walk out in mild and pleasant weather; and sometimes a sea-voyage may be prescribed, and wearing of warm articles of clothing.

Q. What are the characteristics of pituitary catarrh? — *A.* It does not follow the acute affection; and the local signs are those of the various rhonchi, both dry and moist, and a preponderance of the moist over the dry; and sometimes all the rhonchi are heard at once.

Q. Is there much fever? — *A.* No.

Q. What does it resemble? — *A.* The more acute varieties of catarrh; but is more intractable.

Q. What is the treatment in this variety? — *A.* Nauseating expectorants. Lobelia is very beneficial. Bals. copaib., venice turpentine, &c.

Q. How would you prevent an attack of it? — *A.* By the use of cold affusion and quinine.

Q. What other variety do you find? — *A.* Dry catarrh; in which there is little or no expectoration.

Q. What is the prominent lesion in this variety? — *A.* Thickening of the mucous membrane.

Q. Is there much febrile excitement? — *A.* No.

Q. What is the nature of the cough? — *A.* Short and dry.

Q. What is the state of the percussion? — *A.* Sonorous throughout, and sometimes more so than natural, from emphysema being present.

Q. What is the state of the respiration? — *A.* Feeble; and sometimes a rough rustling sound is heard; the dry rhonchi is sometimes also heard.

Q. Where is the sibilant rhonchus usually confined? — *A.* To the anterior portion of the chest.

Q. What other complication, besides emphysema, do we often meet with? — *A.* Hypertrophy and dilatation of the heart.

Q. Is the duration of this disease longer than that of the other varieties? — *A.* Yes; and renders other acute affections which arise more difficult to manage.

Q. On what does the treatment of this disease depend? — *A.* Principally upon hygienic means; as warm clothing, protection from vicissitudes of weather; and if the patient insists upon medicines, the alkalies are decidedly beneficial.

Q. What is chronic bronchitis frequently coexistent with? — *A.* Tuberculous phthisis.

Q. Is not bronchitis sometimes dependent upon constitutional taint? — *A.* Yes; it may arise from syphilis or scrofula, and it then should be treated as these diseases generally are.

PERTUSSIS, OR HOOPING-COUGH.

Q. What do you understand by hooping-cough? — *A.* A peculiar state of the nervous system, accompanied with bronchitis.

Q. How often does this affection generally attack an individual? — *A.* Once in a life-time.

Q. Who are the subjects most affected? — *A.* Children.

Q. What is the character of the affection as regards duration? — *A.* It is self-limited; cannot be cured, but may be mitigated.

Q. Do patients suffer from the bronchitis attending it? — *A.* Yes; in that lies the chief danger.

Q. Is the secretion greater in this than in the ordinary varieties of bronchitis? — *A.* Yes; and it tends to the lower parts of the tubes, thereby causing dilatation.

Q. When a fatal termination takes place, what is the cause? — *A.* Feebleness of the patient, and a consequent inability to expectorate; or in children, to discharge the secretion by vomiting, or on account of the lungs becoming implicated.

Q. Does the parenchyma of the lungs become affected? — *A.* Yes; and we then have pneumonia.

Q. What is the peculiar mark of the affection? — *A.* The hooping character of the inspiration; and its paroxysmal nature.

Q. What is the character of the rhonchi? — *A.* Both dry and moist, and sometimes gurgling, from the collection of mucus.

Q. What is the character of the secretion? — *A.* Thick, glairy mucus; and it sometimes contains pus intermixed with blood.

Q. What is the character of the countenance? — *A.* Bluish in colour, with puffed eyelids.

Q. When fever occurs, what are we to fear? — *A.* Inflammation of the lungs.

Q. Is the diagnosis difficult? — *A.* No; not after the second week; we then have the paroxysms, hooping, &c.

Q. What is the prognosis? — *A.* Favourable, when uncomplicated.

Q. What should be our aim in the treatment? — *A.* To promote the secretion into the tubes, and favour its removal.

Q. What remedies favour this? — *A.* Mild emetics, during the day, for a week or two, and then mild nauseating expectorants, as ipecacuanha. Assafœtida is of great service, as it also influences the nervous system.

Q. Are revulsives to the chest serviceable? — *A.* Yes; especially sinapisms.

Q. What remedy has been found very beneficial? — *A.* Belladonna.

Q. Is change of air beneficial? — *A.* Yes.

Q. Is this disease contagious? — *A.* Yes.

PLEURISY.

Q. What do you mean by pleurisy? — *A.* Inflammation of the serous membrane covering the lungs and lining the thoracic cavity.

Q. How many varieties are there? — *A.* Three; 1, simple pleurisy; 2, pleurisy with tubercular complication; and 3, pleurisy complicated with acute lesion of the parenchyma of the lungs.

Q. What is the first pathological change which takes place in the membrane? — *A.* Injection of the vessels situated in the sub-serous cellular tissue.

Q. What next takes place? — *A.* Development and effusion of lymph, which is generally deposited at the lower portions.

Q. Is there much difference in the quantity of the lymph effused in persons of different temperaments? — *A.* Yes; in the plethoric and robust the lymph is deposited in larger quantities than in the lymphatic or thin.

Q. Should the inflammation exist for some time unchanged, is pus ever produced? — *A.* Yes.

Q. What circumstances occur during the recovery of the patient? — *A.* As the serum is absorbed the lung and thorax approach near each other, and adhesion is the result.

Q. What takes place in the adhesions? — *A.* They become organised, and new vessels are formed in the lymph.

Q. Is the chest contracted by the adhesion taking place between the pleura costalis and pulmonalis? — *A.* Yes; and in the ratio to the quantity of the liquid exhaled.

Q. What is the character of the fluid? — *A.* Mostly serum, or serum mixed with flocculi of lymph; or there may be purulent matter varying with the stage of the disorder.

Q. What are the physical signs developed by these changes? — *A.* As the fluid increases we have dulness over the seat of the affection increasing to flatness, and this flatness is much more marked at the lower than at the upper portion of the chest, owing to gravitation.

Q. May not this flatness depend upon another cause? — *A.* Yes, upon the production of lymph; and the flatness there does not disappear when the position of the patient is changed.

Q. What are we enabled to judge from the degree of flatness? — *A.* The extent of the effusion.

Q. Does this flatness mark the declining stage accurately? — *A.* No; for the lung requires time to resume its usual elasticity.

Q. Is there ever much enlargement of the affected side? — *A.* Yes; and it varies with the quantity of the fluid effused.

Q. Is the position of the heart ever altered? — *A.* Yes; it may be pressed by the fluid to the right of the sternum or back to the left axilla.

Q. What is the character of the respiration? — *A.* In the early stages feeble, depending either upon pain or effusion.

Q. Do we ever have rude respiration? — *A.* Yes; when the lung becomes condensed, or the effused lymph is dense.

Q. What is the character of the resonance of the voice, when we have bronchial respiration? — *A.* We have bronchophony, with a peculiar quivering in the tone.

Q. What is meant by *egophony*? — *A.* When the bronchial respiration is less loud, the resonance of the voice is less bronchial, and its vibration is increased, resembling the bleating of a goat.

Q. When does this take place? — *A.* When the effused fluid is of moderate density, and it is generally heard from the anterior portion of the axilla to the scapula, and from thence to the spine.

Q. Do we ever have little resonance, and no vibration of the voice? — *A.* Yes; and this depends upon the obstruction of the passage of air through the tubes.

Q. What is another sign of pleurisy? — *A.* The friction sound; but it is very variable, and occurs at the commencement, and at the end of the disease.

Q. What is this dependent upon? — *A.* The almost entire effusion of lymph.

Q. Are the negative signs of great importance in the diagnosis of this disease? — *A.* Yes.

Q. Is the recovery from pleurisy rapid? — *A.* No; and the lung does not recover for some time its natural respiration.

Q. What are the rational signs of this disease? — *A.* Pain, and when severe it is felt near the nipple, and it is acute and lancinating; and this pain may vary in degree, and is greater as the effusion is more extensive.

Q. Is there any cough? — *A.* Yes, in the milder varieties; but it is generally short and insignificant.

Q. How is the respiration performed? — *A.* In the beginning of the disease, when the pain is severe, it is performed mostly with the healthy lung.

Q. How is the decubitus? — *A.* The patient rests upon the healthy side, and when there is much effusion he reclines upon the diseased side, to allow the healthy lung full play.

Q. Does pleurisy have many symptoms in common with other inflammations of the serous tissues? — *A.* Yes.

Q. What do we generally have at the commencement of an attack? — *A.* Chill, followed by heat and sweating.

Q. What is the character of the fever? — *A.* Persistent, with a quick, tense, and small pulse.

Q. Is there much secondary irritation? — *A.* No.

Q. Upon what does the cerebral and intestinal irritation depend? — *A.* Upon the character of the fever.

Q. Is the diagnosis of pleurisy difficult? — *A.* No.

Q. With what is it most likely to be confounded? — *A.* With pleurodynia; but in this the pain is more shifting than in pleurisy.

Q. Is there much difficulty in distinguishing this from pericarditis? — *A.* Yes; especially where the left pleura is affected.

Q. What is the prognosis in pleurisy? — *A.* Favourable in the simple variety; but if the effusion is large, or the disease chronic, it is doubtful; and when accompanied with tubercles, still more doubtful.

Q. What is the treatment of pleurisy? — *A.* Antiphlogistic.

Q. After a general bleeding, would you use local depletents? — *A.* Yes; taking the moment for their repetition when the pain is most acute.

Q. What other applications are necessary? — *A.* Hop poultices and warm fomentations.

Q. Are blisters of benefit? — *A.* Yes; when the active inflammatory symptoms have been checked.

Q. Do they promote absorption? — *A.* Yes; and are hence beneficial in the more advanced stages—small blisters frequently repeated are decidedly so.

Q. How would you guard your patient from relapse? — *A.* By application of a plaster to the side.

Q. What are some of the internal remedies? — *A.* Tart. ant., $\frac{1}{4}$th to $\frac{1}{8}$th gr., to produce diaphoresis in the commencement; followed by hydrarg., nitre, digitalis, squill, and colchicum.

Q. What is the best remedy? — *A.* Hydrarg., in combination with Dover's powder, or ipecacuanha.

Q. Are vegetable diaphoretics beneficial? — *A.* Yes; in the advanced stages.

Q. How do anodynes act? — *A.* As palliatives, and are generally given in combination.

Q. What is the best form to administer opium? — *A.* In Dover's powder.

Q. If little fever still exists, and the patient has still effused fluid in his chest, what hygienic means would you resort to? — *A.* Change of air by a journey.

Q. What is the cause of chronic pleurisy? — *A.* This is difficult always to determine; it may follow a badly cured acute pleurisy.

Q. Is there often much effusion? — *A.* Yes; sometimes very great, and the patient may be unaware of it.

Q. What are some of the signs of chronic pleurisy? — *A.* Emaciation, flabbiness of the muscles, harsh and dry skin, and slight œdema of the limbs, &c.

Q. Is the diagnosis of chronic pleurisy easy without the physical signs? — *A.* No; for it resembles phthisis.

Q. How is the prognosis in this affection? — *A.* Unfavourable, especially if the effusion is large. There is also a liability to the deposit of tuberculous matter in the lungs.

Q. What is the treatment of chronic pleurisy? — *A.* Similar to that of the acute variety; and graduating the remedies to the disease.

Q. Are small blisters beneficial? — *A.* Yes.

Q. How would you administer mercurials? — *A.* So as to favour absorption of the effused fluid.

Q. Are tonics ever beneficial? — *A.* Yes.

Q. Is salt-bathing of service? — *A.* Yes.

Q. Is the operation of paracentesis of much service? — *A.* No.

Latent Pleurisy. — *Q.* What do you mean by latent pleurisy? — *A.* A disease not indicated by the usual functional signs.

Q. Upon what do you found your diagnosis? — *A.* Upon the physical signs and general disorder of the economy.

Q. What are the physical signs? — *A.* Those usual in pleurisy.

Q. What is the general course of the decline of the patient? — *A.* First, slight chill, followed by slight fever, slight anorexia, and thirst, slight hacking cough, no expectoration, slight loss of strength, &c.

Q. With what disease is it liable to be confounded? — *A.* Pulmonary phthisis.

Q. What is the treatment? — *A.* That of the ordinary chronic form.

Q. Is latent pleurisy ever a secondary affection? — *A.* Yes.

Q. When it occurs during the course of a disease of the lungs, where is it most apt to develope itself? — *A.* Where the portions of lung which is nearest the serous membrane is affected, as in pneumonia, gangrene, and phthisis.

Q. To what, however, do you chiefly direct your treatment? — *A.* To inflammation of the parenchyma, which is the cause of the pleurisy.

Q. When we have much effusion, which is generally the more grave affection? — *A.* The pleurisy.

Q. Is tuberculous pleurisy a disease of importance? — *A.* Yes; and it may either follow pleurisy, or *vice versâ*.

Q. Does tuberculous disease follow this affection or pneumonia more frequently? — *A.* This disease.

PNEUMONIA.

Q. What do you mean by pneumonia? — *A.* Inflammation of the parenchyma of the lungs.

Q. How does it commence? — *A.* Either as bronchitis, or it may arise in the substance of the lungs from the very commencement.

Q. When the bronchi are first affected, and the secretion takes place, does the disease soon yield? — *A.* Yes.

Q. When the lobules are first affected, what takes place? — *A.* The exit for the secretion is closed, and we have accumulations causing congestion.

Q. What is the character of the fluid? — *A.* Bloody serum; and it may pass through the stages of lymph and pus.

Q. How many stages is pneumonia divided into? — *A.* Four.

Q. What are they? — *A.* 1st, engorgement; 2d, hepatization; 3d, yellow induration; 4th, softening down and removal by expectoration.

Q. What are the physical signs? — *A.* In the first stage we have rude respiration with crepitant rhonchus, and the percussion flat or dull. In the second and third stages we have bronchial respiration, in large tubes, and feeble elsewhere; mucous and subcrepitant rhonchus, and imperfect bronchophony, with percussion flat. In the fourth stage we have cavernous respiration with gurgling, with percussion flat.

Q. May not several of these stages exist in the same lung? — *A.* Yes.

Q. When the patient recovers, what course does the disease take? — *A.* It retraces the same steps that it has taken when approaching; and hence we call the signs, the signs of return.

Q. Do all the signs of the affection immediately subside? — *A.* No; the bronchial respiration and flat percussion require time.

Q. Is there no exception to this law of return? — *A.* Yes; in the third stage we have the mucous rhonchus first observed, and in the fourth stage we have the secretion of pus becoming less and less.

Q. Does pneumonia always follow these rules? — *A.* Not always, except when it is of a perfectly frank character.

Q. How would you divide the functional signs? — *A.* Into local, secondary, and general.

Q. What are the local signs? — *A.* Generally, a bronchitic cough at first, but afterwards it becomes short and suppressed or pneumonic, but sometimes the cough is absent.

Q. What is the character of the respiration? — *A.* The frequency is increased; but where only one lung is slightly diseased, it is only modified to a small degree.

Q. When one or both lungs are affected, what is the number of respiration? — *A.* If one lobe is affected we have respiration from forty to fifty in a minute; but if both, we have from fifty to sixty; and so in proportion to the extent of the mischief.

Q. In what manner does the patient breathe? — *A.* Irregularly; it being high, and performed chiefly by one side of the chest; and, after a time, we have abdominal breathing entirely.

Q. What is the character of the pain? — *A.* It is variable, and proportioned to the inflammation of the pleura. When the inflammation is deep-seated the pain is slight; and in the old and feeble the pain is scarcely felt.

Q. What is the character of the expectoration? — *A.* At the commencement it is mucus, then viscid and transparent, and, in some cases, it is rusty. Viscidity and transparency are, however, the characteristics.

Q. If an abscess forms, what is the character of the sputa? — *A.* Purulent, and a large quantity is sometimes suddenly discharged.

Q. What organs are secondarily affected, and what affections are apt to arise during the course of this disease in the lungs themselves? — *A.* Bronchitis and pleurisy almost always are attendants upon it; tubercles, emphysema, &c.; the heart is also often affected, the brain is affected, and if the cerebral symptoms are severe, we have the lung affection masked. The liver is, also, sometimes affected, causing what some authors call *bilious pneumonia.*

Q. What other organs are affected? — *A.* The stomach and bowels, pharynx, œsophagus, and kidneys, &c.

Q. What are some of the general symptoms? — *A.* We have suffusion of one or both cheeks, and of the whole countenance, varying from a bright red flush to a deep violet, modified by the dyspnœa.

Q. What is the state of the general circulation? — *A.* After a slight chill a fever sets in, increasing with the close of the day; and the pulse is full, hard, and developed at the commencement of the disease, and in the latter stages it is often fre-

quent, and from 100 to 120 per minute, and it is a good index in bloodletting.

Q. Is the pulse not sometimes contracted? — *A.* Yes; and often upon the use of the lancet it rises.

Q. What is the prognosis? — *A.* Variable; being favourable when a person has been in good health and treated early; but when the disease is complicated with affections of the brain, liver, or heart, it is more or less unfavourable.

Q. What is the duration? — *A.* In mild cases, without treatment, it usually lasts from ten to twenty days; and if in the third stage, usually longer. By treatment from the very beginning we may shorten it.

Q. When does death usually occur? — *A.* At the beginning of the third stage, or in the passage from the second to the third; and this stage usually occurs in three or four days, or at the beginning of the second week.

Treatment. — *Q.* What is the treatment? — *A.* That of ordinary inflammations, modified by circumstances.

Q. What is the first indication? — *A.* Bleeding freely at the onset in strong individuals, if the pneumonia is highly inflammatory; and this may be repeated according to circumstances.

Q. When you are called late in the disorder, what is the most judicious practice? — *A.* To try the effect of small bleedings or of local depletion.

Q. In acute sthenic pneumonia is local depletion of as much benefit as general bloodletting? — *A.* No; local depletion appears to be of more benefit in the latter stages of the disorder.

Q. Are blisters of benefit in the acute stage? — *A.* No; but they are of benefit in the beginning of the third stage.

Q. In what way are they beneficial? — *A.* By checking the inflammation and preventing collapse.

Q. Where should they be placed? — *A.* Under the axilla, or between the scapula and spine.

Q. Are sinapisms or other rubefacients serviceable? — *A.* Yes; as stimulants to the strength, and as a relief to the dyspnœa.

Q. Is tart. ant. et potas. of much service? — *A.* Yes.

Q. How has it been given? — *A.* Either as a diaphoretic, expectorant, or as an arterial sedative, the action of it varying with the quantity given.

Q. What is the contra-stimulant plan? — *A.* Giving it in large doses, and continuing it for twenty-four hours, and then diminishing the dose till the third day, &c.

Q. Is there any danger to be apprehended if the patient becomes comatose from the effect of the medicine? — *A.* Yes.

Q. How would you obviate emesis or catharsis? — *A.* By combining it with opium.

Q. What is the remedy next in power? — *A.* Mercury.

Q. When given where there is hepatisation, how does it act? *A.* As an antiphlogistic and antiplastic.

Q. How should it be given? — *A.* So as to produce a general impression upon the system, in doses from a quarter to half a grain in combination with ipecac.

Q. If the disease should not yield, what is necessary? — *A.* If we have a highly phlogistic state of system, either recur to depletents, or if the strength is failing, administer stimulants.

Q. What are the expectorants of most value? — *A.* Eupatorium, and senega, or serpentaria.

Q. Should the patient not seem to entirely recover, what is necessary? — *A.* To guard the patient from cold by a proper dress or a plaster to the part affected.

Pathology. — *Q.* What is the pathology? — *A.* At first we have engorgement of the lung by blood; secondly, we have red hepatization, the lung assuming the appearance of liver, arising from the overflow of nutritive function in the blood: it also sometimes is fragile, arising from the deposit of soft fresh lymph.

Q. What is the colour of hepatised lung? — *A.* It varies with the quantity of blood effused, sometimes being red, at others violet coloured.

Q. What is the appearance upon opening it? — *A.* Granulated.

Q. What is the condition in the third stage? — *A.* Yellow hepatisation, or suppuration has taken place.

Q. What is the change in this stage? — *A.* The conversion of the lymph, &c., in a soft friable yellow matter, and finally into pus; the tissue loses its granular appearance, and becomes more smooth and polished; and by placing the lung under a stream of water, the parenchyma is removed, and nothing but the bronchial tubes remain, and these tubes contain purulent matter.

Q. What takes place in the fourth stage? — *A.* The parenchyma is softened down and removed by expectoration, and an abscess remains, resembling an abscess in the other tissues of the body.

Q. Does the patient recover when this stage has arrived? — *A.* Yes, generally, if the pus is in an abscess, instead of being diffused throughout the lungs.

Q. Can pneumonia be local? — *A.* Yes; and then we have only a small portion of the lung affected with the physical signs in that part, without, however, the general inflammatory symptoms.

Q. How long do these cases usually continue? — *A.* From ten days to two weeks.

Q. What is the prognosis? — *A.* Favourable.

Q. What is the treatment? — *A.* Moderate bleeding, followed by cups to the part affected.

Q. How would you excite secretion? — *A.* By the means pointed out before.

Q. Into what may this affection pass if not watched? — *A.* Into phthisis.

Q. May not pneumonia assume the *asthenic form*? — *A.* Yes.

Q. When, and how does this occur? — *A.* It may be so from the commencement. In the third stage of ordinary pneumonia this occurs to a certain extent, as when the suppuration has been diffuse.

Q. What are the causes of its occurrence in the earlier stages? — *A.* Advanced age, previous debility, and certain epidemic causes.

Q. Do the local signs or the expectoration differ in this type from the preceding? — *A.* No; except that it passes more speedily to suppuration, with little viscid expectoration.

Q. How are the general symptoms? — *A.* Different from the other variety, inasmuch as we have a feeble pulse, diminished action in the capillaries, and great sinking in the strength.

Q. What is apt to occur in the third stage? — *A.* Gangrene of the lungs.

Q. What is the treatment of asthenic pneumonia? — *A.* Local bleeding may be used, but blisters are of chief benefit; and also the free application of contra-irritants.

Q. What are some of the internal remedies? — *A.* Antimony should not, as a general rule, be used at all; and we must rely more upon opium, calomel, and ipecac.; and the opium should be used with caution.

Q. Are stimulants of advantage? — *A.* Yes; and they may be used as in the third stage of the previous type, viz., wine whey, senega, &c.

Q. In inebriates are alcoholic stimulants beneficial? — *A.* Yes.

Q. Is carbonate of ammonia beneficial? — *A.* Yes; of great importance.

Q. When the asthenic variety prevails as an epidemic, what name has been given to it? — *A.* Typhoid pneumonia; and then it requires great stimulation.

Q. What do you understand by lobular pneumonia? — *A.* It is that form of the affection occurring principally in young children, and where the disease is scattered over a large extent of the lung, attacking isolated lobules, leaving, for a time, the intermediate tissue in a healthy state.

Q. Which are the lobules principally affected? — *A.* Those at the posterior part of the lung.

Q. What is the appearance of the tissue in this form of the disease? — *A.* It is much darker, harder, and smoother, and imperfectly granulated; and passes with difficulty to purulent secretion.

Q. Does this affection confine itself to one lung? — *A.* Rarely, but the right lung generally suffers the most; and the bronchial tissues are more frequently inflamed than the pleura.

Q. Does bronchitis accompany this disease sooner or later? — *A.* It is often the first lesion.

Q. Where does the induration usually occur? — *A.* At the posterior portion of the lung, and surrounds the smaller tubes, and gradually advances; and in other cases the induration occurs rapidly, and modifies the type of the affection.

Q. What are the physical signs? — *A.* At first those of ordinary bronchitis; and the percussion at first is clear, but becomes dull as the disease advances; and the dulness is not confined to one side.

Q. How is the respiration? — *A.* Not completely bronchial, but approaches this as the disease advances.

Q. What is the state of the circulation? — *A.* The fever is sometimes intense, and the disturbance of the circulation extends to the capillaries; and the red circumscribed patch on each cheek, with the dilatation of the nostrils, form one of the best indications of the disease.

Q. What are the accidental symptoms? — *A.* Those connected with the abdomen, brain, &c. The more important are the cerebral symptoms, which may sometimes mask the others.

Q. Where lies the difficulty in diagnosis? — *A.* In making the dividing line between it and bronchitis, and in distinguishing it from tubercles in the lungs.

Q. What is the prognosis? — *A.* Favourable in the early stages and where it is acute; but they become changed by complications of enfeebled health, or when it is secondary; but it is generally more unfavourable than in pneumonia proper.

Q. What is the treatment? — *A.* It varies with the manner in which the disorder commences. If we have an acute dis-

ease, with oppression and high excitement, we must use the antiphlogistic treatment vigorously.

Q. Is venesection ever necessary? — *A.* In a few cases, but eeching is preferable.

Q. Are blisters much used? — *A.* No; but revulsives over a large surface are decidedly beneficial, as mustard poultices, &c.

Q. What is the natural cure? — *A.* By secretion.

Q. By what do you favour this? — *A.* By the nauseating expectorants, in combination with stimulant expectorants; vin. ipecac., lac. assafœt., and sometimes, by vomiting, when much mucus is secreted.

Q. What is a very important hygienic precaution? — *A.* Not to allow the child to remain long in one position, but varying it every half hour.

Q. Why is this precaution necessary? — *A.* To prevent congestion of the lungs.

Q. What is the peculiarity of this disease when it attacks the aged? — *A.* To become latent, or lose the ordinary functional signs; and to run on to the second and third stage before anything of the kind is indicated.

Q. How would you manage such a case? — *A.* As in ordinary pneumonia, varying as a sthenic or asthenic type.

Q. When there is an attack of pneumonia supervening upon another affection of the lungs, what is it called? — *A.* Intercurrent pneumonia.

GANGRENE OF THE LUNGS.

Q. How may this occur? — *A.* Either as a primary or secondary affection.

Q. What are the probable causes in the two instances? — *A.* In the first, from altered condition of blood; and the second, from asthenic pneumonia.

Q. What is the state of the tissue? — *A.* At first hard and congested in the midst of inflamed parenchyma, or else there is infiltration of thin serous fluid; and in the second stage the tissue breaks down, then the bronchial tubes slough off, and nothing is left but the vessels, which resist for some time the destructive process.

Q. What is the condition of the sputa and breath? — *A.* They are pathognomonic of the disease — being both extremely fœtid.

Q. What are the characteristics of the sputa? — *A.* There are two; the one consists of a thin liquid, like tobacco-juice, with

now and then small pieces of gangrenous lung; the other of a grayish-yellow, pasty fluid — a mixture of pus and gangrenous fluid.

Q. What is the third stage? — *A.* The formation of a cavity more or less extensive.

Q. What occurs in a fatal termination? — *A.* The sputa is increased in quantity, and the patient sinks.

Q. What occurs in a favourable termination? — *A.* A membrane circumscribing the cavity in the lung is formed, which protects the healthy portion of the lung; and it first secretes pus, but gradually assumes the character of a mucous membrane lining small tubes.

Q. If there is no exit to the cavity, what occurs? — *A.* It becomes converted almost into a serous membrane, and may exist during the life of the individual.

Q. What are the local signs? — *A.* Cough, expectoration, and fœtor of breath.

Q. What are the physical signs? — *A.* Feeble respiration and moist rhonchus, and the percussion is either natural or slightly dull.

Q. What occurs as the disease advances? — *A.* We have the signs of a cavity developed.

Q. What are the signs when cicatrization takes place? — *A.* Feebleness of respiration gradually diminishing; and if the liquid is discharged from the cavity in its early stages, we have cavernous respiration, and the resonance of the voice is more clear.

Q. What are the general signs? — *A.* Fever, with a small, frequent, and irritable pulse; anorexia; diarrhœa from the swallowing of the fluid; the skin is leaden in hue, and sometimes great dyspnœa is present.

Q. What is the prognosis? — *A.* Unfavourable.

Q. What are the peculiar diagnostic signs? — *A.* The fœtid breath and expectoration of the patient.

Q. What is the treatment? — *A.* Supporting and stimulating, requiring tonics and stimulants.

Q. Has chlorine any beneficial tendency? — *A.* Yes. The sol. sodæ chlor. (Labarraque), is of great benefit, together with the free use of chlorine as a disinfector.

Q. Is opium ever beneficial? — *A.* Yes; sometimes to prevent paroxysms of coughing; but it should be used with great care.

TUBERCULOUS PHTHISIS.

Q. What affection of the lungs is considered the most formidable? — *A.* Phthisis pulmonalis.

Q. When is treatment of benefit in this disease? — *A.* In the forming stage.

Q. In what light is it to be viewed? — *A.* As a complex affection; the whole economy being vitiated, and the lungs principally affected.

Q. Does not, sometimes, the pulmonary affection show itself as the first sign of a tuberculous diathesis? — *A.* Yes.

Q. What is the essential character of phthisis? — *A.* The deposition of tuberculous matter, either primary or secondary, in the substance of the lungs.

Q. What is a tubercle? — *A.* A white, opaque, or yellowish body, and when softened it is converted into a thick, pasty, yellow liquid, of a dull yellow colour, and of a heavy odour.

Q. How does the matter find its exit? — *A.* By the ulceration of the delicate cellular membrane investing it, and by its communication through ulceration with a bronchial tube.

Q. Do not tubercles assume various forms? — *A.* Yes.

Q. What is their chemical composition? — *A.* Albumen, and the salts of lime.

Q. Is it invariable that the tubercles soften and discharge by a tube? — *A.* No; they sometimes, when the patient's health is improved, become hard and dry; the earthy matter increases in quantity, and a calcareous mass is left in the place of the tubercle; or they may be entirely absorbed, and so the patient may entirely recover.

Q. Which is the most frequent variety of tubercle? — *A.* That which commences by gray granulation.

Q. Where do tubercles commence? — *A.* At the summit and two sides of the lung.

Q. Is the exact seat of tubercle easy of demonstration during life? — *A.* No.

Q. Is there any peculiarity in the process of cicatrization of a tuberculous cavity? — *A.* No.

Q. What is the condition of the surrounding tissues? — *A.* Very various; if the case is purely constitutional, without previous local disorder, the tissue remains pervious; but if there has been inflammation, there is induration of tissue, with a variety of colours, &c. At other times, we have infiltration of tubercle throughout the pulmonary tissue.

Q. Are the appendages of the lungs affected? — *A.* Yes; the serous tissues and lymphatic glands.

Q. What is the mode of attack of phthisis? — *A.* It varies as the affection is either acute or chronic. In the acute disease we have the usual symptoms of an inflammatory affection; and

in the chronic we have a slow change in the capillary vessels. In the acute variety, the serous membranes are usually attacked first; and in the chronic, the mucous.

Q. Is tubercle invariably caused by inflammation? — *A.* No; but inflammation may be one of the causes acting upon a vitiated constitution.

Q. Which of the pectoral affections most favour the development of tubercles? — *A.* Pleuritis.

Q. Does bronchitis and pneumonia ever occur among the earlier lesions of phthisis? — *A.* Yes.

Q. Is pneumonia a frequent cause?—*A.* No; it is the least so.

Q. Does phthisis ever occur without accompanying inflammation? — *A.* Yes.

Q. How would you divide the symptoms? — *A.* 1, Into those proper to phthisis and other tuberculous diseases; 2, those apparent upon development of tubercles in the lungs and air-passages; 4, symptoms of other organs.

Q. What are some of the first class? — *A.* Extreme frequency of pulse, quick and jerking; fever continuing during the day, and increasing at night; sweating at night, thirst, anorexia, constipation; when fever is developed, we have a restless expression of countenance; light, circumscribed red spot upon the cheek, and emaciation; and in the more chronic cases, we have dulness of the skin, and burning in the palms of the hand and in the soles of the feet.

Q. Is hectic fever a consequence of tubercles? — *A.* Yes.

Q. What are the symptoms directly dependent upon the development of tubercles? — *A.* We have bronchial inflammation, cough in paroxysms, and in the last stages it becomes feeble and cavernous in character.

Q. What is the character of the expectoration? — *A.* At first very similar to bronchitis, and when the tubercles are softened they form a yellow expectoration of pus and softened tubercle, and nummular sputa.

Q. Is there much pain in tubercle? — *A.* No.

Q. What are some of the physical signs? — *A.* At first we have vesicular inspiration harsh and feeble, and slightly puerile, and the expiration becoming louder and louder; and when softening occurs we have a slight rhonchus, passing through the various stages to complete gurgling, &c.

Q. What is the percussion? — *A.* We have dulness at the summit of the lung, &c.

Q. What is the appearance of the thorax? — *A.* It is contracted.

Q. What are the symptoms dependent upon the accessary disease of the lungs and air-passages? — *A.* We have bronchitis, pneumonia, pleurisy without effusion, laryngitis, tracheitis, and pharyngitis, all of which have a tendency to increase the symptoms of phthisis, by combining their symptoms with those of phthisis.

Q. What are some of the symptoms arising from other organs than those of respiration? — *A.* Tuberculous affections of the bowels, with diarrhœa, dyspepsia, fistula in ano, affections of the liver, &c.

Q. Is the diagnosis of this affection difficult? — *A.* No, not when the disease is far advanced; but when the local signs are not well developed, or other signs of other affections predominate, it is then difficult.

Q. What are some of the signs of most value in early diagnosis? — *A.* Hemoptysis occurring before tubercles are developed, or when they are enclosed and few, and when cavities are formed; and the frequent occurrence of attacks of pleurisy; and the grouping together of other symptoms of lung affections.

Q. What is the prognosis in this affection? — *A.* In a large majority of cases unfavourable, but there are many circumstances which may modify its result.

Q. What is the general duration? — *A.* In acute cases it generally runs its course in a short time, while in the ordinary variety it may last for eighteen months or more.

Q. What is the treatment? — *A.* It is in a large majority of cases only palliative.

Q. What are the principal remedies upon which we rely? — *A.* Tonics and alteratives; as iodine, preparations of sarsaparilla, &c.

Q. Is iodine of benefit if hectic supervenes? — *A.* No.

Q. Have hygienic means any effect? — *A.* Yes; sometimes they are very beneficial.

Q. In the management of this disease, to what should we direct our attention chiefly? — *A.* To the causes; as hereditary taint; the depressing causes upon the power of life; certain occupations, as the various sedentary trades and professions.

Q. Is change of climate beneficial? — *A.* Yes.

Q. Which places are the most selected? — *A.* The West Indies, Madeira, south of France, and Italy.

Q. What are some of the intercurrent affections which require our attention? — *A.* The bronchial and tracheal, causing irritation, and tickling, &c.; pneumonia, pleurisy, and laryngitis.

Q. Are opiates ever prescribed? — *A.* Yes; in small quantities to produce sleep, &c.

Q. How are these affections to be treated? — *A.* As if uncomplicated, always bearing in mind the cause of them.

Q. What other complications do we have? — *A.* Diarrhœa, hectic fever, night sweats, &c.

Q. How would you treat them? — *A.* As in ordinary cases, modified by the existing phthisis.

CARDIAC AFFECTIONS.

PERICARDITIS.

Q. What is pericarditis? — *A.* Inflammation of the pericardium.

Q. Are not the general symptoms often obscure? — *A.* Yes.

Q. What, however, are some of them? — *A.* In addition to fever, pain in the left breast, shooting to the sternum, back, &c., we have tenderness on pressure between the cartilages of the fourth, fifth, and sixth ribs, &c.; there may be also some dyspnœa and palpitation of the heart, &c.

Q. What are the principal physical signs? — *A.* First increased loudness of the natural sounds, with a strong and abrupt impulse; sometimes the pulse is reduplicated; we then have superficial friction sounds, like the rubbing together of two pieces of silk or paper, which is heard at the middle of the sternum, and gradually extends.

Q. How long does this friction sound exist? — *A.* Generally for only a few days, because either the effused lymph is absorbed, or adhesions take place between the heart and sac.

Q. How is the percusion? — *A.* Dull.

Q. How is the course of pericarditis determined? — *A.* By the quantity of the effusion.

Q. What has inflammation of the pericardium a tendency to produce? — *A.* Effusion of serum and coagulable lymph upon the free surfaces of the membrane, with all the appearances found in pleurisy.

Q. What cases are likely to be complicated with pericarditis? — *A.* Rheumatism; injuries of the left side; also pleurisy and pneumonia of the left side; and cases of difficult breathing, with general or partial œdema.

Q. What is the prognosis in this disease? — *A.* Generally favourable.

Q. What is the treatment? — *A.* In severe cases we resort to venesection, followed by cupping and leeching, and these repeated when necessary; and if there is much effusion, we resort to blisters and repeated bleedings, &c.

Q. What are the internal remedies? — *A.* The mercurials, sometimes pushed to ptyalism; digitalis, tart. ant. et potas, &c.

Q. What are the hygienic means? — *A.* Rest and abstinence from excitement of every kind, &c.

ENDOCARDITIS.

Q. What is endocarditis? — *A.* Inflammation of the lining membrane of the heart.

Q. To what does this give rise? — *A.* To the greater number of valvular diseases of the heart, and indirectly to alteration in the muscular structure.

Q. What are some of the anatomical characteristics? — *A.* They are not so distinct as those from pericarditis, but we find some traces of lymph, thickening, and ulceration.

Q. What are the signs of inflammation? — *A.* Injection of the membrane, cloudiness of the membrane, of a dull, whitish tint, and a thin coating of lymph; and upon the valves we find vegetations.

Q. Where do we find the ulceration? — *A.* At the valves, and sometimes at other portions of the membrane.

Q. What takes place in the valves of the right side? — *A.* Thinning and separation of the fibres.

Q. What are the physical signs? — *A.* In the severer forms the heart is distended with blood, forming sometimes coagula, and hence the percussion is dull; the impulse of the heart loses its sharpness, and the contraction is spasmodic and confused.

Q. What is the character of the sounds? — *A.* They are changed; the first is usually roughened, bellows or rasping; the second dull and indistinct; or if there is much distension, we have a strong exaggerated sound.

Q. What is the character of the general signs? — *A.* They are mostly obscure: there may be some pain, especially if we have pericarditis as a complication. The dyspnœa is often violent, and causing intense suffering, with lividity of the lips and nostrils; and there is a haggard, wild expression of countenance.

Q. What is the condition of the pulse? — *A.* Small and irregular, but generally tense.

Q. What is the prognosis? — *A.* Favourable in a large proportion of cases; but when the valves are much affected, the disease is decidedly dangerous.

Q. Does this disease often exist with other serous inflammations of the chest? — *A.* Yes; and then the diagnosis is difficult.

Q. When it exists alone, on what are we to rely for our diagnosis? — *A.* The physical signs and the local symptoms.

Q. What is the treatment of this affection? — *A.* Venesection, and repeated local depletion; and in the decline of the inflammation, blisters and counter-irritants.

Q. What are the internal remedies? — *A.* Those used in pericarditis — mercurials, antimonials, &c.

Q. What other remedies are highly beneficial? — *A.* The antispasmodics sometimes combined with digitalis; but this latter remedy should be used with caution.

Q. When the active period of the disease has passed, and there still remains irregular action of the heart, what is necessary? — *A.* The patient should be kept as quiet as possible, free from excitement of every kind, and resort may again be made to antispasmodics, digitalis, &c.

Q. Should depletory remedies and abstinence be long continued after the state of active inflammation has elapsed? — *A.* No.

Q. When should we allow gentle exercise? — *A.* When the disease has entirely subsided.

HYPERTROPHY OF THE HEART.

Q. What do you understand by hypertrophy? — *A.* Thickening of any organ.

Q. How is hypertrophy of the heart divided? — *A.* Into simple, concentric, and into the variety with dilatation.

Q. What are the anatomical characters? — *A.* The heart may be harder than the ordinary variety; and may be of a redder colour than usual. In concentric hypertrophy, the shape of the heart is nearly natural; but in the other varieties the organ is more rounded.

Q. What are some of its causes? — *A.* Active muscular exercise, with powerful action in the muscles of the chest; slight attacks of muscular rheumatism, nervous affections, inflammations of the lining membrane of the heart, &c.

Q. What are the symptoms? — *A.* In simple hypertrophy we have increase in the impulsion, change in the sounds of

the heart, and prominence in the præcordial region, with dulness on percussion gradually passing to flatness.

Q. What are some of the sensations of the patient? — *A.* Violent throbbing, dyspnœa, wandering pains, and a præcordial uneasiness.

Q. What is the state of the vascular system? — *A.* The arteries are distended (unless the aortal valves are contracted); the capillaries are congested. We may have congestion of the brain, congestion of the lungs, &c.

Q. Are the abdominal viscera affected? — *A.* Yes; particularly the liver.

Q. What is the progress and termination of this disease? — *A.* It tends to increase and end fatally, if almost perfect rest is not enjoined.

Q. Is the diagnosis of the disease difficult? — *A.* No, not if we judge from the physical signs, and these repeatedly made.

Q. What is the prognosis? — *A.* This depends upon various circumstances, and particularly the general health of the patient.

Q. What is the treatment? — *A.* Moderative; keeping the heart quiet, and, for that purpose, avoiding anything that can in any manner stimulate it.

Q. Should the heart become oppressed, what is necessary? — *A.* Local depletion, and sometimes the use of digitalis (in the varieties without dilatation).

Q. What organic lesion is generally connected with hypertrophy? — *A.* Disorder of the auriculo-ventricular valves.

Q. What do you mean by dilatation? — *A.* Enlargement of the cavities of the heart.

Q. What are the causes? — *A.* Nearly the same as in hypertrophy, but, in dilatation, we have thinness and weakness of the organ depending upon want of proper nutrition.

Q. Who are most liable to this affection? — *A.* Anemic individuals.

Q. What are the symptoms in dilatation? — *A.* Percussion is not dull to the same extent as in hypertrophy. The sounds of the heart are changed, and we have a sharp, loud, and clacking first sound; pain dull and indistinct; but the vascular symptoms are less evident in these cases.

Q. What are the general symptoms? — *A.* Neuralgia and hysteria, feebleness of the patient, &c.

Q. What is the prognosis? — *A.* The patient seldom dies of simple dilatation.

Q. What is the treatment? — *A.* Tranquillizing the action

of the heart, and supporting the strength; blisters to breast or spine, as the case may indicate.

Q. Is digitalis in large doses proper? — *A.* No.

Q. Are the antispasmodics beneficial? — *A.* Yes.

Q. What are the hygienic rules necessary? — *A.* Those adapted to hypertrophy.

Q. If anemia complicates dilatation, what should be done? — *A.* Invigorate the patient by tonics, &c.

PHLEGMASIÆ OF THE ALIMENTARY CANAL AND ACCESSORY ORGANS.

GLOSSITIS.

Q. What is glossitis? — *A.* Inflammation of the tongue.

Q. Is it more an idiopathic or symptomatic affection? — *A.* Symptomatic.

Q. What affections does it usually accompany? — *A.* Exanthematous fevers; and it also arises from continuity of inflammation in neighbouring organs.

Q. What are the symptoms? — *A.* The usual symptoms of inflammation, together with great dyspnœa, and congestion of the bloodvessels of the brain, &c.

Q. When the inflammation is idiopathic, what accompanies it? — *A.* Fever; and the pulse is quick and hard until we have the respiration obstructed.

Q. How may the disease terminate? — *A.* Either in resolution or suppuration, &c.

Q. What are the causes? — *A.* Those of the usual phlegmasiæ, and it also may arise from specific irritants.

Q. Should the treatment be prompt? — *A.* Yes.

Q. On what must we depend? — *A.* Bloodletting, generally and locally; incisions from the base to the tip of the tongue; ice to the tongue, and blister to throat and neck; cathartics both by the mouth and anus; and sometimes we must resort to tracheotomy.

PAROTITIS.

Q. How do you divide this affection? — *A.* Into the specific and common.

Q. What is the specific variety vulgarly called? — *A.* Mumps.

Q. What are the symptoms? — *A.* Pain in one or both

parotid glands; slight febrile excitement; fulness at the angle of jaw, and extending to neighbouring parts.

Q. When does it subside, and what then may occur? — *A.* It usually subsides from five to nine days, and then metastasis may take place to the mammæ, testes, or to the brain.

Q. What is the general cause for specific parotitis? — *A.* Contagion; and it occurs generally but once in one's life.

Q. What is the treatment? — *A.* Keeping the bowels open, the parts warm, and regulating the diet.

Q. What should be done with the secondary affections? — *A.* Treated as if idiopathic.

Q. What does the common variety usually result from? — *A.* Exposure to cold.

Q. What are the symptoms? — *A.* Those of the specific variety, though often running higher.

Q. Do we ever have a form arising from scarlatina? — *A.* Yes; and then the swelling is hard and indolent, and extends to the glands of the neck.

Q. What is the treatment? — *A.* As antiphlogistic as the strength of the patient will bear, together with local applications.

CYNANCHE TONSILLARIS.

Q. What is the common name of this affection? — *A.* Quinsy.

Q. What is the character of the affection? — *A.* Inflammation, either superficial or deep-seated, of the tonsils.

Q. What are the symptoms? — *A.* Fulness in the throat, pain and difficulty of swallowing, heat and dryness of the fauces, and shooting pains; the voice is croaking.

Q. What is seen upon inspection? — *A.* We find the tonsils swollen and red, and projecting into the throat.

Q. How long may these symptoms continue? — *A.* Several days, and either terminate in resolution or in passive congestion, or in suppuration.

Q. Is there much fever? — *A.* Yes, generally.

Q. What are the causes? — *A.* The usual predisposing causes of the other phlegmasiæ.

Q. Is it ever fatal? — *A.* Yes; when there is pressure on the larynx obstructing respiration, or causing difficulty in taking food.

Q. What is the treatment? — *A.* Antiphlogistic; emetics, bleeding, cathartics, and incisions in the tonsils, especially if pus is formed.

Q. Are local remedies beneficial? — *A.* Yes.

Q. What is hypertrophy of the tonsils? — *A.* An indolent enlargement of these organs without pain.

Q. In whom do we find this? — *A.* In those of strumous habit.

Q. What is the treatment? — *A.* Leeching, scarification, blisters, &c., and, finally, extirpation; and sometimes nitrate of silver has been used with advantage.

DISEASES OF THE ŒSOPHAGUS.

Q. Is this liable to disease? — *A.* Not often.

Q. What may excite inflammation? — *A.* Acrid poisons, or by continuation of disease from the fauces, pharynx, and stomach.

Q. What are the most important alterations of structure? — *A.* Hypertrophy of the submucous cellular tissue, carcinoma, compression from tumours, &c.

Q. How is spasmodic stricture characterised? — *A.* By difficulty of swallowing, and that being felt in the upper part of the œsophagus, and coming and going frequently.

Q. Who are most subject to it? — *A.* Nervous persons.

Q. Is the diagnosis of this form of the affection of importance? —*A.* Yes; especially to distinguish it from organic derangement.

Q. What is the treatment? — *A.* To lessen morbid irritability by cold sponging, blister to the nucha, and antispasmodics, introduction of the bougie, &c.

Q. When we have previous debility what is best? — *A.* To restore the strength of the patient by tonics, &c.

GASTRITIS.

Q. What is gastritis? — *A.* Inflammation of the stomach; but the term is used to denote inflammation of the mucous membrane alone.

Q. What are the symptoms? — *A.* Fever, with intense pain and burning extending to the œsophagus; and increase of pain by pressure on the stomach, or inspiration, or swallowing, or vomiting; nausea and vomiting, great thirst, &c.

Q. What are some of the local signs? — *A.* Fulness in the epigastrium, and increase of heat is felt when the hand is placed over the stomach, &c.

Q. Is there much prostration? — *A.* Yes.

Q. How is the pulse? — *A.* Frequent and small, soon becoming weak and thready.

Q. How are the bowels? — *A.* Constipated, and the urine is scanty and high coloured.

Q. How is the tongue? — *A.* Red along the edges and at the top, and covered in the middle with flaky fur.

Q. With what may this disease be confounded? — *A.* With peritonitis; but it may eventually be distinguished by the seat of pain, &c.

Q. When does the disease terminate? — *A.* It may terminate in a few hours or last some weeks, and degenerate into the subacute or chronic form.

Q. What are the symptoms of subacute? — *A.* Pain and uneasiness in the epigastrium, with the usual signs.

Q. What is the condition of the tongue? — *A.* Red at tip and margin, and covered over the whole surface with elevated papillæ.

Q. What is the condition of the bowels, skin, &c.? — *A.* The bowels are sluggish, the skin is dry, and the urine high coloured.

Q. What are some of the sympathetic disorders? — *A.* Fever, headache, cough, and pains in limbs, &c.

Q. How long does it generally last? — *A.* Sometimes many months.

Q. What are the symptoms of chronic gastritis? — *A.* They are very similar to the last variety, but it has a great number of sympathetic affections.

Q. Mention some of the symptoms peculiar to it? — *A.* Constant tenderness, vomiting of glairy fluid, gnawing pain, feelings of vacuity, irregular appetite, acidity, flatulence, palpitation, &c.

Q. What is the condition of the intestines? — *A.* Torpid; and the urine is of various hues.

Q. What is the condition of the skin? — *A.* Dry and harsh.

Q. Does the nervous system suffer? — *A.* Yes; and with the most varied diseases.

Q. Do the thoracic organs sympathize? — *A.* Yes.

Q. How may death be caused? — *A.* By general exhaustion; but in many instances by the complications of disease in the liver, kidneys, and lungs.

Q. What are the anatomical characters? — *A.* We have a contracted and wrinkled mucous membrane, with varied degrees of redness in the different parts; and in the chronic variety we have hypertrophy of the mucous tissue, with brown, gray, and chocolate tints.

Q. What is the state of the follicles? — *A.* More developed than natural.

Q. What are the causes of the different varieties? — *A.* The usual changes in the weather, irritants of various kinds, errors in diet, sympathetic inflammation; and in the chronic variety

it may arise, besides, from positions of the body, as stooping, &c.

Q. What is the treatment of the acute variety? — *A.* If poison has been taken, we must use the antidotes, &c.; if from other causes, the antiphlogistics; sometimes bleeding, but chiefly leeching, repeated cupping, anodynes, mucilaginous drinks, ice and iced drinks, cold arrow root, &c.

Q. How must we act upon the bowels? — *A.* By enemata.

Q. Are the preparations of mercury beneficial? — *A.* Sometimes.

Q. Are external applications of service? — *A.* Yes.

Q. What is necessary in the subacute variety? — *A.* It may be treated on the same general principles as the acute.

Q. What is necessary in the chronic variety? — *A.* Local depletion, farinaceous diet, counter-irritation, as blisters, ol. tiglii, Burgundy pitch plaster, and anodynes; and a carefully conducted course of mercury.

Q. Must the bowels be regulated? — *A.* Yes; and we may use, for that purpose, castor-oil, Rochelle salts, manna, &c.

Q. What are some of the remedies which have seemed to possess a peculiar influence in the chronic variety? — *A.* Argt. nit., bismuth trisnit., ol. terebinth., tr. benz., creos., ferri sulph., quinia sulph.

Q. Is warm bathing beneficial? — *A.* Yes, sometimes.

ORGANIC DISEASES OF THE STOMACH.

CARCINOMA OF THE STOMACH.

Q. What is the appearance in carcinoma of the stomach? — *A.* That of an indurated, fibrous, semicartilaginous formation.

Q. Which part does it most frequently attack? — *A.* The pylorus.

Q. What is the state of the mucous membrane? — *A.* Thickened and indurated, or partially ulcerated; and this ulceration sometimes perforating the coats of the stomach.

Q. What other form does it assume? — *A.* The cephalomatous, collected in masses, and growing from the submucous tissue.

Q. What is still another form? — *A.* Where the parietes are thickened, and where a section shows a number of little cells, having fibrous septa, and containing a glue-like matter.

Q. Are neighbouring organs involved? — *A.* Yes, frequently.

Q. What are the symptoms? — *A.* Pain, of a burning kind, and gnawing; acid or bitter eructations; at first vomiting ingesta, and afterwards ropy or shreddy substances, and sometimes of blood or sanious matter.

Q. Have we constipation? — *A.* Yes, at first; and this is generally succeeded by diarrhœa, and extreme emaciation.

Q. What is the appearance of the countenance? — *A.* That of a cancerous diathesis.

Q. Are these signs certain? — *A.* No.

Q. What disease are we apt to confound with this? — *A.* Chronic gastritis with ulceration.

Q. What is the diagnosis where the cardiac orifice is affected? — *A.* The pain and vomiting occurs immediately after food is taken, and there is also a feeling of impediment in deglutition.

Q. What is the progress of cancer of the stomach?—*A.* Slow.

Q. What is the cause of cancer of the stomach?— *A.* A peculiar diathesis.

Q. Is there any cure for carcinoma? — *A.* No; but we may palliate the disease and retard its progress.

Q. How would you favour this? — *A.* By proper diet, and by perfect rest.

Q. What anodynes are beneficial? — *A.* Morphia, prussic acid, opium, hyosciamus, conium, belladonna, &c.

SOFTENING OF THE STOMACH.

Q. From what may this result? — *A.* From inflammation.

Q. May not softening after death be mistaken for the effect of disease before death? — *A.* Yes.

Q. Is not this subject still in great obscurity? — *A.* Yes.

ULCERATION OF THE STOMACH.

Q. What are the varieties of this disease? — *A.* Those of slight erosion, minute ulcers of the follicles, and ulcers penetrating the muscular and peritoneal coats, &c.

Q. Which varieties are the most common? — *A.* The two first; and they have the symptoms of chronic gastritis.

Q. What is the peculiarity of the third variety? —*A.* That it is quite latent until perforation suddenly takes place.

Q. Should hematemesis occur in chronic gastritis, or if there is a dark pitchy appearance in the matters vomited, what should we suspect? — *A.* Ulceration.

Q. What is the treatment? — *A.* Dietetical and palliative, and the careful administration of sedatives.

Q. If ulcerations are not extremely large, how are the symptoms? — *A.* Very obscure.

Q. What may perforation be caused by? — *A.* Simple ulceration, beginning either in the mucous or serous coat; carcinomatous ulceration, and gelatiniform softening.

Q. Is it necessary in every perforation that the contents escape in the cavity of the abdomen? — *A.* No; for the stomach may adhere to neighbouring organs, and thus prevent it; but when it does occur the symptoms of sudden and violent peritonitis set in.

DYSPEPSIA.

Q. What is the meaning of this term? — *A.* It is derived from δυσπεπτεω, to digest with difficulty; or any derangement of that function by which the aliment is converted into chyle.

Q. What are some of the causes of this disease? — *A.* 1st, from plethora or anemia; 2d, from the stomach sympathising with other organs; and 3d, from deranged nervous action, &c.

Q. What is the most simple form? — *A.* Acute dyspepsia, or indigestion.

Q. What are the symptoms? — *A.* Anorexia, oppression, nausea, pain in various parts of the body, headache, &c.

Q. What is the condition of the tongue? — *A.* Loaded with thickish, white, pasty fur.

Q. What is the most usual cause? — *A.* Excess in eating when the stomach is debilitated, or eating indigestible articles.

Q. What is the treatment? — *A.* An emetic, at first, to clear the stomach, and then a dose of some aperient medicine, and the abstinence from solid food.

Q. There is another form, what are its peculiarities? — *A.* We have all the symptoms in the preceding form increased, with a discharge of bilious matter.

Q. What are some of the peculiar symptoms? — *A.* Dulness of vision, tingling, and prickling in the hands; and the conjunctiva of the eye is of a yellow or muddy tint.

Q. What is the cause of this disorder? — *A.* In addition to those of the preceding variety, we have regurgitation of bile from duodenum into the stomach.

Q. How is an attack induced? — *A.* By inattention to the bowels, disturbance of the emotions, excess in eating or drinking, and moist state of the atmosphere.

Q. What is the treatment? — *A.* Slight emetics, afterwards

a dose of blue pill; or if necessary, use clysters; and if the nausea continue, use effervescing mixtures, with a little brandy, or tinc. opii, counter-irritation, &c.

Chronic Dyspepsia. — *Q.* How would you divide the symptoms of this affection? — *A.* Into local and general.

Q. What are some of the local signs? — *A.* Impaired appetite, or absolute want of it, disgust for food, excessive appetite, perverted appetite, pains after eating, feelings of sinking or fulness, vomiting, cramp, hiccup, flatulence, ejection of acid, acrid, or bitter fluid, and sometimes of glairy fluid, called water-brash.

Q. What are the general symptoms? — *A.* These are very various, and assume protean forms.

Q. What are the causes? — *A.* Any of the usual debilitating causes, as loss of blood, dejection, luxuries largely indulged in, &c.; irregularity in taking food, change of diet, crude fruit, &c.

Q. Is the pathology of this affection well understood? — *A.* No.

Q. How is the treatment to be regulated? — *A.* To impart tone to the stomach, and remove urgent symptoms.

Q. What is the treatment to answer these indications? — *A.* To remove the cause of irritation and promote secretion of bile, by the administration of blue pill in combination with ipecacuanha, followed by gentle aperients.

Q. What is next to be done? — *A.* The application of local measures, to remove the peculiar condition of the stomach.

Q. If the stomach is in an asthenic state, what remedies are beneficial? — *A.* Tonics; commencing with the light vegetable, as cascarilla and columba, &c., and combining them with some of the alkalies.

Q. What are some other remedies which have been used? —*A.* Aqua calc., creosote, bismuth, argt. nit., mineral acids, &c., iron, strychnia, and, finally, the mineral waters.

Q. Is the subject of diet of importance? — *A.* This is of great importance, and must be regulated in the time when food is taken, and the quantity and the kind.

Q. What should be the diet? — *A.* For breakfast, between 8 and 9 A.M., the lightest articles; and for dinner, which should be from 1 to 2 P.M., the diet should also be simple, using venison, mutton, tender beef, and game; and, in a large majority of cases, even this food should be used with great caution; and the articles of the pantry should be avoided.

Q. Are fluids of service? — *A.* Yes, in small quantities

and in combination with a little sherry, Madeira, or hock wines.

Q. What should be the supper? — *A.* The very lightest articles; as oatmeal, sago, &c.

Q. What are the hygienic means to be used? — *A.* Sponging the body, mild shower-bath, using regular exercise by walking, or riding on horseback, early rising; and intellectual exercise, immediately after a meal, should not be allowed.

Q. What is the second indication? — *A.* To mitigate particular symptoms.

Q. What would you do in flatulence? — *A.* A carminative water, or spt. ammon. fœt., spt. æth. comp., creos., os terebinth., Hoff. anodyne, are serviceable.

Q. What is necessary in heartburn? — *A.* Alkalies, mineral acids, &c.

Q. What in vomiting and nausea? — *A.* Effervescing draught, magnes. carb., counter-irritants, undiluted brandy in ʒj. doses, abstinence from taking food; limewater and milk, and hydrocyanic acid.

Q. What is necessary in palpitation? — *A.* Purgatives, and antispasmodics, as valerian, castor, morphia, &c.

Q. What other organs are affected? — *A.* The intestines, the liver, the organs of respiration, producing spasmodic, catarrhal, and organic affections; the heart, the brain, the spinal cord, and the skin.

GASTRALGIA.

Q. What is the meaning of this term? — *A.* Pain in the stomach.

Q. What is the character of the pain? — *A.* Acute and capricious in its accessions; and it extends also to the neighbouring parts.

Q. What are some of the other signs? — *A.* Little if any fever, the tongue is clean, bowels are costive, temper irritable, and captious; and there is headache, neuralgic pains in the bladder and rectum, and generally we have great despondency.

Q. What sometimes complicates this affection? — *A.* Chronic gastritis.

Q. What appears to be the nature of this affection? — *A.* Alteration in the function of the gastric nerves.

Q. Who are the most liable to this affection, and what are the exciting causes? — *A.* Females; and it may arise from

deficient food, anemia, affections inducing great nervous susceptibility, &c.

Q. What are the exciting causes? — *A.* Those acting locally upon the stomach, as the use of indigestible food, stimulant potions, cold drinks; and when the predisposition exists, an attack may be induced by the most trifling circumstances.

Q. What is the plan of treatment? — *A.* To subdue local irritation by narcotics, as prussic acid, morphia, henbane, hops, &c.; and last, though not least, argt. nitratum internally, bismuth in from gr. iii. to xiv. gr. doses.

Q. How would you prevent a recurrence of the disease? — *A.* By due regard to diet.

Q. What is necessary in cases where the general habit is affected? — *A.* This is difficult to mark out in this treatise, depending, as we must, upon the peculiar susceptibilities of the patient.

GASTRORRHŒA.

Q. What do you mean by this? — *A.* Functional disorder of the stomach, where we have ejection of fluid by vomiting, or eructation as the chief symptom.

Q. What is the character of the fluid? — *A.* Thin, glairy, and insipid, and it is sometimes as much as a pint in quantity.

Q. What is it called when we have pain or burning accompanying the discharge? — *A.* Pyrosis, or water-brash.

Q. Who are most subject to it? — *A.* Persons after puberty; and it is also an accompaniment to pregnancy.

Q. What are the causes? — *A.* The use of vegetable food, especially when combined with alcoholic drinks.

Q. What is the nature of this affection? — *A.* A catarrh from the mucous membrane of the stomach.

Q. What is the treatment? — *A.* The diet must be firm and dry, chiefly animal food; and a resort to the various stomachic remedies must be made; sedatives, &c.

Q. What are some of the remedies of high reputation? — *A.* Bismuthi subnitras, nitric acid in infusion of columba, argt. nit. gr. i., twice or thrice daily; tr. benz. comp., &c.

DUODENITIS.

Q. What are the anatomical characteristics of this disease? — *A.* Similar to those in inflammation of the stomach and ileum; the glands of Brunner and Peyer being also very much enlarged.

Q. Are the symptoms of acute duodenitis well marked? — *A.* No; there is most generally jaundice present, but this is not always the case.

Q. What are the symptoms of the chronic variety? — *A.* These are also very obscure, but we may suspect something of the kind, if pain is not felt till two or three hours after taking food, and from the tenderness being seated between the right hypochondrium and mesial line.

Q. What are the symptoms of duodenal dyspepsia? — *A.* Those of the same affection of the stomach, but having more hepatic symptoms present.

Q. What is the treatment of this affection? — *A.* Upon the same general principles as those of gastritis, but we must choose aperients, which act more particularly upon this portion of the intestinal canal, as senna, sulphur, castor oil, neutral salts, and blue pill.

Q. Should we suspect mucus in the intestine, what is found an excellent remedy? — *A.* Lime water.

Q. Can duodenitis, under any circumstances, be easily recognised? — *A.* No.

ILEO-COLITIS, OR ENTERITIS.

Q. What is meant by this term? — *A.* Inflammation of the ileum and colon.

Q. What are the two parts affected? — *A.* The villous coat, and the follicular; the former arises from common causes, the latter appears to be subsequent to specific inflammation.

Q. What are some of the anatomical characters of acute ileo-colitis — *A.* We have inflammation of the follicles, presenting a button-like, pustular appearance; while in inflammation of the glands of Peyer, we have an elliptical arrangement, made more manifest by their distended state.

Q. May not one set of glands be affected while another entirely escapes? — *A.* Yes.

Q. What are the peculiarities in the villous membrane, independently of the follicles? — *A.* We have redness, softening, abrasion, hypertrophy, and sometimes an uniform blackness, like gangrene.

Q. In what disease do we find the most disease of the glands of Peyer? — *A.* In typhoid fever; and in patients above the age of fifty.

Q. Is this affection in its simple form dangerous? — *A.* No.

Q. What is the general appearance in ileo-colitis? — *A.*

Patches of redness, with coatings of lymph, tough mucus, pus, irregular ulcerations, &c.

Q. Does acute enteritis ever occur as a primitive disease? — *A.* Seldom.

Q. When we have this affection arising from typhoid fever, what is the peculiarity of the affection? — *A.* The lesion extending to the cellular rather than to the mucous tissue.

Q. What is seen in the chronic variety? — *A.* In addition to the signs of the acute we have also induration, and brown and slate-coloured tints, contraction of the intestine, &c.

Q. Does ulceration ever extend deeply? — *A.* Yes; but in this respect there is a vast variety.

Q. What are some of the symptoms of acute and subacute ileo-colitis? — *A.* The local symptoms are pain, of a dull, griping character, about the hypogastrium and right ilium, tenderness on pressure, and diarrhœa; the stools are thin and feculent.

Q. What are the general signs? — *A.* Fever, skin moist, pulse soft, urine scanty, and high-coloured, tongue red at tip and edges, and furred in centre; and, in severe cases, the crust on the tongue is brown or black, the eyes dull, and in a typhoid form; the cerebral symptoms mask the abdominal disease.

Q. What are some of the signs in the typhoid variety? — *A.* Meteorism, enlargement of spleen, anorexia, fauces inflamed, headache, somnolence, and weakness; morbid sounds in the head, epistaxis, rose-coloured spots, great heat, &c., of the surface.

Q. What is the duration and mortality? — *A.* The duration is twenty-five days, and mortality small.

Q. What is a standing sign in chronic ileo-colitis? — *A.* Diarrhœa.

Q. What are some of the causes of ileo-colitis? — *A.* Cold and damp air, or an epidemic condition of the atmosphere; and from eating crude articles; and sometimes it is caused by a want of food.

Q. What is the treatment in the acute variety? — *A.* In mild cases a few leeches to the abdomen, fomentations, mucilaginous drinks, and a little Dov. pulv. and hyd. c. creta; but in more severe forms a general bleeding, leeching the anus, be cautious in the use of astringents, warm bath, and a bland farinaceous diet; and should the diarrhœa continue when the inflammation has subsided, make use of the chalk julep, &c.

Q. What is necessary in the chronic form? — *A.* Frequent local depletion, counter-irritation, and a mild mercurial course.

Q. What medicines are beneficial in chronic diarrhœa? —

A. Opium, logwood, kino, tr. benz. comp., cupri sulph., plumb. acet., and zinci sulph.

Q. What is beneficial in ulceration at the lower portion of the colon? — *A.* Argt. nit. in enemata.

Q. Is it not sometimes necessary to sustain the strength? — *A.* Yes, by tonics; and by the use of unirritating and nutritious articles of food.

COLITIS, OR DYSENTERY.

Q. What are the symptoms of the acute form? — *A.* Uneasiness in the abdomen, griping pain, with general tormina and tenesmus, hot and tender abdomen; the stools are fœtid and dark coloured, and contain lumps, of a pultaceous character.

Q. What are the principal types? — *A.* The sporadic, and the malignant occurring in epidemics.

Q. What are some of the general symptoms in sporadic cases? — *A.* In sporadic cases we have fever and its usual accompaniments, together with griping pains, diarrhœa, &c.

Q. How is the severity of the disease increased? — *A.* By the extent of the intestines inflamed. If the lower portion only is affected it is a disease of little danger; but if the pain is diffusive and extending along the colon, the case is more precarious; and if we have quick pulse, thirst, anxiety, vomiting, and hiccup, and rapid failing of the vital powers, it may be looked upon as fatal.

Q. Do the symptoms of chronic dysentery vary in any important particular from ileo-colitis? — *A.* No.

Q. Is this disease liable to be confounded with any others? — *A.* No; but it may appear similar to diarrhœa, hemorrhage, &c.

Q. What is the prognosis? — *A.* When the stools, from being mucus and bloody, become bilious and feculent, and the tormina and tenesmus abates, we may argue favourably.

Q. What are some of the fatal signs? — *A.* Tumid, tense abdomen, dry harsh skin, livid finger nails, body supine and legs drawn up, eyes sunk, abdomen contracted, dejections involuntary, muttering, delirium, subsultus, &c.

Q. When do we generally find improvement? — *A.* Before the seventh day; and we find the cases more fatal as the days of amendment are lengthened.

Q. What are some of the causes of colitis? — *A.* Depression of vital powers by fatigue, watching, care, &c., and by the action of crude articles upon the alimentary canal; exposure to cold and damp.

Q. What is the treatment of this disease? — *A.* In the active inflammatory variety bloodletting may be used, but not to the same extent as in serous inflammations; if there is much pain, cupping, leeching, and these applied over the painful parts of the abdomen, and to the anus; and by fomentations of hops, &c., to the belly.

Q. What are some of the internal remedies? — *A.* At first a little oil with tr. opii, or hyd. ch. mit. and opium; or the latter by enema.

Q. What is necessary to bear in mind in the administration of hyd. ch. mit.? — *A.* That when ptyalism is produced without the symptoms abating, we must not expect benefit from it on account of the existing ulceration in the intestines.

Q. What other two remedies do we have of great value? — *A.* Ipecacuanha and plumb. acet.

Q. Are mercurials alone of benefit in the malignant form? — *A.* No.

Q. What do we find of service in this form? — *A.* Mist. oleag., with hyd. mass., in combination, or aromatic infusion of rhei, ipecac., and opium.

Q. Should sinking occur, what must be done? — *A.* We must resort to stimulants, as small portions of wine, or brandy-toddy, or camphor, and plumb. acet., &c.

Q. Does the treatment of chronic dysentery differ in any great respect from ileo-colitis? — *A.* No.

Q. What is necessary in chronic thickening and induration of the mucous membrane? — *A.* A course of leeching, and repeated bleeding.

Q. Upon what, however, must we rely chiefly? — *A.* Upon a rigorous attention to diet, and alteratives in minute doses.

Q. What articles and combinations have been found beneficial? — *A.* Opium and ipecac., argt. nit., hops, nitro-muriatic acid mixture, lemon-juice, &c.

Q. Should we pay much attention to diet? — *A.* Yes; it should be sparing and light, consisting of liquid and semi-liquid, farinaceous substances.

DIARRHŒA.

Q. What characterizes this affection? — *A.* An increased number of alvine discharges.

Q. May not this arise from various causes? — *A.* Yes.

Q. What are some of them? — *A.* Increased peristaltic motion of the bowels, increased feculent matter from morbid bilious

secretion, mucous diarrhœa, serous diarrhœa, and fibrinous secretion.

Q. What is the first dependent upon? — *A.* Upon increased irritability of the intestine, and too rapid propulsion of the secretions.

Q. What is the cause of the second? — *A.* From a large collection of excrementitious matter, as caused by fruits and other vegetable substances.

Q. What is the cause of the third? — *A.* Of this we are ignorant; but the discharges are either bright yellow or of a greenish colour.

Q. What is the cause of the mucous variety? — *A.* It is irritation of the follicles by substances immediately applied, or caused by congestion of the mucous membrane, from various circumstances.

Q. Where do we find serous diarrhœa? — *A.* It is very like the mucous, but may be seen more particularly in dropsies, or in cases of Asiatic cholera.

Q. What is the source of the fibrinous variety? — *A.* The secretion of coagulable lymph; and of sufficient consistence to be discharged as a mould of the intestine, or in detached pieces, coming from various portions of the intestinal canal.

Q. What is the treatment in the different varieties? — *A.* The first variety generally yields spontaneously, or it may be proper to administer some anodyne and antispasmodic.

Q. What is best in the second variety? — *A.* A mild laxative and opiate.

Q. What is the third? — *A.* Demulcents, opiates, and a slight mercurial course.

Q. How would you treat the mucous form? — *A.* By diverting the blood from the part, allaying irritation, and diminishing morbid secretion.

Q. What remedies are beneficial? — *A.* Counter-irritation, spts. Mindereri, and for allaying irritation, the vegetable astringents, and anodyne injections, &c.

Q. What is necessary in the serous variety? — *A.* Opiates, and vegetable astringents; but we may be compelled to resort to metallic salts, as acet. plumb. et cupri sulph.

Q. What is the management of the fibrinous variety? — *A.* A course of alteratives; and then turpentine, copaiba, benzoin; tonic medicines, as limewater, chalybeates, and nitric acid in bitter infusion, and the use of the warm bath, &c.

Q. How should the diet be regulated? — *A.* The food should be mild, but nutritious.

CHOLERA.

Q. How is this affection divided? — *A.* Into common or sporadic, and the epidemic, malignant, or Asiatic cholera.

Q. What are the symptoms of the sporadic variety? — *A.* Frequent vomiting and purging, first of the contents of the stomach, and then a liquid follows tinged with bile, and excessive in quantity; pain in abdomen and limbs; the pulse becomes small and frequent, voice weak, the countenance is haggard, and great thirst is present, and the body covered with clammy perspiration.

Q. What are favourable indications? — *A.* Cessation of the discharges and cramps, and general amelioration of the preceding symptoms.

Q. How long does the affection last? — *A.* From three to four days, or more frequently for a shorter time.

Q. Is the convalescence rapid? — *A.* Yes; though some signs of gastric irritability may exist for some time.

Q. What are some of the causes? — *A.* The season of the year, unwholesome food, drastic purgatives, cold drinks, when the body is heated, or by a sudden transition of temperature.

Q. What is the treatment? — *A.* Opium, in large quantity, and repeated, or with calomel, diluent drinks, frictions by means of stimulating articles to keep up warmth; and if collapse takes place, we resort to brandy, camphor, ammonia, blisters to stimulate, &c.

Q. How should we treat the debility? — *A.* By mild, nutritious diet, &c.

Malignant, or Asiatic Cholera. — *Q.* Where did this affection first show itself? — *A.* In the East Indies.

Q. Where has it extended? — *A.* Over nearly the whole world.

Q. Is the contagiousness of this affection settled? — *A.* No; there is still great difference of opinion on this point.

Q. What are the symptoms of malignant cholera? — *A.* They almost always show themselves suddenly, but sometimes we have a feeling of uneasiness preceding them, with diarrhœa.

Q. What is generally the commencement of the violent symptoms? — *A.* Watery purging, followed by vomiting and cramps. After the contents of the stomach are discharged, we

have whitish, turbid fluid, like rice water; these have a slight sickly smell and pass without straining, and are often in large quantities.

Q. Where do we have cramps? — *A.* In the belly, and in the muscles, generally contracting them into hard knots; then we have slight relaxation, and then cramp again.

Q. What other symptoms are there? — *A.* Headache, and noise in the head; very soon a pulse scarcely felt; the surface cold; the blood appears in a completely congested state; the conjunctiva becomes dry; the tongue is pallid, or slightly blue, cold, and covered with thin mucus; the palms of the hands and soles of the feet are shrunk and sodden; the pulse is feeble and fluttering; burning at the præcordia; thirst, &c.

Q. Is there much oppression in the breathing? — *A.* Yes.

Q. How is the intellect? — *A.* Unaffected, generally.

Q. What happens after a few hours? — *A.* The violent symptoms subside, the discharges and cramps cease, but the usual warmth of surface and the pulse do not return, or only transiently, and the patient relapses, and becomes covered with a cold clammy sweat, and the patient dies within seven or eight hours, or in twelve hours.

Q. If the case is not a fatal one, what occurs? — *A.* After the symptoms, being more or less violent, they gradually subside, and we have heat of surface returning, discharges ceasing, anxiety and oppression diminishing, pulse regains its power, and reaction becomes fully established.

Q. What is the usual course after the attack? — *A.* The patient either convalesces immediately, or recovery is slightly retarded by the supervention of internal inflammation of a mild character; or we may have a secondary fever of a typhoid character, and from which the patient is not likely to recover.

Q. What is the prognosis in this form of cholera? — *A.* Unfavourable.

Q. What are some of the circumstances which make it unfavourable? — *A.* The severity of the early symptoms, with a combination of general unfavourable signs.

Q. What are the peculiar anatomical characters? — *A.* These are so various and so uncertain, that we are unable to introduce them here, but must refer to works on pathological anatomy.

Q. What is the treatment? — *A.* It has been various, and as yet no settled plan has been adopted; some of the remedies which have attracted attention we will mention.

Q. What are they? — *A.* Heat and friction by means of

bags of hot bran, and by friction with a coarse brush, venesection in the onset of the disease has been used with decided advantage; opium alone, and in combination; calomel in large and frequent doses, warm drinks of cayenne pepper tea, or the other stimulants.

Q. By whom was large doses of saline articles recommended? — *A.* By Dr. Stevens.

Q. Who adopted the plan of injecting solution of salt in the veins? — *A.* Dr. O'Shaughnessy.

Q. What effect seemed produced by this plan? — *A.* The patient appeared to improve for a short time, but gradually relapsed.

Q. Upon what theory was this plan based? — *A.* The want of saline matters in the blood.

Q. Has acetate of lead been used with benefit? — *A.* Yes.

Q. Is it highly probable that a combination of opium and acetate of lead in large quantities would be beneficial? — *A.* Yes.

Q. When the period of reaction has arrived, what is necessary? — *A.* We must endeavour to repair the loss the blood has sustained of serum.

Q. Which way can we best answer this end? — *A.* By the administration of saline fluids, &c.

Q. Should any inflammatory affection of the chest supervene what must be done? — *A.* We must resort to local depletion, and the administration of saline articles.

COLIC.

Q. How many varieties do we embrace under this head? — *A.* Simple colic, including nervous, flatulent, and stercoraceous, bilious colic; dry bellyache; ileus; and colica pictonum.

Q. What have these varieties in common, and by what caused? — *A.* Exaltation of intestinal sensibility, with unequal contraction and dilatation of portions of the intestinal tube; pent up flatus, constipation, and sometimes inflammation; and these are caused by indigestible matters, sudden chill, suppression of perspiration, &c.

Q. What do you mean by colic? — *A.* A disease of some portion of the gastro-intestinal canal, with morbid sensibility and contractility, with morbid secretion, commonly of air, manifested by acute pain, rolling and twisting alternately, with flatulent distension, and almost always with constipation.

Q. What is the chief cause? — *A.* Morbid excitement of the nervous system by gross irritation, or by derangement of the secretions of the part, with generally an absence of inflammation.

Q. What is the character of the pulse? — *A.* Little, if at all, changed.

Q. What individuals are more liable to this disorder? — *A.* Females, and persons of sedentary habits, and individuals generally of nervous and irritable temperaments.

Q. What is the treatment of this variety? — *A.* In slight cases a little aromatic water, or the essential oils will be beneficial; but if the case continues, we must resort to opiates and antispasmodics by the mouth and by injection, application of warmth externally, &c.

Q. When it arises from indigestible food, what is necessary? — *A.* An emetic, followed by a mild laxative.

Stercoraceous Colic. — *Q.* What do you mean by stercoraceous colic? — *A.* That arising from an accumulation of fæces in the large intestine.

Q. Are not lumps sometimes felt in the intestine when it arises from this source? — *A.* Yes.

Q. What are the symptoms more peculiar to this form? — *A.* The pain is more particularly referred to the colon, and between the iliac region and umbilicus, and is more fixed; pain is felt in the kidneys, the urine is scanty, high-coloured and offensive; the stomach is irritable; the pulse slow, full, and hard, and the tongue white and moist.

Q. What is the treatment? — *A.* The procuring of an ample evacuation by means of cathartics and enemata, and the prevention of a return of the affection by the general improvement of the tone of the intestines.

Q. What are some of the remedies that have been used? — *A.* The usual cathartics and antispasmodics, the introduction of the tube per anum. Tobacco enemata have been used; and (if we should have inflammation), bleeding locally and generally; the ol. tiglii, &c.

Bilious Colic. — *Q.* When does this affection principally occur, and by what is it caused? — *A.* Chiefly in the heat of summer, and is generally caused by overloading the stomach, the use of spirituous and acescent liquors, and exposure to the intense heat of the sun, &c.

Q. What are the symptoms? — *A.* It is sometimes preceded by indigestion and slight fever, and frequently its attacks are sudden and with only a slight chill after either of these causes;

and we have irritability of stomach, vomiting of bilious matter, pain, and flatus in the intestinal canal, cramps, coldness of surface, &c.

Q. What then occurs? — *A.* Flushed countenance, beating of the temporal arteries, and the pulse is frequent, hard, and voluminous, the tongue is loaded and yellow, the countenance is now become anxious and dingy, and we have present constipation of the bowels, &c.

Q. What do we find by post-mortem examination? — *A.* Inflammation and congestion of various portions of the intestinal canal, morbid accumulation of blood in the liver, &c.

Q. What is the treatment? — *A.* Venesection, emetics, the administration of opiates, fomentations, and sinapisms to various parts of the body: and then the administration of enemata of a stimulating character, until the bowels are freely evacuated.

Q. Should pain recur, what is necessary? — *A.* Warm opiate enemata should be administered, and then administer calomel, in a large dose, to produce an effect upon the liver, and to evacuate the bowels.

Q. Should the physician leave his patient at this time? — *A.* No; he should be on the alert, and watch for any untoward symptom.

Q. What should be the diet? — *A.* That of the mildest character; and the bowels should be opened, if necessary, by mild enemata.

Q. What is beneficial to quiet the irritability of the stomach? — *A.* By rest from all stimuli, and by bland diluents; by revulsion by leeches and stimulating liniments and frictions, and opiates.

Q. How would you prevent a relapse? — *A.* By proper attention to the secretions and excretions, and avoiding anything like exposure.

Lead Colic. — *Q.* What other names has this affection? — *A.* Dry bellyache, colica pictonum, painters' colic, and Devonshire colic, &c.

Q. What is generally said to be the cause of this form? — *A.* The poisonous action of lead upon the system.

Q. Who are most liable to this form? — *A.* Plumbers, lead miners, manufacturers of white lead, and workers in lead generally.

Q. What other causes have we? — *A.* Drinking from vessels which have a preparation of lead in glazing, and from drinking water kept in leaden vessels.

Q. Does the history of the patient afford any ground for judgment? — *A.* Yes.

Q. What are the symptoms? — *A.* It has many symptoms in common with the other forms of colic, but the particular ones are the increase in the pain from dull to sharp, and extending from the hypochondria to the back.

Q. What other symptoms are there? — *A.* Pain in the limbs; spasm of the respiratory muscles; the tongue is flat and tremulous, and the countenance is dingy in hue, and dejected.

Q. What is the character of the stools? — *A.* Hard, dry, and knotty.

Q. Is this affection often fatal? — *A.* No.

Q. What are some of the sequences? — *A.* Partial palsy, impaired digestion, and debility of the whole system.

Q. Are we well acquainted with the anatomical characteristics of this affection? — *A.* No; but it is probably of a neurotic character.

Q. What is the treatment? — *A.* Similar, in many respects, to the foregoing. Sulph. alum has been used, and opiates; while mercury, pressed to ptyalism, is of decided advantage.

Q. What is sometimes used by workmen to prevent an attack? — *A.* A dose of castor-oil daily.

Ileus. — *Q.* What is ileus? — *A.* It is a species of colic, either with impaction in the bowels, or an intussusception or invagination of the intestines.

Q. What are the symptoms? — *A.* Pain of a twisting character around the umbilicus; obstinate costiveness, and vomiting without fever; by and by, if there is no relief, the abdomen is tender, tense, and tympanitic; vomiting is often stercoraceous, with severe tormina, and rapid failing of strength.

Q. What are the causes of this affection? — *A.* Most generally the same as those of colic, conjoined with some mechanical obstruction.

Q. What are the anatomical characters? — *A.* These are various; and while in some cases we find obstruction of the bowels, in others we have gangrene, and in others, again, spasmodic constriction, and in some we find nothing.

Q. Is intussusception frequently met with? — *A.* No.

Q. Which parts of the intestine are most liable to this? — *A.* The ileum and jejunum.

Q. What is the situation of the tissues in intussusception? — *A.* Two mucous and two serous surfaces are in contact.

Q. What are some of the causes of this affection? — *A.*

Worms; inflammation, as a consequence of dysentery and chronic diarrhœa; drastic purgatives, &c.

Q. What is the termination of intussusception? — *A.* By restoration of the intestine; and by death, either with or without inflammation.

Q. Which is the most dangerous form of intussusception? — *A.* Where the invagination is from above downwards.

Q. How is the form of intussusception from below upwards relieved? — *A.* After adhesions have formed between the two opposing peritoneal surfaces, the ends of the intestine slough off and pass out by stool.

Q. How would you form a diagnosis of intussusception? — *A.* This is difficult, and we must depend principally upon the tact of the practitioner in examining the abdomen; and from the vomiting sometimes of stercoraceous matter, &c.; and also by the irregular pulse, and the suddenness of the severe attack.

Q. What is the treatment? — *A.* After examining the abdomen carefully to find out the cause if possible, attending to the points of pain, we must resort to the usual remedies in colic, viz., bloodletting, purgatives, enemata, &c.

Q. What is necessary in addition to this? — *A.* The administration of tr. opii, by enema; the belladonna ungt. externally; warm bath, &c.

Q. Knowing the tendency to inflammation, should we early resort to the lancet? — *A.* Yes.

Q. What other remedies must we resort to? — *A.* Local depletion; blister over the point affected; ol. terebin., fomentations, &c.

Q. Is purging of much benefit? — *A.* No; but if there is much irritability of the stomach, calomel in small quantities must be used, either alone, or in combination with opium and camphor.

Q. What enemata have been used? — *A.* Turpentine, &c.

Q. Is not tobacco enemata beneficial? — *A.* Yes; but it must be used with great caution.

Q. What other remedies have been resorted to? — *A.* Ingestion of crude mercury, of warm water, warm oil, and, finally, a surgical operation.

TORPOR OF THE COLON.

Q. What is the cause of this? — *A.* Deficient contractile

power in the intestine, by which fæcal matter is detained and accumulated in the bowels: this is one of the most common causes of constipation.

Q. From what may this arise? — *A.* It may arise from a general asthenic condition of the system; from over-feeding and little exercise; want of compression of the abdominal muscles; indigestible food, &c.

Q. Does spinal irritation ever produce this affection? — *A.* Yes.

Q. What are the signs of torpor of the colon? — *A.* Constipation, tympanitis, borborygmi, depraved or lost appetite, bad digestion, the tongue is pale, sodden, puffed; breath fetid, countenance anxious, pains in the head and loins, palpitation, dyspnœa, &c.

Q. What are some of the bad effects of this? — *A.* We have disorder of the stomach and bowels, obstruction of the biliary duct, jaundice, &c.

Q. What is the treatment? — *A.* To unload the bowels by cathartics and enemata.

Q. What purgatives are beneficial? — *A.* Dec. alæ. comp., inf. senna., tr. jalap., pil. gambog. comp., &c.

Q. What next is necessary? — *A.* To remove the tendency by proper hygienic and dietetic management.

Q. How would you restore the tone of the colon? — *A.* By tonics and laxatives, as pil. of aloe et myrrh. cum quinia, or ferri sulph., frictions to the abdomen, tepid or cold affusion; and if there is spinal irritation, by applications to the spine.

Q. Should not dietetic regimen in all cases be preferred to medical? — *A.* Yes.

TYMPANITIS.

Q. What is meant by this term? — *A.* Distension of the abdominal parietes by a large collection of air in the intestines.

Q. Is this affection common? — *A.* Yes.

Q. When do the acute and chronic forms generally happen? — *A.* The acute may happen as an attendant upon peritonitis, colic, typhoid fever, &c.; and the chronic form, though sometimes an attendant upon other affections, may exist entirely alone.

Q. What are the diagnostic marks of tympanitis? — *A.*

Clear resonance on percussion, and by equable distension of the parietes of the abdomen, &c.

Q. What is the pathology of this? — *A.* This varies with the disease it accompanies; and in the chronic variety it is caused by want of tone in the muscular fibre of the intestines.

Q. By what is the gas formed? — *A.* By imperfect digestion of vegetable substances, and may also be induced by direct secretion.

Q. What is the treatment? — *A.* We may resort to leeching, blistering and frictions externally, and by the administration of ol. terebinth. in various forms; by carminatives, and by aperients and antispasmodics; and for a more permanent cure, upon a combination of aperients and tonics.

Q. What are some of the special remedies? — *A.* Strychnia, cold water by affusion, elastic belt, and by the removal of the air by passing up a tube, &c.

PERITONITIS.

Q. What is peritonitis? — *A.* Inflammation of the lining membrane of the abdominal parietes, and of this membrane reflected over the contents of the abdomen, called peritoneum.

Q. What are some of the symptoms? — *A.* A feeling of lassitude, chills, pain in the limbs, acute pain in some part of the abdomen; and this pain is aggravated by any movement of the body, which puts the abdominal muscles in action.

Q. Is pressure borne easily? — *A.* No, pressure is extremely painful; and on this account the patient lies with his knees drawn up to relax the abdominal muscles.

Q. What is the condition of the surface of the abdomen? — *A.* Dry, hot, and tense, and sometimes tympanitic.

Q. What is the condition of the bowels? — *A.* If not constipated at first, they soon become so.

Q. What is the condition of the pulse? — *A.* Rapid, small, and hard.

Q. What is the state of the countenance? — *A.* It is distressed and depressed.

Q. May not peritonitis sometimes exist without our being aware of it from any peculiar symptoms? — *A.* Yes.

Q. What is considered as one of the best signs of inflammation? — *A.* Tenderness of the abdomen.

Q. May not the effusion of coagulable lymph be sometimes discovered by the ear or hand? — *A.* Yes.

Q. What has this affection been confounded with? — *A.* Enteritis, ileus, hysteria, &c.

Q. How would you distinguish between them? — *A.* In the first, we have diarrhœa and deep-seated pain, and a milder pain and less tenderness, by the softer pulse, &c.; and in the second, we have the inflammatory symptoms coming on after an obstruction; and in the third, by the history of the case; the tenderness being superficial, and upon deep pressure being made the pain is relieved; and by the tenderness being more diffused over the body; and also by pressure upon the lumbar vertebræ eliciting pain.

Q. What are some of the causes of this affection? — *A.* Those of the usual phlegmasiæ also from mechanical injuries; also by parturition, or the introduction of any foreign substance in the abdominal cavity; and also it may be produced by metastasis from rheumatism, and by a peculiar contagion.

Q. What are the anatomical characters? — *A.* Redness, effusion of lymph, adhesion: sometimes serum and pus in proportion to the stages of inflammation; in some cases the inflammation may be partial. Gangrene and ulceration are quite rare.

Q. What is the prognosis? — *A.* If the case is seen early in the disease we may anticipate a favourable issue, but if allowed to run on, it is almost hopeless.

Q. What are some of the most unfavourable signs?—*A.* Tympanitis with obstinate constipation and vomiting; the pulse frequent and thready, and the strength prostrate, with hiccup and cold perspiration.

Q. What is the general duration of fatal cases? — *A.* These are various; they may run their course in less than thirty-six hours, or they may last for a fortnight, or three weeks, but they most generally last from six to eight days.

Q. What is the treatment? — *A.* To overcome the inflammation by every possible means, as bloodletting pushed very far, and this repeated if necessary; and by leeching frequently.

Q. When are blisters beneficial? — *A.* In the advanced stage, when the abdomen is tumid and tympanitic, and the first signs of inflammation have disappeared, and after bleeding has been freely resorted to.

Q. What are some of the best external applications? — *A.* When inflammation is active, warm poultices, hot turpentine fomentations, and sometimes cold evaporating lotions.

Q. Are strong purgatives beneficial? — *A.* No.

Q. Are not mild laxatives beneficial? — *A.* Yes.

Q. Is not mercury beneficial? — *A.* Yes; and should be used, from the onset of the disease, in alterative doses.

Q. How would you allay the vomiting in the case? — *A.* By means of hot laudanum fomentations, sinapisms, creosote, hydrocyanic acid, &c.

Q. When all hope by medical means have failed, what must be done? — *A.* Support the strength of the patient and favour a spontaneous cure.

Q. What is that form of peritonitis called, under which lying-in women sometimes labour? — *A.* Puerperal.

Q. What are some of the symptoms of peritonitis from intestinal perforation? — *A.* Great pain, coming on suddenly, followed by great frequency of pulse, collapse of features, and general prostration.

Q. What is the end of this form? — *A.* Nearly always fatal.

Q. Must we leave our patient to his fate in these cases? — *A.* No; we must support the strength, and administer opium freely.

Chronic Peritonitis. — *Q.* What are the symptoms of this form? — *A.* Very little, and sometimes no pain; a burning heat may exist near the stomach, the bowels are irregular, and the evacuations either of a light yellow or stone colour, and very fœtid.

Q. Has the patient much nausea? — *A.* Yes; and his tongue is generally of a bright red colour, and of uneven surface.

Q. What is the character of the substances vomited? — *A.* Green and thick.

Q. Is there much emaciation? — *A.* Yes; and the whole external physiognomy is changed.

Q. What is the condition of the abdomen? — *A.* Protuberant; and if fluid is present, we will find fluctuation; and we have also a doughy feel over the surface of the abdomen.

Q. What are the causes of this form? — *A.* The acute variety may pass into this form; or it may arise also from a tuberculous diathesis.

Q. Who are more liable to this form? — *A.* Females between fourteen and twenty-one.

Q. What is the prognosis? — *A.* Generally unfavourable.

Q. What are some of the anatomical characters? — *A.* The peritoneum in its various inflexions are found agglutinated toge-

ther ; we have also sanious serum and pus ; tubercles may be found ; thickening of the peritoneum ; enlargement of mesenteric glands, &c.

Q. What is the treatment ? — *A.* Sometimes topical bleeding, repeated blistering, frictions with liniments and ointments ; iodine and opium to relieve pain ; and the vegetable alteratives in combination with vegetable tonics.

Q. What should be the diet ? — *A.* Nutritious and various.

ENTERALGIA.

Q. What is the character of this affection ? — *A.* Neuralgic.

Q. From what may it arise ? — *A.* From irregular action in the bowels, and from disorders of secretion, or from any of the usual exciting causes of gastralgia.

Q. What is the treatment ? — *A.* A dose of oil, and tr. opii, camphor, anodynes, and antispasmodics ; and a general regulation of the nervous system.

DISEASES OF THE BILIARY ORGANS.

Q. What are some of the causes of disorder in the biliary organs ? — *A.* Atmospheric heat ; a large quantity of highly seasoned animal food ; a sedentary life ; external injury ; alcoholic liquors ; the incautious use of mercury. In cases of injury of the head we frequently have abscess ; mental emotions often favour it ; and it also follows other diseases.

Q. What are some of the diseases which it follows ? — *A.* The different forms of fever, dysentery, and diseases of the heart.

Q. What are some of the functional derangements ? — *A.* A decreased, diminished, and vitiated secretion of bile.

Q. Is the term bilious, as used commonly, at all significant ? — *A.* No.

Q. What is considered a sign of diminished biliary secretion ? — *A.* The paleness or dull ash colour of the fæces, where there is no evidence of mechanical obstruction in the ducts.

Q. What is considered as the sign of excessive biliary secretion ? — *A.* The yellow or green appearance of the alvine discharges, but this is doubtful.

Q. What are the causes of excessive biliary secretion ? — *A.* Elevated temperature ; the plentiful use of animal food ; and

when we have jaundice, without deficiency of bile in the stools, we may look for an excess of biliary matter in the system.

Q. What are some other causes? — *A.* An altered hepatic circulation; also particular states of the nervous system; and a deranged action of the intestinal canal.

Q. Can we give any particular reason for the vitiated secretion of bile? — *A.* None, except the general one, of vitiated blood.

Q. From what causes may the excretion of bile be impeded? — *A.* By mechanical impediments and spasm of the ducts, and from viscidity of the bile.

Q. What are some of the signs of functional derangements? — *A.* The appearance of the evacuations being either yellow or otherwise; also from their green colour; and also from a white appearance sometimes existing in them.

Q. What is the treatment of the functional derangements? — *A.* In excessive secretion we avoid exposure to high temperature; diminish animal food; to increase biliary secretion, we use cholagogues, as mercury; regulate the diet, and administer laxatives, &c.

Q. Is it at all known how we may change the biliary secretion when vitiated? — *A.* No.

Q. How would you favour the excretion of bile? — *A.* Emetics may be beneficial, so also laxatives, &c.

Q. What is the general character of gall-stones? — *A.* The composition is various, but it may consist either of the yellow matter of the bile, of the resinous matter of picromel, and of cholesterine.

Q. What are the symptoms of biliary calculi? — *A.* When they form an obstruction in the ducts, we have jaundice, whiteness of stools, and muddy redness of the urine.

Q. Is there not frequently great pain? — *A.* Yes; especially during the passage of a calculus along the ducts.

Q. Where is this pain situated? — *A.* In the pit of the stomach, extending to the right hypochondrium and back, and recurring in paroxysms.

Q. What is the treatment of biliary calculi? — *A.* We must obviate the cause of their formation; and during an attack we must facilitate the passage of the gall-stones by the administration of opium, warm baths, fomentations, emetics, bloodletting, &c.

Q. What are some of the affections to which the gall-ducts and biliary passages are liable? — *A.* In addition to what have been mentioned, we have enlargement of certain glands in the

capsule of Glisson; thickening from inflammation of the mucous membrane of the gall-bladder and ducts; also by purulent effusion, contraction of the parietes of the gall-bladder and ducts, and obstructions in the ducts.

Q. What is the treatment in these forms of diseases? — *A.* That of the affections of the liver generally.

HEPATITIS.

Q. What parts of the substance of the liver are liable to inflammation? — *A.* The parenchyma, and its investing serous covering.

Q. What are the varieties? — *A.* Acute and chronic.

Q. Upon what may congestion depend? — *A.* Upon obstruction of the circulatory system of the liver; or it may be produced by increased vascular action, &c.

Q. What is the character of the liver in this state? — *A.* It may be either red or mottled; or we may have extravasation of blood, either escaping in the intestines or in the cavity of the abdomen.

Q. Does hepatic hemorrhage depend upon other causes than congestion? — *A.* Yes; from rupture or ulceration of the larger vessels.

Q. What is that peculiar appearance we find in pernicious intermittents? — *A.* We have black blood coagulated similar to the spleen.

Q. What are the symptoms of congestion? — *A.* We have weight and fulness of the liver, and it projects beneath the ribs, &c.

Q. What is the treatment? — *A.* Upon the principles of chronic inflammation.

Acute Hepatitis. — *Q.* What are the premonitory symptoms of this affection? — *A.* They are similar to those of ordinary fever, but soon after we have some local signs, which show the character of the affection.

Q. What is the general type of the fever? — *A.* Inflammatory; but it may become typhoid.

Q. What are some of the general symptoms of this affection? — *A.* The skin is hot and dry; the pulse full and hard; tongue covered with a yellow fur; with thirst and bitter taste in the mouth; nausea and vomiting, of a bilious or dark-coloured fluid; bowels constipated; urine scanty and high-coloured, and depositing a lateritious sediment.

Q. What are some of the local symptoms? — *A.* Pain in

the region of the liver and epigastrium, increased by pressure or by inspiration and cough, or by lying on the right side; and the pain is greater when the peritoneal coat of the liver, or that part of the parenchyma nearest to the surface, is affected.

Q. Do we not also have pain shooting up to the right shoulder? — *A.* Yes, generally.

Q. Do not other parts of the body frequently sympathize? — *A.* Yes.

Q. Is not the function of respiration frequently affected? — *A.* Yes.

Q. What other local signs have we? — *A.* Tumefaction detected by percussion.

Q. What are the terminations of this disease? — *A.* Resolution; effusion of serum in the substance of the liver; the effusion of coagulable lymph; formation of pus, and consequently of abscess, and this discharging into the cavity of the abdomen; and being fatal, or else by pointing outwardly, or in the intestinal canal, or in the kidney, or the vena cava.

Q. Do we ever have gangrene? — *A.* This is still doubted.

Q. Are the symptoms of chronic hepatitis very marked? — *A.* No; we may have all the signs of dyspepsia in its various forms, &c.; and with the exception of pain on pressure, find the liver apparently healthy.

Q. Does post-mortem examinations develope anything marked? — *A.* Not generally.

Q. What may distinguish gastro-enterite from hepatitis? — *A.* The characters of the fever, in the first, it being typhoid generally; and in the latter, acute and inflammatory.

Q. How would you diagnosticate it from chronic pleurisy with effusion? — *A.* In chronic pleurisy we have obliteration of the intercostal spaces, while in this we have more marked spaces than in the natural state.

Q. What is the treatment of hepatitis? — *A.* Venesection, regulated by circumstances, followed by local depletion, and especially leeches, warm poultices to the part, and purgatives.

Q. Which purgatives are the most proper? — *A.* The mercurials, neutral salts, and the cholagogues generally, &c.

Q. Are counter-irritants and blisters of benefit? — *A.* Yes, in the advanced stages of the acute variety, and also in the chronic forms; and we may also sometimes use setons and issues.

Q. Is it of the greatest importance to attend to the diet of the patient? — *A.* Yes.

Q. Must the physician loose sight of the disease if there

should be a temporary amendment? — *A.* No; for the disease may be deeply seated, and abscesses may form, &c.

Q. When is it considered as the most auspicious moment for administering mercurials? — *A.* After the violence of the attack has been in a great measure subdued by the ordinary antiphlogistics.

Q. Is the mode of administration of the mercurials in regard to quantity or time well settled?—*A.* No; but the weight of evidence seems to be in favour of small doses frequently repeated.

Q. What other article has been used with decided advantage in hepatic affections? — *A.* The nitro-muriatic acid, both internally and externally.

Q. Has taraxacum any reputation in these affections? — *A.* Yes.

Q. Should hepatic abscess exist, pointing externally, what points would favour your undertaking the opening of the abscess? — *A.* From its being in the investing membrane of the liver, without involving the parenchyma; the smallness of the abscess, the existence of adhesions to the surrounding parts, the prominent signs of pointing, the age and constitution of the patient, &c.

Q. What are some of the structural diseases of the liver? — *A.* Serous cysts and hydatids, adipose degeneration, tubercles, malignant tumours, and formations, &c.

JAUNDICE.

Q. What is jaundice? — *A.* It is a symptom of diseases occurring under different pathological states, either with or without inflammation in the biliary organs, and where the fluids and solids of the body are tinged more or less deeply with bile.

Q. What are some of the causes of jaundice? — *A.* Mechanical obstruction to the exit of the biliary secretion, and consequently the bile is reabsorbed in the system; or the innervation of the liver is injured, and is unable to perform its ordinary function; and the materials of bile are not separated from the blood.

Q. What other cause have we? — *A.* Spasmodic jaundice occurring in hysterical or hypochondriacal patients; but where the exact seat of spasm is, we are unable to tell.

Q. Do acute and chronic diseases of the liver favour jaundice? — *A.* Yes.

Q. What is the most important and frequent cause of jaun-

dice? — *A.* Disease of the mucous membrane of the stomach and duodenum.

Q. How would you explain the action of the irritation in the mucous membrane of the stomach or duodenum, producing jaundice? — *A.* By sympathy.

Q. What fever does pathologists now think depends upon gastro-intestinal irritation, with the liver sympathizing? — *A.* The yellow-fever; and consequently we have jaundice in its course.

Q. Does the sympathetic action of the brain upon the liver ever cause jaundice? — *A.* Yes.

Q. What solid and fluid of the body is an exception to the law of universal colouring by jaundice? — *A.* The substance of the brain, and the milk during lactation; and possibly the humours of the eye.

Q. Do we ever have jaundice in young children? — *A.* Yes, shortly after birth, depending upon irritation in the intestinal canal.

Q. Do we not often find jaundice existing in patients without their feeling any bad effect from it? — *A.* Yes.

Q. Who are those most liable to jaundice from gastro-duodenal irritation? — *A.* Dyspeptics, and individuals subject to diarrhœa; but it may occur in individuals, who, after exposure to intense heat, use some articles irritating to the gastro-enteric mucous membrane.

Q. What two forms does jaundice take in this country? — *A.* Either the mild, passing off spontaneously, or the severe and fatal, &c.

Q. What are some of the symptoms of the severe form? — *A.* After using some irritating article of diet, from which the patient is indisposed for several days, we have nausea, vomiting, thirst, anorexia, burning in the epigastrium, and tenderness in the stomach and duodenum, with a foul tongue.

Q. What is the character of the excretions? — *A.* The bowels are costive and clay-coloured, and the urine is high-coloured and loaded.

Q. What is the general condition of the patient? — *A.* There is great prostration of strength, with vertigo, low spirits, &c.; and there is fever, sometimes passing off in a day or two, or lasting for some time, and tending to produce the most dire results.

Q. Is the variation in the intensity of the colouring of the skin favourable or unfavourable? — *A.* Unfavourable.

Q. Is coma a highly unfavourable sign? — *A.* Yes.

Q. Is the diagnosis of jaundice arising from gastro-duodenitis or from hepatitis difficult? — *A.* No; not when we bear in mind the peculiar symptoms.

Q. What is the treatment of this form of the affection? — *A.* We have little or no fever, and the jaundice often disappears without any treatment, we relying upon a regulation of diet and laxatives, and prohibiting anything stimulating; but in more severe cases we must use topical depletion, iced drinks, &c., to remove inflammation, with laxatives and enemata for the bowels.

Q. Is mercury beneficial in this disease? — *A.* Yes.

Q. Should coma supervene, what is the most approved treatment? — *A.* The head should be shaved and ice applied, with leeching behind the ears, blisters to the nape of the neck, and purgatives.

Q. Does there not exist a strong analogy between the severer forms of jaundice and yellow fever? — *A.* Yes.

Q. In the form of jaundice depending upon biliary calculi, what are the symptoms? — *A.* Sudden pain in the epigastrium and right hypochondrium, the stomach is nauseated, and cardialgia and vomiting is present, and the pain is referred to the region of the gall-bladder; the abdominal muscles are spasmodically contracted, and we have convulsions, fainting, cold extremities and perspiration, and the pulse is hard and contracted with no fever, and this is somewhat pathognomonic.

Q. May we not have a tumour in the right hypochondrium? — *A.* Yes.

Q. Does not the patient enjoy times of perfect ease in the interval between the paroxysms? — *A.* Yes, frequently.

Q. What is the treatment in a case arising from biliary calculi? — *A.* To guard against inflammation, to allay spasmodic pain, and to favour the passage of the stone.

Q. How would you answer these indications? — *A.* By venesection, topical depletion over the region of the gall-bladder, brisk purgation by cathartics and enemata, and the administration of opium in full doses.

Q. Have tobacco injections ever been used? — *A.* Yes; and they are of decided benefit.

Q. What is the objection to the employment of emetics? — *A.* Rupture of the gall-bladder.

Q. What other external remedies have been found highly beneficial? — *A.* Warm bath, fomentations, &c.

Q. In spasmodic jaundice, what is to be done? — *A.* It must by treated in the usual manner, as if mere nervous excitement existed, by purgatives and antispasmodics.

Q. Is the precise mode of action in the cases of brain affections occurring in jaundice known? — *A.* No; not unless we consider the nutrition of the brain injured from the morbid state of the blood.

DISEASES OF THE PANCREAS.

Q. What are the principal diseases attacking the pancreas? — *A.* We may have a disorder of the secretion, both in regard to quantity and quality. The pyrosis which attacks some is thought by many to arise from a diseased state of the pancreas. We may also have congestion and hemorrhage; inflammation both acute and chronic; and these may terminate in the usual manner of inflammations, — hypertrophy, atrophy, induration, cartilaginous transformation, fatty transformation, steatomatous concretions, cancerous and scirrhous degeneration, melanosis, calculi, &c.

Q. Is the diagnosis of this affection at all certain? — *A.* No.

Q. Are the symptoms at all peculiar? — *A.* No; and consequently the treatment is entirely in the dark.

DISEASES OF THE SPLEEN.

Q. Are we acquainted with the functional diseases of this organ? — *A.* No.

Q. To what, then, must we direct our attention? — *A.* To the organic affections, viz.; inflammation, congestion, hypertrophy, softening, rupture, induration, purulent formations, tubercle, atrophy, &c.

Q. What are the signs of diseases of this organ? — *A.* Enlargement extending to the left hypochondrium, to the epigastrium, or to the umbilicus, &c.; and this enlargement may be felt by external pressure.

Q. What is the sound upon percussion? — *A.* Dull; but this may depend upon other causes.

Q. May not other tumours be mistaken for diseased spleen? — *A.* Yes; and they may occur either in the acute or chronic variety.

Q. What other symptoms do we have of splenic affection? — *A.* Pain, oppressed respiration, cough, with or without expectoration, bending of the body to the affected side, placing the hands in the region of the spleen, inability to lie on the right side, depression of spirits, dingy yellow colour of the skin, tendency to dropsy, and dysentery, &c.

Q. What are some of the causes? — *A.* Certain articles of

diet, and a blow in the region of this organ, especially in those parts of the country where we have a tendency to spontaneous development of this form of disease.

Q. In what fever do we find enlargement of the spleen most general? — *A.* In intermittent fever.

Q. Do we not frequently find disease of the spleen and of the heart co-existing? — *A.* Yes.

Q. Affections of what other organs of the body have we as frequent complications? — *A.* Those of the stomach and liver.

Q. Do we not frequently find enlargement of the spleen occurring in deranged menstrual function? — *A.* Yes.

Q. Do not metastatic inflammations frequently occur to this organ? — *A.* Yes, particularly gout.

Q. What districts particularly favour enlargement of this organ? — *A.* The damp and marshy, &c.

Q. How is the treatment of diseases of the spleen divided? — *A.* Into that for the acute and chronic varieties.

Q. What is the treatment in the acute form? — *A.* That of the usual inflammatory affections.

Q. What is proper in the chronic form? — *A.* That of the usual chronic inflammatory affections.

Q Is purging proper in the chronic form? — *A.* By some purging is highly recommended, while others disapprove of it.

Q. Is mercury of service in diseases of the spleen? — *A.* No, not generally.

Q. What remedies have been highly extolled? — *A.* Cinchona and its preparations; also iodine externally and internally.

Q. Where has the actual cautery been used externally? — *A.* In the East Indies.

Q. Is not compression of service in this affection? — *A.* Yes.

Q. Are not hygienic means of service in splenic affections? — *A.* Yes.

Q. What is the celebrated spleen mixture of Mr. Twining? — *A.* ℞. Pv. jalap; rhei; columb. zinzib; potas. bitart. āā. ℥j.; ferri sulp. ℈iss.; tr. sennæ, ℥ss.; aqua menth. sativ. ℥x. M. Sig. ℥iss., at 6 A.M. and 11 A.M., &c.

DISEASES OF THE URINARY ORGANS.

Q. In diseases of the urinary organs, what first necessarily attracts our attention? — *A.* The correct knowledge of healthy urine.

Q. What is the quantity of urine passed by an individual under the most favourable state of health and correct diet? — *A.* The average quantity is daily, 35 ounces; and its density is about 1029.

Q. What is the colour, taste, &c. of healthy urine? — *A.* A lively wine, yellow, transparent, limpid colour, aromatic odour, and of an intense bitter saline taste, slightly acid; and alkaline and ammoniacal when long kept.

Q. What is its general composition? — *A.* Water, urea, lithic acid, with ammonia, carb. acid, alkalies, sulphates, phosphates, hydrochlorates, lactates, phosphates of lime and magnesia, colouring matter, silica, and fluoride of calcium, with some mucus, &c. Some of these compounds are merely accidental.

Q. What are some of the circumstances which favour a variety in the character of urine? — *A.* Diet and drink, heat or cold, character of occupation, age, sex, and time of day when voided.

Q. What influence has vegetable or animal diet upon the character of urine? — *A.* Vegetable diet diminishes and an animal diet increases the proportion of urea and lithic acid; and particular articles of diet produce greater or less results in this degree.

Q. Which articles favour most the formation of lithic acid? — *A.* Cheese and pastry.

Q. To what forms of disease are the kidneys liable? — *A.* To functional and organic.

Q. What are some of the functional diseases? — *A.* Gravel calculus, diabetes, hematuria, suppression of urine, &c.

Q. What are the organic diseases? — *A.* Granular disease, or that of Bright, nephritis, tubercles, urinary and serous cysts, malignant diseases, &c.

Q. What are some of the morbid states in regard to function? — *A.* Sometimes we have the urine increased, or sometimes reduced in quantity; the density may be either too high or too low; the solids in its constitution may be increased, and its sensible qualities may be affected.

Q. Which are some of the ordinary ingredients that may be affected? — *A.* Urea; this may be either too much or too little; lithic acid, partaking of the same variations. The earthy phosphates may exist in either too large or too small quantities; and we have the same variety in regard to mucus in the urine, and also the muriatic and phosphoric acids.

Q. What other substances may we find, sometimes, which should never exist? — *A.* Blood, albumen, sugar, milk, an

oleo-albuminous matter, pus, spermatic fluid, carbonate of lime, nitric acid, oxalate of lime, &c.

Q. What are some of the sediments to be found? — *A.* A black sediment, red and purplish sediment, cystine, prostatic calculi, &c.

Q. Do not some of the articles of food and drink impart peculiar odour, colour, &c., to the urine? — *A.* Yes; viz., asparagus, horseradish, beet-root, &c.

Q. What are some of the causes for the great variety of substances to be found in the urine of an organic nature? — *A.* By the mutual action and reaction of elementary substances upon each other.

Q. From what do these various morbid affections of the urine arise? — *A.* Either from the primary morbid condition of the kidney, or from a secondary cause by which the kidneys are implicated.

Q. What classes of affections of the kidneys shall we notice? — *A.* Those which are either connected with primary functional disturbance in the kidneys, or those which, though secondary, become of primary importance, on account of the local or general disturbance caused.

GRAVEL.

Q. What is gravel? — *A.* The occurrence of pulverulent or gritty matter in the bladder; and when discharged, producing irritation in the genito-urinary organs.

Q. What are the symptoms? — *A.* They are of a twofold character, local and general; the general are, dyspepsia with disturbed circulation, with the usual signs peculiar to these affections.

Q. What are the local signs? — *A.* A dull pain, and feeling of weight in the loins, darting pains in the extremities, and these pains increased by movements of the body; irritation and heat in the neck of the bladder, itching at the urethra, pain and retraction of one or both testicles, discharge of bloody urine, appearance in the urine of sandy powder of various colours, frequent calls to pass the urine, and difficulty of passing it; sickness accompanying the pains, and anxiety of countenance.

Q. What is the character of the urine? — *A.* Scanty and high-coloured, high in density, and abounding in urea and lithate of ammonia.

Q. Which is the most frequent kind of gravel? — *A.* The

lithic; and then we have next in order the phosphatic and oxalic gravel, &c.

Q. What are the causes and pathology of urinary gravel? — *A.* These may arise from particular kinds of diet, and from organic diseases, either in the urinary organs or those of the digestive organs; or from constitutional causes; age also has its effect.

Q. What kind of diet favours this affection? — *A.* Rich, nutritive, and solid diet, and this in excess, without the usual exercise necessary for an individual.

Q. What articles of diet and drink cause this disease more frequently? — *A.* Articles that cause indigestion, or which are acescent, especially acescent wines; also calcareous waters.

Q. What are some of the other causes? — *A.* Injuries of the spine, and organic diseases either in the organs of digestion or in the urinary organs. It may also arise from hemorrhoids, or from organic disease of the liver.

Q. Does suppressed perspiration have any effect upon this disease? — *A.* Yes, it favours it.

Q. Is not a strong constitutional tendency most influential in the cause of gravel? — *A.* Yes.

Q. Does not gravel appear to be an hereditary complaint? — *A.* Yes.

Q. Which is the least and which the most unfavourable species of gravel? — *A.* The lithic is the least injurious, while that composed chiefly of phosphate of lime is the worst, because we generally find organic disease of the mucous membrane of the kidneys or bladder accompanying it.

Q. What other circumstances have an influence upon our prognosis in this disease? — *A.* The deposit yielding or not to the influence of judicious management.

Q. What is the treatment? — *A.* This varies with the different species of gravel.

Q. What is the object sought after in the case of lithic gravel? — *A.* To increase the quantity of urine, to lessen its density and its azotiferous principles, to substitute alkalinity for acidity, and to favour cutaneous secretion.

Q. How would you favour these indications? — *A.* By diminishing the quantity and nutritive quality of the food; by increasing drink and withholding acescent liquids; by the administration of alkalies, and by regular exercise; and by correcting the various morbid conditions in the constitution; and by warm clothing, &c.

Q. Does the due regulation of diet have much benefit? — *A.* Yes; many cases of gravel are entirely relieved by it.

Q. What articles of diet and drink are the best? — *A.* Milk and vegetable diet, and drinks of simple diluents.

Q. Which one of the alkalies are most used and beneficial in lithic gravel? — *A.* The bicarbonate of soda or potash.

Q. In cases where there is dyspepsia, or undue excitement in the kidneys, what is necessary? — *A.* To remove the dyspepsia, and also to reduce the excitement in the kidneys by local or general depletion.

Q. What remedies have been used to promote a discharge of gravelly deposits? — *A.* Turpentine, cantharides, and other stimulants to the kidneys; but they must be used with great caution.

Q. What is necessary in phosphatic gravel? — *A.* Generous diet with nutritive articles, and sometimes a small quantity of wine, and attention to the condition of the bowels.

Q. To what must we in all cases of gravel direct our attention? — *A.* Whether it depends upon an organic disease of the kidneys or bladder, or not.

Q. How would you allay the pain occurring during fits of the gravel? — *A.* By opiates and antispasmodics, tonics, warm baths, &c.

Q. What is the treatment of oxalic gravel? — *A.* The same as that for lithic, also avoiding all articles containing oxalic acid, &c.

Q. In this form of gravel is it not necessary for us sometimes to remove symptoms of inflammation? — *A.* Yes.

Q. What has been suggested as advisable in this variety of gravel? — *A.* To endeavour to change this oxalic acid to the lithic variety, by means of muriatic acid internally administered.

URINARY CALCULI.

See Surgery, p. 257.

DIABETES.

Q. What is meant by this term? — *A.* This has a twofold signification; the one where the urine is increased in quantity and abounding with saccharine matter, and the other when the urine is merely increased in quantity, materially, uniformly, and independently of the administration of diuretics. To the former, the name of diabetes mellitus is given, and to the latter that of diabetes insipidus.

Q. Is the term diabetes insipidus at all significant or proper? — *A.* No.

Q. What forms of the urine have been distinguished under this head? — *A.* By Dr. Willis there have been three designated, viz.; hydruria, or excessive watery discharge simply; and the deazotised and the hyperazotised urine.

Q. Is a simple uniform increase in the quantity of urine from simple dilution, uncommon or deserving the name of disease? — *A.* No.

Q. Do we not sometimes have cases when the thirst is incessant and urgent, the flow of urine excessive, the appetite increased, and the general tone of the constitution impaired? — *A.* Yes; these are cases of real disease, and have been mistaken by some for cases of diabetes mellitus, but they are wanting in the essential elements of that disease.

Q. Who are liable to this form of the affection, and upon what does it depend? — *A.* Young adults of the labouring classes; and it is supposed to depend upon deranged digestion, but we cannot tell the cause of the primary disorder.

Q. What is the best treatment for this form? — *A.* Tonics, mineral and vegetable, opiates, nutritious but unstimulating diet, freedom from diuretics, and the proper regulation of the appetite for liquids; and purging with oleaginous and resinous articles, when necessary.

Q. What are the characteristics of anazoturia? — *A.* Great paleness, absence of odour, diminution of density in the urine, with a feeble ammoniacal odour when kept, and deficiency of urea and the other solids.

Q. What treatment has been recommended? — *A.* Gentle aperients, of the resinous or oleaginous kinds, bitter tonics, diaphoretics and anodynes, light nourishing diet, chiefly farinaceous and animal, and slightly acidulated drinks.

Q. What is the last variety? — *A.* Those in which we have an excessive secretion of urine and surcharged with urea, and has been termed azoturia.

Q. What are the appearances of the urine in this form? — *A.* The urine is sometimes pale, at others deeper-coloured than natural, from four to sixteen pints is the daily quantity, high in density, and abounding in urea.

Q. What are some of the general symptoms? — *A.* Irritability of the bladder, causing frequent calls to pass the urine, sometimes great appetite, gnawing sensations in the stomach, dyspepsia, laryngitis, debility, mental depression, and emaciation.

Q. What are some of the causes of this affection? — *A.* High living, indulgence in alcoholic drinks, sexual excess, &c. In young children the causes are obscure.

Q. What is the treatment of this form of disease? — *A.* If there is much excitement we must use venesection; food must be taken in moderation, and that which is easily digested, principally farinaceous articles; diluent drinks slightly acidulated; opium regularly administered; finally, invigorate the constitution, and bring about healthy secretions.

DIABETES MELLITUS.

Q. What do you mean by this term? — *A.* A discharge of saccharine urine with great tendency to emaciation and suppressed transpiration.

Q. Are these phenomena constant? — *A.* No; but that of the presence of sugar in the urine is more so than any, but even this is not pathognomonic.

Q. What are the symptoms of this affection? — *A.* These are always obscure, and the first sign is that of sugar found in the urine.

Q. Is it probable that the disease only commences when sugar is found in the urine? — *A.* No; but long before this we have reason to suppose that the kidneys are affected.

Q. What are some of the more marked signs? — *A.* Frequent evacuation of the bladder, and being disturbed frequently at night on its account; paleness of the secretion, and diminution of its proper odour; excessive appetite and thirst, deranged secretion of the skin, loss of flesh, and muscular power.

Q. What is the general character of the urine? — *A.* This is increased in quantity absolutely, and also in relation to the fluid contained in the drink and food; it is increased in density, in solid contents, and in solids daily discharged, and also in its sensible and chemical qualities.

Q. Can we detect sugar in the urine by the taste? — *A.* Not always, and hence should not be depended upon.

Q. Which is the best manner to detect the presence of sugar? — *A.* By fermentation with yeast. See *Chemistry*.

Q. What are some of the other properties of diabetic urine? — *A.* A tendency to early putrefaction, and the development of ammonia, deposition of earthy phosphates, spontaneous fermentation, and the presence of albumen.

Q. What sometimes takes place in an uncomplicated case of diabetes about a week before death? — *A.* It sometimes becomes quite healthy.

Q. What is the state of the functions of the alimentary canal? — *A.* Though some writers deny it, we nevertheless

have not in incipient diabetes any affection of the stomach and alimentary canal, though when the disease has set in we have marked dyspeptic symptoms.

Q. Where has sugar been found by a late observer? — *A.* In the stomach during digestion, in the half digested food, in the saliva and fæces.

Q. What is the state of the circulation and the blood? — *A.* Generally in a state of excitement, and the blood has more or less of a buffy coat ; the serum is whey-like, and the colouring particles diminish as the disease advances.

Q. Has sugar ever been found in the blood? — *A.* No ; but a syrupy fluid has been discovered, which fermented with yeast, by McGrigor.

Q. Is the skin affected? — *A.* Yes ; it is dry, harsh, and rough, and even where diaphoretics are used perspires badly.

Q. What is the state of the mind? — *A.* It is weakened and impaired ; the faculty of attention is injured, and the patient becomes morose and irritable.

Q. What are some of the secondary affections? — *A.* Tubercular phthisis, granular degeneration of the kidneys, anasarca, apoplexy, &c.

Q. Is the pathology of this disease known? — *A.* No.

Q. What do we most frequently find? — *A.* The kidneys enlarged, flabby, gorged with blood, with general enlargement of their vessels, &c.

Q. What morbid appearances do we find in other parts of the body? — *A.* Tubercles in the lungs, and enlargement of the mesenteric glands.

Q. Is this affection probably a functional or organic disease? — *A.* A functional ; and from what it originates is still clothed with doubt, though many have supposed that error in diet is the chief cause.

Q. What is the prognosis in these cases? — *A.* This varies with various circumstances ; of the perfect cure of any we doubt much, but a fatal issue may be prevented from speedily taking place by proper treatment.

Q. What are some of the fatal signs? — *A.* The accession of pectoral complaints, the appearance of albumen in the urine, and sudden prostration of strength.

Q. What is the treatment in this disease? — *A.* Bloodletting in its earlier stage, and then used in moderation ; an animal diet, and this strictly adhered to ; and for animal food, that of adult animals is preferable ; and cooked by boiling or roasting, with little salt ; the quantity of food should be re-

gulated ; and in regard to drinks, these should be small in quantities, and as simple as possible.

Q. Is opium of importance in the treatment? — *A.* Yes, in doses of from a half to a grain twice or thrice a day, and gradually increasing it to produce a gentle calming effect.

Q. Which one of the astringents has been found beneficial? — *A.* The plumbi acetas.

Q. How would you restore the functions of the skin? — *A.* By means of pulv. Dov., frictions, and warm bath.

Q. What must be done in the various affections which may arise? — *A.* They must be treated on general principles.

Q. What other remedies have been used? — *A.* Alkalies, the tonics, as cinchona, iodine, creosote, &c.

DIABETES CHYLOSUS.

Q. What name has been given to this form by Dr. Willis? — *A.* Oleo-albuminous urine.

Q. Is this a rare or common disease? — *A.* Rare.

Q. Are the symptoms well marked? — *A.* No.

Q. What, however, are some of the more prominent? — *A.* The milky appearance, its coagulating sometimes into a gelatinous body, and separation into a white clot, and a clear yellowish fluid ; or there is simply a white flaky matter deposited, urea is defective but not entirely wanting.

Q. How are these symptoms frequently removed? — *A.* By inflammatory action in the kidneys, or by ptyalism.

Q. Is this state of the urine continuous? — *A.* Not always.

Q. What are its causes? — *A.* They are obscure ; but luxurious living, exposure to cold, extreme fatigue, and the constitutional action of mercury, have been assigned.

Q. What is the nature of this disease? — *A.* This is not known.

Q. What is the treatment? — *A.* Upon this point we are still in doubt ; though that proper in other cases of diabetes has been adopted.

SUPPRESSION OF URINE.

Q. What name has been given to this by nosographists? — *A.* Ischuria renales.

Q. Is this properly a disease or a symptom of various diseases? — *A.* A symptom.

Q. Is the mere reduction of quantity to a slight degree in

urine during the course of an acute disease of any importance? — *A.* No; it often occurs.

Q. Is not extreme diminution or entire suppression dangerous? — *A.* Yes.

Q. Do not the symptoms vary with the circumstances and with the cause of its suppression? — *A.* Yes.

Q. When suppression takes place suddenly from any cause during a state of health, or in any other circumstances than those of a pre-existing state of protracted chronic disease, what are the results? — *A.* Languor, restlessness, weariness, and pains in the loins and lower extremities; the pulse is excited, the skin is heated, features flushed, with headache, nausea, and vomiting.

Q. Does not drowsiness soon supervene? — *A.* Yes; and this soon passes to coma generally about the fourth day, and death soon follows.

Q. What is the state of the bladder when examined with a catheter?—*A.* We have muddy urine loaded with mucus, or pale and of a low density; and still later, we find the bladder empty.

Q. Do we not find the quantity of urine gradually diminishing before we have complete suppression? — *A.* Yes.

Q. What are the usual symptoms under these circumstances? — *A.* Simple coma, without any fever or convulsions, and death creeps on slowly.

Q. What poisons sometimes produce suppression of urine? — *A.* Digitalis, corrosive sublimate, cantharides, &c.

Q. What, probably, is the cause in these cases? — *A.* Irritation of the kidneys.

Q. What other variety has been noticed? — *A.* That arising in young children, and in elderly persons who are troubled with lithic gravel, depending probably upon indigestion and nervous irritability.

Q. What are some of the causes of suppression? — *A.* A blow over the parts adjacent to the kidneys, exposure of the lower part of the trunk to cold and wet, and from poisons taken inwardly.

Q. What are some of the pathological appearances? — *A.* In sudden suppression we have darkness, flabbiness, and congestion of the kidneys, enlargement of cortical portion, emptiness and contraction of the bladder, urea in the blood; and in case of poison we find evidences of inflammation; we also find granular disease of the kidneys, &c.

Q. What is the treatment? — *A.* This differs with the various circumstances under which it occurs. If the suppres-

sion is complete we can do nothing, but if the urine is merely diminished as in chronic organic disease, diuretics may be given.

Q. When we have reason to suppose that suppression occurs without previous organic disease, what may be done? — *A.* We may use bloodletting, with anodynes and diaphoretics, and purgative injections, but our remedies are all likely to fail.

ORGANIC DISEASES OF THE KIDNEYS.

Q. Are the kidneys subject to many morbid alterations of structure? — *A.* Yes; but most of them are of rare occurrence.

Q. Which are the principal organic affections? — *A.* Errors in conformation, hypertrophy, inflammation, granular deposition, hyperemia, anemia, atrophy, tubercles, carcinoma, hydronephrosis, and serous cysts.

Q. Which are two of the most important, and of more frequent occurrence? — *A.* Inflammation and granular deposition.

INFLAMMATION OF THE KIDNEYS.

Q. What are the various forms of inflammation? — *A.* Nephritis, or inflammation of the gland; pyelitis, or inflammation of the pelvis or calyces; perinephritis, or inflammation of the investing fibrous membrane; and pyelonephritis, when both the pelvis and glandular structure is affected.

Q. What are the symptoms of simple acute nephritis? — *A.* The attack is announced as in other forms of inflammation, attended by pain in one or both loins, deep-seated and dull, aggravated by firm pressure, and by the sitting posture.

Q. What effect has a violent sudden movement upon the parts? — *A.* It increases the pain.

Q. Is the pain limited to the loins alone? — *A.* No; but it shoots down the ureters to the bladder, to the groin and scrotum, and we frequently have retraction of the testicles.

Q. What is the state of the urine? — *A.* It is either suppressed or scanty, and it may be in great abundance, but voided with pain.

Q. What is the character of the fluid? — *A.* It is sometimes bloody, or of a dark brown colour, and sometimes it is pale, almost like water, not acid, but rather neutral; sometimes also we have albumen present.

Q. In what form of nephritis do we find the acids present? — *A.* In the asthenic variety.

Q. Is pus or mucus present in the urine when we have pure nephritis? — *A.* No.

Q. What are some of the other constitutional signs? — *A.* Great nausea and vomiting, constipation, tympanitis, anxious and depressed countenance, &c.

Q. What are some of the signs of the termination of nephritis? — *A.* Sometimes we have resolution without any new symptoms, or we may have signs of apoplectic coma.

Q. Under what circumstances is coma apt to occur? — *A.* Where the urine is greatly diminished or altogether suppressed.

Q. When does death usually ensue? — *A.* Within three or four days after the supervention of the cerebral symptoms.

Q. What are the other terminations? — *A.* Typhoid symptoms, which finally end in coma; and also suppuration may occur, indicated by rigors, followed by hectic fever, which may end in renal fistulæ, opening either externally or internally.

Q. When gangrene takes place, what are the usual signs? — *A.* A diminution of pain, fluttering pulse, constant vomiting, hiccup, delirium, suppression, or a discharge of black, fetid urine, &c.

Q. What are some of the signs of chronic nephritis? — *A.* These are obscure and indefinite; we seldom have pain, but an uneasy feeling may be aroused by pressure over the region of the kidneys.

Q. Upon what must we chiefly rely for a diagnosis? — *A.* Upon the alkaline and turbid state of the urine, and upon the gradual wasting and emaciation of the patient.

Q. Will local depletion and counter-stimulants have any effect in forming a diagnosis? — *A.* Yes; for by these means the alkalinity and turbid conditions of the urine are diminished.

Q. What are the terminations of this form of the disease? — *A.* These are not well understood; but we may have it passing into the acute form, or into inflammation of the pelvis, and suppuration, and sometimes into induration, or atrophy.

Q. What are the complications of the acute and chronic forms? — *A.* These may be as various as the different diseases to which the gland, as a whole, is liable, or to which the appendages of the glands are liable, including the ureters and bladder.

Q. Mention some of the diseases particularly with which

it may be complicated? — *A.* Cancer, diseased prostate, gonorrhœa, diseases of the uterus, &c.

Q. Does this disease complicate other affections? — *A.* Yes; the liver, the duodenum, spleen, colon, and *vice versâ;* also pleurisy, pneumonia, and affections of the spinal cord and the brain.

Q. To what diseases may nephritis arise as an intercurrent affection? — *A.* Typhoid fever, variola, yellow fever, and purulent absorptions.

Q. What are the symptoms of pyelitis? — *A.* The pain extends to the testicles, and is attended with retraction of them; and when suppuration takes place, we may know it by manual examination; and sometimes we may distinguish fluctuation in the gland.

Q. What is the condition of the urine? — *A.* Never suppressed, but frequent calls to void it; and when passed, it has an admixture of mucus or pus with it.

Q. How may it terminate? — *A.* In resolution, suppuration, gangrene or inflammation of the gland itself.

Q. Is this form subject to many complications? — *A.* Yes; and similar to those of nephritis.

Q. What are some of the causes of these various diseases? — *A.* They may be caused by injuries inflicted upon the neighbouring parts by blows or penetrating wounds; by exposure to cold and wet, and from the influence of irritating poisons.

Q. What are some of the poisons which seem to have a peculiar effect in causing nephritis? — *A.* Cantharides, oil of turpentine, corrosive sublimate, digitalis, &c.

Q. Does the co-existence of disease in the other urinary organs have any influence upon inflammation of the kidneys? — *A.* Yes.

Q. What are some of the other influences? — *A.* Age, and the peculiar gouty diathesis.

Q. Give some of the anatomical characters? — *A.* We have engorgement and redness or brownness present, enlargement of the bloodvessels, induration, and swelling of the kidney, purulent deposits, general softening of the cortical substance, &c.; and in the chronic variety, the kidney is diminished, hardened, rugous, &c.

Q. What are some of the anatomical characters in pyelitis? — *A.* The mucous membrane is vascular, with red spots of ecchymosis, and spots of lymph, &c.; and in the chronic form we have dull paleness, with enlarged vessels, and varicose; the pelvis and calyces are distended, and membrane thickened, &c., &c., &c.

Q. What is the prognosis in this affection? — *A.* This varies with the various causes producing the disease; as when it arises in the course of other urinary diseases it is unfavourable, and when it arises suddenly during some chronic disease it is fatal.

Q. Is it generally fatal when it occurs during disease of the liver, lungs, spinal cord, or brain? — *A.* Yes.

Q. In cases of coma with prostration, &c., what is the prognosis? — *A.* Fatal.

Q. Which are the least unfavourable cases? — *A.* Those cases caused by exposure to cold, and by injuries done to the parts near the kidneys, &c.

Q. What is the treatment? — *A.* A large bloodletting, and this repeated, if necessary; followed by an opiate, leeches and cups to the loins, warm hip-bath, and fomentations to the part; and in chronic cases, counter-stimulants, and the usual antiphlogistic remedies, as cal. and opium, &c.

Q. What must be the diet? — *A.* Strictly antiphlogistic.

Q. Is not rest indispensable? — *A.* Yes.

Q. What are some of the special symptoms to be combated? — *A.* To reduce or increase the quantity of urine, but not by diuretics.

Q. Are not diluents beneficial in the acute stage? — *A.* Yes.

Q. What is proper in the chronic stage? — *A.* Here we may use diuretics, but not of the stimulant character; hence digitalis and bitart. of potash are the best.

Q. What may be done in case of strangury or frequent micturition? — *A.* In addition to the treatment already mentioned, we may use opiate clysters, opiate frictions, emollient injections into the urethra, and warm hip-baths.

Q. Is there any specific treatment in cases where nausea and vomiting are present? — *A.* No; we must resort to the usual means proper in other cases.

Q. Should we not turn our attention to the original cause of the disease in all cases? — *A.* Yes.

Q. How would you alter the character of the urine in regard to alkalinity? — *A.* By administering the aërated alkaline bicarbonates, and by directing our attention to the cause of the renal irritation.

Q. Should not the bladder be frequently examined when we have retention of urine? — *A.* Yes.

GRANULAR DISEASE OF THE KIDNEY.

Q. Who was the first to direct the profession to this form of disease? — *A.* Dr. Bright.

Q. What is the peculiar state of the kidney? — *A.* The deposition of a yellowish granular matter takes place in its substance, together with gradual atrophy of its cortical and tubular structure.

Q. Is this a common or uncommon affection? — *A.* A common one; and is connected with a large number of acute and chronic affections, which may be ascertained by careful investigation.

Q. How are the symptoms divided? — *A.* These may be divided into primary and secondary.

Q. What are the primary symptoms? — *A.* These vary as the disease breaks out suddenly, or developes itself slowly; in the former instance, we have rigor, with the usual signs of inflammatory fever, scanty urine, highly albuminous, occasionally bloody, and passed frequently and with difficulty; lumbar pain, rarely acute, pain across pit of stomach, with sickness and vomiting.

Q. Does not dropsy soon occur? — *A.* Yes, and it is generally inflammatory.

Q. What is the general course of the disease? — *A.* It either is checked soon, or proceeds to a fatal termination by the occurrence of some acute visceral inflammation, as pleurisy or pneumonia, pericarditis or peritonitis, or else in coma.

Q. What is, however, the only invariable character? — *A.* Scanty and highly coagulable urine, with more or less fever.

Q. How may the chronic form commence? — *A.* With acute symptoms, which soon pass off; or it may commence obscurely with symptoms which scarce attract the patient's attention.

Q. What is the condition of the urine at this time? — *A.* There may be either a scanty or a superabundant discharge of pale, or cherry-red, or brown, and often muddy urine, low in density, and coagulating with heat and nitric acid.

Q. After the disease has existed thus for some time, how is the fundamental affection indicated? — *A.* By the strength being reduced, the body emaciated, the complexion of a waxy paleness or dingy, the skin dry and not perspirable, the patient is drowsy, and an enfeebled digestion and much thirst is present, while the blood has lost its colouring material to a great degree.

Q. What are some of the secondary affections? — *A.* Dropsy, acute and chronic, visceral derangements, diarrhœa, rheumatism, catarrh, diseased heart, and coma.

Q. What are the essential characters of the chronic form of granular disease? — *A.* Reduction in the density of the urine,

diminished solids, reduction of the colouring matter of the blood, and leuco-phlegmasia generally.

Q. Is the presence of albumen an invariable appearance? — *A.* No.

Q. What are the characteristics of the urine depending upon the stage and form of the disease? — *A.* In the early stage and acute form we have a moderate reduction of density, and a diminution in the daily discharge of solids, and a strong impregnation of albumen.

Q. What do we find in the more chronic forms? — *A.* Reduction of density, some albumen, and the discharge of solid matter is also reduced.

Q. What is the state of the blood? — *A.* In the acute stage the blood is buffed, and the serum lactescent and reduced in density, and as the disease advances, the colouring matter is greatly diminished; and as the disease still farther advances, we have the blood still more changed, &c.

Q. What are some of the causes of this disease? — *A.* These are often obscure, but we may refer them sometimes to exposure to cold and wet, or to any of the usual exciting causes of the phlegmasia.

Q. Do not constitutional circumstances clearly predispose to it? — *A.* Yes, viz., intemperance, scrofula, and that state of the constitution following scarlatina.

Q. Do not some articles which have a peculiar influence upon the kidneys favour it? — *A.* Yes, viz., mercury, cantharides, and diet of pastry, cheese, and heavy puddings.

Q. Has age, sex, or profession, any influence upon it? — *A.* No.

Q. What is the prognosis? — *A.* When taken in its incipiency it may be cured, but when allowed to advance far it is incurable.

Q. Do not the secondary disorders have an influence in the prognosis? — *A.* Yes.

Q. What is the general rule in regard to the fatality of this affection? — *A.* The danger is proportional to the lowness of the density of the urine, especially where the quantity is defective.

Q. What is a favourable circumstance? — *A.* Gradual increase in the density of the urine, its quantity remaining the same or increasing.

Q. What are some of the anatomical peculiarities? — *A.* When we have an acute form of the disease, in the first instance we have the kidneys flabby, larger, and weighing more than natural, externally dark and ecchymosed spots are seen, while

within, we have them dark and full of blood, and also ecchymosed.

Q. What is the condition of the cortical texture? — *A.* It is broader than natural, with a deposition of granular matter; and when the case has existed for some time, we have the granular matter in great abundance, so as to conceal the striated appearance of the cortical portion of the kidney.

Q. What is the condition of the bladder? — *A.* Contracted, containing a small quantity of urine, and that highly albuminous, and of low density, and the organs of the body are marked by inflammation, &c.

Q. What takes place in the more advanced stages? — *A.* The cortical substance is seriously affected, and the internal portion is also much injured; the kidney is either diminished or enlarged; in the former case it is hardened, and in the latter softened and flabby. The investing membrane may be easily stripped off, and the appearance of the surface is pale, yellowish, or greyish-brown, and rough.

Q. How is the inner portion of the cortical membrane? — *A.* It has almost entirely lost its striated appearance and reddish-brown hue, and has a very slight injection, if any; and the tubuli may have some specks of granular deposit upon them.

Q. What is the condition of the other organs? — *A.* They present a variety of morbid alteration, and vary with the secondary affection during life.

Q. What do we find in the latter stages? — *A.* The morbid signs are all increased.

Q. How must we regulate the treatment? — *A.* We must first attend to the primary disease, and then to the secondary complications.

Q. What is the treatment in the primary form? — *A.* In the first instance antiphlogistics, both by venesection and local depletion, over the region of the kidney, then we may resort to counter-irritants to the parts.

Q. What must be done to favour cutaneous transpiration? — *A.* Diaphoretics and opiates, with warm baths, and by gentle laxatives.

Q. What is said of diuretics? — *A.* They are unnecessary except when dropsy prevails, or where coma is threatened, and when there is a decrease of urine.

Q. Is mercury beneficial? — *A.* No.

Q. When we have quieted the prominent symptoms, what is necessary to be done? — *A.* To enjoin a careful avoidance of cold and damp, abstinence from spirituous liquors and the like,

the use of nutritive digestible food in moderation, the observance of regular exercise, and the use of the warm bath.

Q. Is there any peculiar treatment for the secondary complications? — *A.* No; but they must be treated with great caution and care.

HEMORRHAGES.

HEMOPTYSIS.

Q. To what is this term applied? — *A.* To hemorrhage from the larynx, trachea, or bronchia.

Q. Is not the quantity of blood lost various under different circumstances? — *A.* Yes.

Q. What are some of the premonitory symptoms of active hemoptysis? — *A.* Feelings of lassitude in the extremities, stricture across the breast, deep and frequent sighing, deep-seated pain under the sternum, a quick, small, frequent, and corded pulse, and saltish taste in the mouth, followed by a short cough, with blood following it.

Q. May it not take place without any premonition? — *A.* Yes.

Q. What is the character of the blood expectorated? — *A.* Florid and frothy.

Q. When the blood comes from the fauces do we generally have a cough preceding it? — *A.* No; but it is spit up.

Q. Are not those who have once had an attack of hemoptysis more liable to it than those who have never had it? — *A.* Yes.

Q. At what period of life is it most likely to occur? — *A.* Between the fifteenth and thirtieth years.

Q. What persons are most liable to it? — *A.* Those of weak or delicate pulmonary system, and who have narrow, flattened chests, high and prominent shoulders, long and slender necks, and, in general, those who have a predisposition to tubercular phthisis.

Q. What are some of the exciting causes? — *A.* Change of temperature, suppression of habitual evacuations, metastatic gout or rheumatism, irritating substances acting upon the mucous membrane of the lungs, organic disease of the heart, blows on the chest, loud speaking, and particularly tubercles.

Q. What is the prognosis in hemoptysis? — *A.* This depends upon circumstances. If the patient is scrofulous, or of a phthisical habit, our prognosis is unfavourable, but when it occurs

from pregnancy, or suppressed catamenial or hemorrhoidal discharges, other things being equal, we need not be alarmed. Those cases which arise from over-exertion of the body, producing strong pulmonary congestion or arterial excitement, are less likely to be dangerous than those which occur spontaneously.

Q. How does the treatment of hemoptysis divide itself? — *A.* Into that proper during the flow of blood, and that after the bleeding is arrested.

Q. When the pulse is frequent, tense, and hard, what should be done? — *A.* Use the lancet freely.

Q. What internal remedies have been found beneficial? — *A.* Common salt, small doses of sugar of lead, nitrate of potassa dissolved in mucilage, alum, sulphuric acid, &c.

Q. In cases where the pulse is irritated, small, and frequent, what remedies are highly beneficial? — *A.* Combinations of calomel and opium, or calomel, opium, and ipecacuanha.

Q. Are not emetics beneficial? — *A.* Yes; especially ipecacuanha in small and repeated doses, where we have a hard pulse and much oppression in the chest.

Q. When this disease assumes a chronic character, and with a pulse irritated, what remedy has been found of value? — *A.* Digitalis in small doses.

Q. What external applications have been made in these cases? — *A.* Blisters, rubefacients, pustulating with tartar emetic ointment, &c.

Q. What, however, should we principally bear in mind in cases of hemoptysis? — *A.* The nature of the exciting cause.

Q. When hemoptysis occurs in consequence of suppressed hemorrhoidal discharges what should be done? — *A.* Endeavour to reproduce them by leeches to the anus, an aloetic pill, and by a proper regulation of diet, and moderate exercise.

Q. What remedies have been used when hemoptysis occurs in young females from menstrual irregularities? — *A.* Tr. cantharides, venesection, blisters to the sacrum, warm hip-bath; but the stimulating emmenagogues must be avoided.

Q. When this deranged state of menses occurs from a chlorotic state of system, what must be done? — *A.* We must resort to the ferruginous preparations, a nourishing diet, with a gentle aperient, aloetic pill, &c.

HEMATEMESIS.

Q. What do you mean by this term? — *A.* Hemorrhage from the stomach.

Q. What are the signs of this affection? — *A.* Weight in the epigastrium, loss or voraciousness of appetite, pain and tenderness in the hypochondria, nausea, anxiety, &c.

Q. What is the state of the circulation? — *A.* We have a small, weak, and irritated pulse, with alternate flushes of heat and chills over the body, cold extremities, a pale and contracted countenance with great anxiety, and at length a copious ejection of blood follows.

Q. What is the character of the blood thrown up? — *A.* In general it is of a dark colour, sometimes in coagulated clots, and at others quite fluid, and occasionally florid.

Q. What is the character of the blood thrown off in malignant fevers? — *A.* It resembles coffee-grounds suspended in a glairy fluid.

Q. From what is this supposed to arise? — *A.* From inflammation and abrasion of the mucous membrane of the stomach.

Q. What is the quantity of blood thrown up? — *A.* In some cases it is very great, in others very small in amount, and at other times it may pass off entirely by stool, and not any escape by the mouth.

Q. May not paroxysms of hematemesis frequently occur? — *A.* Yes.

Q. How is the patient left after each paroxysm? — *A.* If the paroxysm is not fatal we have much exhaustion present, but the load at the stomach is much relieved.

Q. Whence does the blood come from in hematemesis? — *A.* Generally from the mucous membrane of the stomach, but sometimes from the liver or spleen.

Q. What are some of the causes of hematemesis? — *A.* Obstruction to free circulation of blood in the abdominal viscera, induration of the liver and spleen, suppressed hemorrhoidal discharges, menstrual irregularity in females. It may also be produced by corroding substances in the stomach, blows upon that organ; and it may also arise in the last stages of malignant fevers.

Q. What is the prognosis in this affection? — *A.* When arising from suppressed hemorrhoidal or menstrual discharges it is not to be considered dangerous unless recurring frequently. It is more dangerous when it arises from visceral obstructions, or in the last stages of malignant fevers, or in corrosion of the stomach, either by poisons or from other causes.

Q. What is the treatment in this affection? — *A.* When the circulation is increased we must use the lancet freely, counter-irritants must be placed over the stomach, and upon the lower

extremities, dry cupping and leeching over the stomach are sometimes highly beneficial.

Q. Are not laxative enemata and purgatives of benefit in this affection? — *A.* Yes.

Q. Have emetics ever been used with advantage? — *A.* Yes, particularly ipecacuanha.

Q. What astringents have been found beneficial in this disease? — *A.* Plumbi acetas, gallic acid, spts. of turpentine, cold water, and the vegetable astringents generally; and in the debilitated, tr. ferri muriat.

Q. What should be the character of the diet of the patient? — *A.* Of the very lightest kind, with drinks of a bland, cooling, and acidulated character.

HEMATURIA.

Q. What is meant by this term? — *A.* Hemorrhage from the urinary organs.

Q. Is it not difficult to tell from what part of the urinary apparatus the blood proceeds? — *A.* Yes.

Q. What are some of the diagnostic marks of the flow of blood from the several parts of the urinary apparatus? — *A.* When we have blood coming from the kidneys or ureters, we generally have much greater lumbar pains than in other varieties, and the blood is intimately mixed with the urine so as to give to it a uniformly red appearance; when from the bladder, it usually comes away in clots or flocculi, and floating in the urine, and is accompanied with pain, a sense of fulness and tenderness of the pubic region, with burning around the neck of the bladder, &c.; when from the urethra, we have none of the before-mentioned symptoms, the blood is passed without any mixture with urine, or any effort at its evacuation.

Q. May not this hemorrhage occur periodically? — *A.* Yes; especially when it comes from the neck of the bladder, or is vicarious to an hemorrhoidal discharge.

Q. Whom is hematuria more likely to attack? — *A.* The aged, and those of a gouty diathesis, or plethoric and corpulent women about the final cessation of the menses; and it may also occur in young children during the period of dentition.

Q. What are some of the causes of this affection? — *A.* This may be excited by calcareous concretions in the kidneys and bladder, or by acrid stimulating diuretics, as cantharides, ol. terebinth, &c., or from schirrous ulcerations, and vascular and fleshy tumours in the bladder, ureters, kidneys, &c.

Q. When does hematuria assume the most unfavourable aspect? — *A.* When it occurs in the latter stages of violent fevers.

Q. Is hematuria considered at all dangerous when it occurs vicariously in the place of an hemorrhoidal discharge or menstruation? — *A.* No.

Q. Are not persons liable to a return of this disease when they have once had it? — *A.* Yes.

Treatment. — *Q.* What is the treatment in this disease? — *A.* In plethoric and young subjects we must resort to venesection; and when the hemorrhage arises from calculous irritation in the kidneys, the warm bath with opiates are decidedly beneficial; cupping over the kidneys has been resorted to with good effect.

Q. What other remedies are beneficial? — *A.* Mucilaginous drinks and the milder diuretics, as the uva ursi, or parsley root, &c.

Q. Is not perfect rest necessary in cases of hematuria? — *A.* Yes.

Q. Should not stimulating diuretics in all cases be avoided? — *A.* Yes.

EPISTAXIS.

Q. What is meant by this term? — *A.* Bleeding from the nose.

Q. What are the causes of epistaxis? — *A.* Anything which may have a tendency to cause a tendency to a preternatural flow of blood to the head; viz., great straining, blowing on wind instruments, a dependent position of the head, &c.

Q. Mention some other causes? — *A.* Suppression of the menstrual and hemorrhoidal evacuations; and it may occur in that thinned state of the blood following copious sanguineous depletion, &c.

Q. Is epistaxis of much consequence if it is not symptomatic of some serious visceral or general affection? — *A.* No.

Treatment. — *Q.* What is the treatment? — *A.* If the hemorrhage occurs as vicarious to the menstrual and hemorrhoidal discharge, it should not be stopped unless it becomes excessive, and this rule should be adopted in all cases where we have an active pulse with great cephalic congestion.

Q. What may be done if we have the system in a very excited state? — *A.* Use the lancet, elevate the head, and administer the cooling purgatives, with cold drinks, &c.

Q. In moderate cases of epistaxis what remedies have been found beneficial? — *A.* Cold to the head, and warm bath to the feet, a dossil of lint in the nostrils, either perfectly dry, or wet with some styptic.

Q. What internal remedies have been resorted to? — *A.* Sugar of lead, gallic acid, &c.

AFFECTIONS OF THE BRAIN.

INFLAMMATION.

Q. How do you divide inflammation of the brain? — *A.* Into meningitis, or inflammation of the membranes of the brain; and cerebritis, or inflammation of the substance of the brain.

Q. What are the symptoms of inflammation of the pia mater and dura mater? — *A.* There is great pain in the head, with feelings of fulness, the eyes are red and suffused, and the countenance flushed, the stomach is affected, delirium soon appears and becomes very great, and the whole system is in a restless condition.

Q. What is the condition of the pulse? — *A.* At first it is firm and full, but afterwards it becomes small, tense, and sometimes intermitting.

Q. What is the state of the respiration? — *A.* At first hurried and anxious, then slow, deep, and laborious.

Q. Do not other organs become implicated? — *A.* Yes, particularly the liver.

Q. What are some of the causes of this variety of inflammation? — *A.* It may occur during the course of any of the general fevers; or from the sudden influence of cold while the body is over-heated; also from violent passions, the sudden suppression of habitual discharges, metastasis of gout, erysipelas, &c.

Q. What is the prognosis in this affection? — *A.* Generally unfavourable.

Q. What is the pathology? — *A.* We have evidence of inflammation on the pia mater and dura mater, with flakes of coagulable lymph, and pus mixed with serum upon them.

Q. What is the treatment in this variety of the disease? — *A.* Vigorous antiphlogistic; bloodletting, locally and generally, and this repeated; iced applications to the head; saline purgatives, &c.

Q. Are not the mercurials beneficial in this form of the affection? — *A.* Yes.

Q. When are blisters to the nucha beneficial? — *A.* When the violent inflammation is first moderated by bleeding, &c.

Q. What internal antiphlogistics have been used? — *A.* Nitre, in combination with antimony, digitalis, &c.

Q. What is proper to be done in regard to the apartments of the patient? — *A.* They should be kept dark, silent, and cool, and everything avoided which disturb the quiet of the patient.

Q. What must be the character of the diet? — *A.* Mild and simple.

Arachnitis. — *Q.* What are the symptoms of arachnitis? — *A.* At first, we have the patient wakeful and irritable, with a great repugnance to a strong light; and in children these symptoms are more marked than in the adult; soon, however, we have transient pains in the head, greater irritability of temper, the pulse is irritated, quick, tense, and active; the countenance indicates distress, and there are flushed cheeks, and contracted eyebrows present, &c.

Q. What are the symptoms in the more advanced stages? — *A.* The delirium is more continuous; the countenance exhibits signs of stupor; the conjunctiva is suffused and red, and there is great somnolency; the mind is torpid, and, finally, coma supervenes.

Q. Are these symptoms always present? — *A.* No; sometimes the patient is attacked very suddenly.

Q. Do not convulsions often occur in young children? — *A.* Yes.

Q. What organs of the body seem more particularly to sympathise in this disease? — *A.* The stomach, liver, and kidneys.

Q. What are the characteristics of the alvine discharges in this affection in young children? — *A.* Mostly like chopped spinage.

Q. What are some of the post-mortem appearances in this disease? — *A.* The arachnoid membrane is minutely injected, or opaque and thickened, and serum is effused in the ventricles of the brain and on its surface.

Q. What are the causes of arachnitis? — *A.* There appears to be in some an hereditary predisposition to it; and children of a weak and nervous temperament are peculiarly liable to it; and it may also be caused by blows on the head, repelled eruptions and suppressed habitual evacuations, or from great mental application, &c.

Q. Who are more liable to this disease? — *A.* Children.

Q. What appear to be the peculiar exciting causes in their cases? — *A.* Dentition, with great intestinal irritation.

Q. What are the principal points to be borne in mind in the treatment of this disease? — *A.* To moderate the general arterial action in the brain, and to remove all articles which have a tendency to keep up a preternatural determination of blood to the head.

Q. How would you answer these indications? — *A.* By venesection and local depletion; ice to the head, and the administration of small doses of calomel, followed by saline purgatives, and their action kept up by milder laxatives.

Q. Are not the mercurials in alterative doses beneficial? — *A.* Yes.

Q. Are not blisters beneficial? — *A.* Yes, when the inflammatory symptoms are partially relieved.

Q. Where would you apply them? — *A.* Behind the ears, and to the back of the neck.

Q. What should be the character of the diet? — *A.* The very mildest.

Cerebritis. — *Q.* What are the first symptoms of this affection? — *A.* A fixed and violent pain in the head, continued for several months, with vertigo, obtuseness of the mental faculties; the patient is dejected and querulous; the vision is perverted, the hearing is dull, and there is an indifference to surrounding objects; the pulse is full and hard, and sometimes intermitting; and occasionally there is temporary delirium, with fever, and much agitation.

Q. What symptoms now occur? — *A.* A gradual or sudden paralysis of a limb or of half the body, while the consciousness and intellect still remains; or we may have coma and convulsions.

Q. May not convulsions, occurring in paroxysms at short intervals, be the first symptom of alarm? — *A.* Yes.

Q. What do we generally find as post-mortem appearances in this disease? — *A.* An injected state of the membranes of the brain, with softening of its substance.

Q. Is the cause of softening of the brain fully determined? — *A.* No; the most probable causes are, 1st, cerebral inflammation; 2d, a defect of circulation in the brain from a diseased state of its arteries.

Q. In whom do we find softening of the brain the most common? — *A.* In the aged.

Q. What is the treatment in this affection? — *A.* General

and local bloodletting, sinapisms to the feet and cold to the head, together with active cathartics, and blisters to the back of the neck.

Q. How would you administer calomel in this disease? — *A.* So as to produce ptyalism as speedily as possible.

Q. Notwithstanding our best efforts, is not this disease generally fatal? — *A.* Yes.

APOPLEXY.

Q. What are the premonitory symptoms of apoplexy? — *A.* Sometimes the attack comes on suddenly, but frequently we have vertigo, a dull, deep-seated pain, or sense of weight in the head, particularly in stooping, with a turgid state of the veins of the head, throbbing of the temporal arteries, ringing in the ears, drowsiness, disturbed and heavy sleep, and dimness of sight.

Q. May we not have paralysis as one of the first symptoms? — *A.* Yes.

Q. When an apoplectic attack has taken place, what are the signs? — *A.* At first the pulse and respiration are weak, and often scarcely perceptible; but they soon change their character, and the pulse becomes full, slow, regular, and often hard, and the respiration slow, oppressed, and interrupted, and stertorous, and often with a puffing out of the lips; the face is sometimes livid and turgid with blood, but more frequently it is pale and bloated.

Q. What is the condition of the extremities and surface of the body? — *A.* The extremities are cold, but the surface generally preserves its temperature.

Q. What is the condition of the bowels? — *A.* Torpid.

Q. How may apoplexy terminate? — *A.* Either in death or in perfect restoration of all the suspended functions of the body, or in paralysis of certain parts of the body; or we may have a general febrile condition of the system taking place.

Q. What is the prognosis in apoplexy? — *A.* Unfavourable.

Q. What are some of the predisposing causes of apoplexy? — *A.* 1st. A peculiar conformation of the body, viz., a large head, thick short neck, broad shoulders, ample chest, florid, full face, &c. 2. Age; it generally occurring between the fortieth and sixtieth years. 3. Whatever tends to produce general plethora. 4. Organic affections of the heart, &c.

Q. What are some of the exciting causes of apoplexy? — *A.* Anything which produces inordinate determination of blood to the head, or impedes its free return from the brain to the heart, viz., over-distension of the stomach, when the digestive powers

are weak, the intemperate use of spirituous liquors, violent exertions, a stroke of the sun, &c.

Q. What are the post-mortem appearances in apoplexy? — *A.* 1st, Vascular turgescence of the brain; 2d, sanguineous extravasation in the substance of the brain; 3d, effused serum in the ventricles and on the surface of the brain; and sometimes we discover nothing.

Q. What is the treatment in apoplexy? — *A.* Bloodletting, both locally and generally, and this carried to a great extent; take all ligatures from every part of the body; cold applications to the head, and warm stimulating ones to the feet; active purgatives, particularly the saline, should be administered, also calomel in large doses; active purgative enemata are also highly beneficial.

Q. What should be the diet in apoplectic cases? — *A.* Of the very mildest character.

Q. What advice should be given to individuals who have a tendency to apoplexy? — *A.* That they should refrain from everything of a stimulating character, and live upon a simple abstemious diet, take exercise in the open air, and if their bowels are torpid, use some mild and gentle laxative; and should any of the premonitory symptoms of apoplexy occur, resort immediately to venesection.

Q. Should habitual, hemorrhoidal, or other discharges be checked if they are not excessive? — *A.* No.

Q. Should individuals who have a tendency to apoplexy bathe their feet in cold water? — *A.* No.

PARALYSIS.

Q. What is meant by paralysis? — *A.* An impaired or abolished power of voluntary motion or sensation, or both, in certain parts of the body, without coma or loss of consciousness.

Q. How many kinds of paralysis are there? — *A.* Hemiplegia, or paralysis of half of the body; paraplegia, or paralysis of the inferior extremities; paralysis partialis, when only a particular part of the body is affected; and paralysis agitans, or shaking palsy.

Q. Is paralysis of the whole body of frequent occurrence? — *A.* No.

Q. Which is the most common kind of paralysis? — *A.* The hemiplegic.

Q. What is the cause of it? — *A.* Pressure upon the base of the brain, similar in character to that we find in apoplexy.

Q. What are the premonitory symptoms of hemiplegia? — *A.* Those of apoplexy.

Q. What are some of the immediate precursory symptoms of an attack? — *A.* Flushed face, distension of the bloodvessels of the head and neck, vertigo, fulness in the head, weight and pain in the head, ringing in the ears, drowsiness, loss of speech, &c.

Q. Do the other organs of the body frequently sympathise in this disease? — *A.* No.

Q. What is the general course of an attack of hemiplegia? — *A.* Often little or no improvement takes place, and the patient dies from exhaustion or from apoplexy, or the patient may gradually recover the use of his side.

Paraplegia.—*Q.* How does paraplegia usually occur? — *A.* It generally comes on gradually, and when it arises from an affection of the brain, we have the symptoms of hemiplegia modified.

Q. What are some of the symptoms occurring in the lower extremities? — *A.* We have a feeling of heaviness and numbness, with a stiff and awkward motion in the lower limbs, which gradually increases until the patient is unable to move them.

Q. What is the condition of the bowels and urinary organs? — *A.* The bowels are generally constipated; but when the sphincter ani is palsied the fæces pass off and the urine dribbles away involuntarily.

Q. Does not paraplegia more frequently occur in children from a lesion of the spinal marrow? — *A.* Yes.

Q. When paraplegia from cerebral affections occur, in whom do we find it most common? — *A.* In males, after the forty-fifth year.

Paralysis partialis. — *Q.* What are some of the instances of partial paralysis? — *A.* Paralysis of the muscles of one side of the face or the under lip, or the eyelids; the different sphincters, the erector muscles of the penis, &c.

Q. What are some of the causes of the different forms of paralysis? — *A.* Those common to apoplexy, as pressure on the brain or spinal marrow; and in partial paralysis, in addition to the preceding causes, we may have injury of a particular nerve, and the action of lead upon the system.

Q. Do we know definitely the real cause of shaking palsy?— *A.* No; nothing more than that of a deranged nervous system.

Q. What is the treatment in paralysis? — *A.* Bleeding locally and generally, purging, emetics, revulsive applications, as blisters to the back of the neck, and sinapisms to the feet and ankles; and in cases of paraplegia, stimulating enemata are highly beneficial.

Q. When the symptoms of undue determination of blood to the head have been relieved, what remedies may we resort to? — *A.* Frictions, stimulating liniments, electricity, galvanism, and occasional blisters to the legs.

Q. What remedies have been used internally in this stage of the disease? — *A.* Nux vomica, or its preparation strychnine; the rhus toxicodendron has also been used; so, also, ol. terebinth, &c.

DROPSY.

Q. What do you understand by dropsy? — *A.* An accumulation of a preternatural quantity of serous fluid in some one or more of the natural serous cavities of the body, or in the interstices of the serous cellular tisue.

Q. Is dropsy more a symptom of disease than a disease itself? — *A.* It is more a symptom of disease.

Q. What was Dr. Rush's opinion of the cause of dropsy? — *A.* An increased action of the exhalant vessels, attended with a general pyrexial condition of the system.

Q. What are the principal occasional causes of dropsy? — *A.* Mechanical impediment to the free return of blood to the heart; excessive hemorrhages; disease of the kidneys; repelled cutaneous eruptions; suppressed habitual discharges; chronic diseases which exhaust the system; arsenic, &c.

Q. What are the principal forms of dropsy? — *A.* Ascites, or dropsy of the belly; hydrothorax, or dropsy of the chest; and anasarca, or dropsy of the cellular tissue.

Q. Upon what is ascites generally dependent? — *A.* Upon visceral indurations, especially of the liver and spleen; but the more immediate cause is chronic inflammation of the peritoneum.

Q. With what is ascites likely to be confounded? — *A.* With pregnancy; but from this it may be distinguished by the presence of fluctuation and the uniformity of the tumour, by the lateral pressure and distension of the abdomen, and from the absence of the usual signs of pregnancy.

Q. What are the symptoms of hydrothorax? — *A.* Great dyspnœa in ascending an acclivity; when recumbent in bed the patient involuntarily raises his head and shoulders high; sleep is interrupted; the pulse is irregular and hard; the thirst is urgent; the urine is scanty and high-coloured; there is a dry and short cough present; and as the disease advances, the patient is unable to lie down, but generally rests by placing his forehead upon the back of a chair.

Q. When does this affection usually occur? — *A.* As a sequel to acute pleurisy, or a tuberculous affection of the pleura.

Q. What is the prognosis in this affection? — *A.* Generally unfavourable.

Q. What will assist us in making our diagnosis in hydrothorax? — *A.* Physical exploration; we have the percussion dull, and the respiratory murmur, if heard at all, is distant and unnatural.

Q. What is one of the principal signs of anasarca? — *A.* The pitting from firm pressure by the fingers.

Q. What is the prognosis in this form of dropsy? — *A.* It is not often attended with much danger when idiopathic.

Q. What are some of the causes of anasarca? — *A.* Hemorrhages, suppressed perspiration from cold, long-continued use of arsenic, intestinal irritation, organic disease of the kidneys, &c.

Treatment. — *Q.* What is the indications for treatment in dropsy? — *A.* To subdue local sub-inflammatory or irritated action of the structures from which the dropsical exhalation takes place, and to remove the fluid.

Q. How would you answer these indications? — *A.* By diminishing the momentum of the circulation when it is preternaturally great; by equalizing the circulation; by promoting the activity of the various serous emunctories; and by facilitating the action of the absorbents.

Q. What are the remedies resorted to that favour these indications? — *A.* Venesection, when the pulse is active, tense, or frequent; blisters over the affected parts, and cathartics of the drastic character, and diuretics and diaphoretics.

Q. What cathartics have been used? — *A.* Cremor tartar, elaterium, gamboge, &c.

Q. What are the principal diuretics which are beneficial? — *A.* Squill, digitalis, acetate of potash, nitrate of potash, cantharides, juniper berries, colchicum, &c.

Q. What diaphoretics have been found of benefit in dropsies? — *A.* The antimonial.

Q. Has not mercury held a high place in the treatment of dropsy? — *A.* Yes.

Q. Which preparation is considered the best in this disease? — *A.* Calomel; and its efficacy is increased by combining it with digitalis and squills.

Q. How far should the action of mercury upon the system be carried in this disease? — *A.* Only to produce gentle ptyalism.

Q. What external means have been resorted to with advantage in ascites? — *A.* A tight flannel bandage around the abdomen.

PART IV.

CHEMISTRY.

Q. What is chemistry? — *A.* Chemistry is the science that treats of the composition and relation of ponderable substances; and of phenomena arising from the reaction of their particles.

Q. What is meant by ponderable substances? — *A.* Such as can be weighed; including solids, liquids, and gases.

Q. What are the imponderable substances? — *A.* Heat, light, electricity, and magnetism.

Q. How is chemistry divided? — *A.* Into organic chemistry, or that which treats of substances of animal or vegetable origin; and inorganic, or that which treats of substances belonging to the mineral kingdom.

INORGANIC CHEMISTRY.

Q. What is meant by the specific gravity of a body? — *A.* Its weight compared with that of other bodies of equal bulk.

Q. What weight is taken as the unit or standard in computing the specific gravity or comparative weights of solids and liquids? — *A.* That of water.

Q. What weight is taken as the unit in determining the specific gravity of gases? — *A.* That of atmospheric air.

Q. Upon what does the difference in the specific gravities of different bodies depend? — *A.* Upon the difference in their densities or degree of compactness.

Q. How do we find the specific gravity of a solid? — *A.* The body is first weighed in air, and then suspended in water, by means of a hair, and weighed again; and the weight of the body, when in the air, divided by the difference between the two weights thus obtained.

Q. What is the *rationale* of this process? — *A.* Since a solid, when immersed in water, will displace an equal bulk of that liquid, the difference in the weights represents the weight of the equivalent bulk of water which is displaced.

Q. How do we ascertain the specific gravity of a liquid? — *A.* By dividing the resistance encountered by a body in sinking in that liquid by the difference it encounters in sinking in water.

Q. How is this explained? — *A.* By the fact that the same body displaces equal bulks of different liquids.

Q. What instruments are generally used to ascertain the specific gravity of liquids? — *A.* Hydrometers.

Q. What is the particular one most employed? — *A.* That of Baumé; in which the degree of resistance is determined by the depth to which the instrument sinks in the liquid which is marked by a graduated scale.

Q. How many of these are employed? — *A.* Two; one (for liquids heavier than water), in which the specific gravity of distilled water is assumed as the zero of the scale, which is graduated from above downwards, and one (for the liquids lighter than water), in which the specific gravity of distilled water is assumed as 10° on the scale, which is graduated from below, upwards.

Q. What else is necessary? — *A.* A table showing the specific gravities corresponding to the several degrees of the hydrometer. (See the United States Dispensatory, Appendix, p. vi.)

Q. How may we obtain the specific gravity of a gas? — *A.* By filling a glass globe with air and weighing it, and afterwards weighing the same vessel filled with the gas in question, and then dividing the weight of the atmosphere by that of the gas; or the weight of the gas may be ascertained by means of a barometer.

Q. What is meant by attraction? — *A.* The tendency evinced by bodies or particles to unite with other bodies or particles.

Q. How is the attraction of particles divided? — *A.* Into homogeneous attraction, or that which unites particles of the same nature; and heterogeneous attraction, or that which causes particles of different kinds to enter into combination.

Q. What other names have been applied to homogeneous attraction? — *A.* Cohesion, and attraction of aggregation.

Q. What other names have been given to heterogeneous attraction? — *A.* Chemical attraction, or affinity.

Q. What effect has heat upon cohesion? — *A.* It diminishes its intensity; causing bodies to expand, and to melt or assume a liquid form, and sometimes to evaporate, or assume the form of vapour or gas.

Q. Is it possible entirely to overcome cohesion by mechanical division? — *A.* It is not.

Q. By what other means may cohesion be partially overcome? — *A.* By solution.

Q. How may the influence of cohesion in counteracting affi-

nity, or chemical attraction, be shown? — *A.* By the fact that nitric acid will produce no visible reaction upon a solid piece of brass; whereas, if the brass be reduced to the form of powder or filings, a violent reaction and union takes place immediately.

Q. When cohesion or the attraction of aggregation is allowed to take place under favourable circumstances, what occurs? — *A.* The particles advance themselves together in regular shapes or crystals.

Q. By what methods may crystals be formed artificially? — *A.* By fusion, followed by gradual solidification; by solution, followed by precipitation; and by sublimation.

Q. What is meant by fusion? — *A.* The conversion of a solid into a liquid by means of heat.

Q. What is meant by precipitation? — *A.* The act of throwing down or depositing a solid from a solution.

Q. What is sublimation? — *A.* The act of converting a solid into vapour, and afterwards condensing or restoring it to the solid state.

Q. To what do crystals owe their transparency? — *A.* To the water contained in them, called water of crystallization.

Q. Does water of crystallization exist in all crystals? — *A.* It does not; being absent from such as are opaque.

Q. What is meant by deliquescence and efflorescence? — *A.* When a crystal absorbs moisture and becomes liquid, it is said to deliquesce; when a crystal gives up its water of crystallization and is converted into a powder, it is said to effloresce.

Q. What name is given to the union of two or more substances by chemical attraction or affinity? — *A.* It is called a chemical compound.

Q. What characterizes chemical compounds? — *A.* They differ in many of their properties from either of their constituent elements, and sometimes possess properties directly opposite to those of their elements when uncombined.

Q. What are some of the changes undergone by bodies entering into chemical combinations? — *A.* Changes of size, density, form or consistence, temperature and colour.

Q. What is meant by simple combination? — *A.* The union of two heterogeneous substances to form a compound. (Thus copper and zinc unite to form brass.)

Q. How may single elective attraction, or simple affinity, be shown? — *A.* It is shown when two substances are in chemical combination, and a third is added which combines with one of

the substances to the exclusion of the other. (As when potassa being added to a solution of sulphate of magnesia, or Epsom salts, the potassa unites with the sulphuric acid to form sulphate of potassa, while the magnesia is precipitated or falls to the bottom of the solution.)

Q. What is said to happen with regard to the original compound? — *A.* It is said to be decomposed.

Q. To what is this decomposition attributed? — *A.* To the affinity which exists between elements of the new compound, being greater than what existed between the constituents of the former compound.

Q. What is meant by double elective attraction, or complex affinity? — *A.* A case in which the compounds mutually decompose each other and form new combinations, as when sulphate of zinc and acetate of lead are mixed in solution, the sulphuric acid unites with the lead to form sulphate of lead, and the acetic acid unites with the zinc to form acetate of zinc.

Q. What other case of affinity may take place? — *A.* When two substances are in combination, a third being added in excess combines with both. (As when ammonia, being added to a solution of nitrate of copper, at first combines with the acid and precipitates the oxide of copper, but more ammonia being added combines with the copper, forming a soluble compound, which is again taken up in the solution; the whole forming the ammoniacal nitrate of copper.)

Q. What condition facilitates chemical reaction? — *A.* A state of liquidity or solution, without which many substances will not react upon each other.

Q. What other causes promote chemical reaction? — *A.* Heat, percussion, pressure, &c.

Q. What characterizes the combination of bodies which have a strong affinity for each other? — *A.* They unite in fewer proportions, and are more insoluble than those bodies which have a feeble affinity for each other.

Q. How does a mixture differ from a solution? — *A.* In the former case there is merely a mechanical intermingling of particles of the substance to be dissolved, and those of the liquid; in the latter, a chemical union takes place between them.

Q. What is meant by saturation? — *A.* That point at which the liquid used as a solvent or menstruum refuses to take up any more of the substance to be dissolved.

Q. What is meant by the theory of definite proportions? — *A.* That bodies unite to form new compounds in proportions that are invariable for the same compound; as for instance,

water is invariably found to be composed of eight parts of oxygen by weight, to one of hydrogen.

Q. What is meant by the term chemical equivalents? — *A.* Numbers which represent the least proportion in which any substance will combine with another. (Thus, the equivalent of hydrogen being 1, that of oxygen is 8, representing the least ratio or proportion in which either of those substances will combine with any other.)

Q. Do the numbers or equivalents represent absolute weights? — *A.* They do not; but merely the relative weights in which the bodies combine.

Q. What is the rule with regard to the progressive proportions? — *A.* When two bodies unite in different proportions to form more than one compound, the proportions in which they unite are multiples of the least combining proportion of each body. Thus, one proportion of sulphur (whose equivalent or relative weight is 16), combines with two proportions of oxygen, (the relative weight or equivalent of each proportion being eight,) to form sulphurous acid; or one proportion of sulphur (equivalent = 16) combines with three proportions of oxygen (8×3) to form sulphuric acid; the proportions being multiples of the least combining proportion of each substance.

Q. How are the equivalents of the compounds determined? — *A.* By adding together the equivalents entering into the combination. (Thus, the equivalent of sulphuric acid may be found by adding the equivalents of one proportion of sulphur = 16, to the equivalents of three proportions of oxygen $= 8 \times 3 = 24$, $24 + 16 = 40$;—thus the equivalent of sulphuric acid is 40.)

Q. Upon what has the ratio of the equivalent numbers been supposed to depend?—*A.* Upon the weights of the atoms or particles of the substances to which they belong; hence the equivalents are sometimes known by the name of atomic weights.

Q. What is understood by the theory of volumes? — *A.* The equivalent bulks or proportions by size, in which gases combine with each other.

Q. What rule do gases observe in combining with each other? — *A.* The rule of definite and multiple proportions as regards bulk.

Q. Are the combining volumes of different gases of the same size? — *A.* Many of them agree in the size of their volumes, as hydrogen, chlorine, nitrogen, carbon, and cyanogen; but oxygen, though eight times as heavy as hydrogen, has a volume only half its size, and ammonia has a volume twice as large as

that of hydrogen, and four times as large as that of oxygen. (Thus sulphuric acid, composed of sulphur and oxygen, unites with oxide of copper as a base, which is composed of copper and oxygen, to form a salt called sulphate of copper; the oxygen being common to, or contained by, both.)

Q. What is the usual definition of a salt? — *A.* A compound resulting from the union of an acid with a base.

Q. What other definitions are sometimes given? — *A.* A compound resulting from the union of two substances having a third in common; or a compound resulting from the union of two or more acid, acrid, and corrosive ingredients, forming a substance materially differing in its properties from its constituents.

Q. How may the acid be distinguished from the base in any compound or salt? — *A.* If a salt be decomposed by a galvanic battery, that which is electro-negative or goes to the positive pole of the battery is the acid, while that which goes to the negative pole, showing itself to be electro-positive, is the base.

Q. What effects do acids generally produce upon vegetable blues? — *A.* They change their colour from blue to red.

Q. How are simple inorganic bodies divided by Berzelius? — *A.* Into halogen bodies, or generators of salts; amphigen bodies, or such as unite to form either acids or bases; and radicals, or such as unite with other bodies to form acids or bases, but do not form acids or bases with each other.

Q. What other method of classification is adopted? — *A.* The halogen and amphigen bodies of Berzelius are included in one class, and denominated basacigen bodies, or those which unite with each other, or with those of the class of radicals, to form either acids or bases. (See *Compendium of Chemistry*, by Professor Hare of the University of Pennsylvania.)

Q. How many simple or elementary bodies have been discovered? — *A.* Fifty-four.

Q. How many of these belong to the basacigen class? — *A.* Eight; viz., oxygen, chlorine, bromine, iodine, fluorine, sulphur, selenium, and tellurium.

Q. Which of these belong to the halogen, and which to the amphigen classes of Berzelius? — *A.* Chlorine, bromine, iodine, and fluorine belong to the class of halogen bodies; and oxygen, sulphur, selenium, and tellurium belong to the class of amphigen bodies. (Cyanogen, a compound of carbon and nitrogen, is reckoned by Berzelius among the halogen bodies.)

Q. How are the acids formed by the union of a basacigen body with a radical, or with one of its own class, denominated? — *A.* Those formed by the union of oxygen with a radical or

basacigen body, take their name from the body with which the oxygen combines ; (as sulphuric acid, formed by oxygen and sulphur, nitric acid, formed by oxygen and nitrogen ;) while those acids formed by the union of basacigen bodies with each other, or with radicals, receive a name formed from those of both its constituents. (The most electro-negative of the constituents should take the precedence ; thus, sulph-hydric acid, sometimes called sulphuretted hydrogen, composed of sulphur and hydrogen.)

Q. How are the bases denominated ? — *A.* By the names of both their constituents, that of the most electro-negative having the termination *ide* or *uret* attached to it ; as oxide of lead (formed by the union of oxygen and lead), chloride of calcium (formed by the union of chlorine and calcium), sulphide or sulphuret of iron, &c.

Q. How are the salts denominated ? — *A.* According to the name of the acid which enters into their composition ; thus, those formed by the union of sulphuric acid with a base are called sulphates, those formed by the union of sulphurous acid and a base are called sulphites, &c.

Q. What is meant by the term *hypo*, prefixed, or the terminations *ic* and *ous* affixed to the name of an acid ? — *A.* They are added to denote the proportion of oxygen in each compound ; thus, nitrous acid contains less oxygen than nitric acid, hyponitrous contains less oxygen than nitrous, and hyponitric than nitric acid.

Q. How are the proportions of oxygen or of the electro-negative ingredients in bases designated ? — *A.* By the terms proto, deuto, or bi, sesqui, and per, prefixed ; thus, protoxide or protosulphuret, the lowest combination of oxygen with any particular substance, to form a base ; bioxide or binoxide, or deutoxide or sulphuret, denotes a double proportion of oxygen or sulphur ; the prefix sesqui denotes that the proportion of the electro-negative constituent is three to two ; and the prefix per denotes the highest proportion of the electro-negative.

Q. What is meant by the prefix sub ? — *A.* It was formerly much used to denote a less proportion of the electro-negative than was denoted by the prefix proto.*

Q. How are simple substances and their combinations frequently expressed ? — *A.* The simple substances are denoted by letters or symbols, and their combinations are expressed by

* The prefix proto is frequently omitted, and the protoxide or protosulphuret simply designated as the oxide, the sulphuret.

grouping together the symbols of the constituents into what are called chemical formulæ ; the proportion of each of the constituents, when it consists of more than one, being expressed by an arithmetical figure attached to its symbol. (Thus, oxygen is represented by O ; hydrogen, by H ; water, which is composed of one proportion of oxygen to one of hydrogen, is expressed by the formula H O ; the symbol of tin being Sn, the sesquioxide of tin which contains 2 proportions of tin (2 Sn), to 3 of oxygen (3 O), is expressed by the formula $Sn^2 O^3$.

Q. What is meant by the term isomeric bodies ? — *A.* Bodies which are composed of the same constituents in the same proportions, which nevertheless differ from each other in their chemical properties.

Q. To what is this difference attributed ? — *A.* To the constituents or elements being grouped together in different ways. (Thus, the elements of the peroxide of iron (Fe), consisting of two proportions of iron (2 Fe), and three of oxygen (3 O), may be supposed to be combined either according to the formula, $Fe^2 O^3$, or according to another formula, Fe O + $Fe O^3$; these formulæ expressing combinations which are isomeric, that is, equal in their proportions, yet combined in different ways.

BASACIGEN SUBSTANCES.

Oxygen. — *Q.* Where is oxygen found in nature ? — *A.* In atmospheric air, in water, and in almost every important compound which exists in nature.

Q. From what is the name oxygen derived ? — *A.* From a combination of two Greek words signifying *to generate acid ;* from the belief that long prevailed of its being the only acidifying principle.

Q. How may oxygen be obtained ? — *A.* By subjecting the peroxides of manganese, of lead, or of mercury, or the chlorate or nitrate of potassa to heat, which causes them to give up a portion of their oxygen ; or by heating equal weights of peroxide of manganese, and concentrated sulphuric acid together in a retort.

Q. What is the *rationale* of the last process ? — *A.* The peroxide gives up one proportion of its oxygen, and is thus converted into a protoxide, with which the sulphuric acid combines, forming a salt called sulphate of manganese.

Q. What is a retort ? — *A.* A chemical implement, made of iron, porcelain, or glass, generally in the shape of a flask, with

a tapering neck bent upon itself at somewhat less than a right angle with its body.

Q. What is meant by a tubulated retort? — *A.* A retort having a mouth and stopper, for the convenience of introducing the materials to be subjected to chemical action.

Q How is the gas thus generated collected? — *A.* By means of a pneumatic trough, which consists of a tub or trough containing water, having a shelf perforated with holes, beneath the surface of the water; the bell-glass or receiver destined to receive the oxygen should be filled with water and placed upon the shelf, with its opening over the perforations in the shelf; the beak, or smaller extremity of the retort, is then plunged under the shelf; and the gas, generated by the application of heat to the body of the retort, or by other means, escapes from the retort, and ascends through the water into the bell-glass or receiver, displacing the water contained in it.

Q. What are the properties of oxygen? — *A.* It is a colourless gas, insipid, and inodorous, heavier than atmospheric air (its specific gravity, taking atmospheric air as the unit, being 1·1024), slightly absorbed by water, absolutely necessary to respiration, an active supporter of combustion, but a non-conductor of electricity.

Q. What is to be understood by its being a supporter of combustion? — *A.* When existing in a state sufficiently pure it combines rapidly with other bodies, giving rise, at the same time, to light and heat.

Q. What would take place if the atmospheric air were composed of pure oxygen? — *A.* It would be impossible to put a stop to combustion, and a universal conflagration would take place.

Q. How may this be illustrated? — *A.* By igniting a piece of spunk fastened to the end of an iron wire, and plunging the wire with the burning spunk into a vessel of oxygen gas, when the iron will take fire and be consumed.

Q. How is oxygen usually denoted in writing? — *A.* By the symbol O.

Q. What is the chemical equivalent of oxygen? — *A.* 8.

Chlorine. — *Q.* How does chlorine exist in nature? — *A.* Only in combination; and in most abundance in marine salt.

Q. What was chlorine formerly supposed to be? — *A.* Oxygenated muriatic acid, or oxymuriatic acid.

Q. How is it obtained? — *A.* It is obtained by heating in a retort peroxide of manganese with chlorohydric or muriatic acid, and collecting the gas over a pneumatic trough or cistern.

Q. What is the *rationale* of this process? — *A.* The muriatic acid is decomposed into its elements of chlorine and hydrogen, and the peroxide of manganese gives up oxygen which unites with the hydrogen to form water, while the chlorine escapes.

Q. What are the properties of chlorine? — *A.* It is a gas of a greenish-yellow colour; becoming liquid under great pressure; a non-conductor of electricity; a good supporter of combustion, and incapable of supporting animal life; proving fatal when respired; imparts to the hand a sensation of warmth; is absorbed by water; and is much used for bleaching.

Q. How does it act in bleaching? — *A.* It decomposes the water, combining with the hydrogen to form chlorohydric acid gas, and freeing the oxygen, enables it to act upon the colouring matter.

Q. What precaution is necessary in collecting chlorine over water in the pneumatic trough?—*A.* To saturate the water with common salt; or to cork and remove the gas bottles from the water as soon as they are filled, to prevent the absorption of the gas.

Q. How may chlorine be shown to be a supporter of combustion? — *A.* By introducing phosphorus, or Dutch gold leaf, or powdered antimony into the gas; when they will immediately take fire.

Q. What is the symbol, and what the chemical equivalent, and the specific gravity of chlorine? — *A.* Its symbol is Cl, its chemical equivalent is 36 (or more nearly 35·42), and its specific gravity 2·47.

Q. How are the compounds of chlorine divided? — *A.* Into chloro-acids, and chloro-bases, or those which act as acids and those which act as bases.

Q. What termination is given to the chloro-bases? — *A.* The termination *ide*, as chloride of calcium.

Q. What are the principal combinations formed by oxygen and chlorine? — *A.* Euchlorine or protoxide of chlorine, composed of half a volume of oxygen* and one of chlorine; chlorous acid, or tritoxide or peroxide of chlorine, composed of one and a half volumes of oxygen to one of chlorine; chloric acid, composed of two and a half volumes of oxygen to one of

* It must be kept in mind that one volume of oxygen contains two combining proportions; they being half the size of those of chlorine or hydrogen.

chlorine; and oxychloric or perchloric acid, composed of three and a half volumes of oxygen to one of chlorine.

Q. What are the properties of euchlorine? — *A.* It is a gas of an orange-yellow colour, slightly greenish; first reddening and afterwards whitening vegetable blues; absorbed by water; supporting combustion for a very short time; and exploding when brought into contact with phosphorus, Dutch gold leaf, powdered antimony, or arsenic, or when heated to 100° of Fahrenheit; occupying one-fifth more space after explosion.

Q. What is this gas supposed by some to be? — *A.* A mixture of chlorous acid and chlorine.

Q. What are the properties of chlorous acid? — *A.* It is a gas of a deep yellow colour, of an aromatic odour; is absorbed by water; whitens vegetable blues; is exploded by artificial heat or by the rays of the sun; and may be liquified by great pressure,

Q. What are the properties of chloric acid? — *A.* It is an oleaginous liquid; colourless, sour and astringent; reddens vegetable blues; and is an exception to the rule that the compounds of chlorine precipitate the salts of silver from their solutions.

Q. What are the properties of perchloric acid? — *A.* It exists only in the liquid form, and in combination with water; is transparent, colourless, sour to the taste, reddens vegetable blues, and is less easily decomposed than any other of the combinations of oxygen and chlorine.

Bromine. — *Q.* Where does bromine exist in nature? — *A.* In the water of the ocean, of the Dead Sea, and of most of the salt springs in Europe, in the form of hydrobromate of magnesia.

Q. How is it obtained? — *A.* The mother water of marine or common salt is impregnated with chlorine, till it acquires a hyacinth-red tinge; the chlorine combines with the hydrogen and earth of a hydro-bromate of magnesia which exists in that water; the bromine thus displaced mingles with the water which is to be washed with ether; the etherial solution of bromine being treated with potash, a bromide of potassium is produced, which, by the combined action of heat, sulphuric acid and manganese, evolves bromine.

Q. What are the properties of bromine? — *A.* It is a liquid of a dark red colour; boiling at 89°, and becoming solid at from —7° to —12° below zero of Fahrenheit; very volatile, emitting red coloured fumes; is slightly soluble in water, alcohol, and ether; whitens vegetable blues, produces a yellow colour with

starch, does not support combustion; is destructive of animal life; and resembles chlorine in its properties and combinations.

Q. What are its principal combinations? — *A.* With oxygen it forms bromic acid; with hydrogen, bromohydric, or (as it is usually called), hydrobromic acid; and with various radicals it forms bromides.

Q. How is bromine most easily detected? — *A.* By means of chlorine, which displaces it from its combinations.

Q. What is the symbol of bromine, and what its specific gravity and chemical equivalent? — *A.* Its symbol is Br, its specific gravity is (compared with water), 2·966, its chemical equivalent is 78·4.

Iodine. — *Q.* Where does iodine exist in nature? — *A.* In sponges and various sea-weeds; and in the waters of various mineral springs.

Q. How is it generally obtained? — *A.* From the lixivium or lye which remains after the manufacture of carbonate of soda; the residuum is treated with sulphuric acid and heat in a retort, when the iodine passes over in the form of crystals of an intensely purple or black colour.

Q. What are the properties of iodine? — *A.* It is a bluish-black solid, of a metallic lustre, brittle, and almost insoluble in water, but is soluble in alcohol and ether; it melts at 225°, and volatilizes at 350° when dry, but when moist, at a temperature lower than that of boiling water; is a non-conductor of electricity; is an acrid poison when taken internally; does not burn in oxygen; produces a deep blue or purple colour with starch; and is incapable of supporting respiration.

Q. What is its symbol, and what its specific gravity and chemical equivalent? — *A.* Its symbol is I, its specific gravity, when solid, is 3·0844, when in the form of vapour, 8·716 (compared with air as the unit); its equivalent number is 126·3.

Q. How may starch be used as a test for iodine? — *A.* The liquid to be tested should first be rendered slightly acid, by means of nitric acid, when, by adding starch (if iodine be present), a dark purple iodide of starch will be formed; or the liquid may be tightly corked, and a piece of moist paper sprinkled with the powdered starch suspended from the cork; and if iodine be present, iodide of starch will be precipitated upon the paper.

Q. How may starch be detected by means of iodine? — *A.* The liquid may be boiled with a small quantity of starch, and a watery solution of chlorine, or a small quantity of sulphuric acid, added through a tube passing to the bottom of the liquid,

when the acid will set the iodine free and allow it to act upon the starch, producing the characteristic colour. (*Hare's Chemistry.*)

Fluorine. — *Q.* How does fluorine exist in nature? — *A.* It exists in most abundance in Derbyshire or fluor spar, which is a fluoride of calcium.

Q. For what is it most remarkable? — *A.* It is remarkable for the corrosive nature of its compounds, one of which (fluohydric acid), even corrodes glass.

Q. Has fluorine ever been obtained in a separate state? — *A.* It has not.

Q. What is its symbol and what its equivalent? — *A.* Its symbol is F, its equivalent, 18·68.

Sulphur. — *Q.* How is sulphur obtained? — *A.* It is obtained by sublimation from numerous combinations existing in nature, commonly called pyrites or sulphurets.

Q. What are the properties of sulphur? — *A.* It is a brittle solid, of a pale greenish-yellow colour; odorous when rubbed; insoluble in water, but soluble in boiling oil of turpentine; is a non-conductor of electricity, and becomes negatively electrified by friction; undergoes a feeble combustion at 180°, melting at 225°, and is sublimed, when in close vessels, at 600°; being deposited upon cooling in the form of minute crystals, known as flowers of sulphur.

Q. How may it be rendered ductile? — *A.* By heating it to 428° and pouring it into water.

Q. How may sulphur be obtained in crystals of appreciable size? — *A.* By melting it and allowing it to cool partially; and then piercing the outer crust, and pouring off the still fluid portion.

Q. How may sulphur be made to unite with alcohol? — *A.* By bringing the two substances into contact in the state of vapour.

Q. How may sulphur and water be made to combine? — *A.* By boiling them together with lime and chlorohydric or muriatic acid, filtering, and adding sufficient muriatic acid to form a soluble muriate of lime, which remains in solution, while the sulphur is precipitated in the form of a hydrate of sulphur, denominated, by the pharmacopœias, *lac sulphuris.*

Q. What is the symbol and what the specific gravity and the equivalent number of sulphur? — *A.* Its symbol is S, its specific gravity is 1·99, its chemical equivalent, 16·1.

Q. What are the combinations of sulphur with oxygen? —

A. Sulphurous acid, containing one proportion of sulphur and two of oxygen; sulphuric acid, = one of sulphur and three of oxygen; hyposulphurous acid, = two of sulphur and two of oxygen; and hyposulphuric acid, = two of sulphur and five of oxygen.

Q. Describe the formation and properties of sulphurous acid? — *A.* It is formed by the ordinary combustion of sulphur in atmospheric air, or in oxygen; is a colourless gas of a pungent sulphurous odour, fatal to animal life, incapable of supporting combustion, and reddens vegetable blues.

Q. How was sulphuric acid formerly obtained? — *A.* By distillation from sulphate of iron or green vitriol; from which it took the name of oil of vitriol.

Q. How is it now usually obtained? — *A.* By burning sulphur previously mixed with one-eighth of its weight of nitrate of potassa or nitre, and conducting the vapour into a leaden chamber containing water.

Q. What is the *rationale* of this process? — *A.* The nitric acid of the nitrate of potassa (containing one proportion of nitrogen and five of oxygen), is decomposed, giving up three parts of oxygen, which unite with a portion of the sulphur to form sulphuric acid; the sulphuric acid combines with the potassa to form sulphate of potassa; while the remaining portion of the sulphur is converted into sulphurous acid by uniting with the oxygen of the air; the nitric acid, having been converted into nitric oxide by the loss of three parts of oxygen, combines with the oxygen of the air and forms nitrous acid; the sulphurous and nitrous acids then unite with the aqueous vapour in the leaden chamber, to form a crystalline compound, which upon falling into the water is decomposed, and the nitrous acid gives up one proportion of its oxygen to the sulphurous acid by which the sulphurous is converted in sulphuric acid, which combines with the water, while the nitrous acid is changed into nitric oxide, which again combines with the oxygen of the air, sulphurous acid, and moisture, to form more of the crystalline compound.

Q. How is the sulphuric acid finally obtained? — *A.* By evaporating the water, and distilling the acid to free it from sulphates of potassa and lead; taking care, if the retort be of glass, to introduce some pieces of platinum, the presence of which enables the acid to boil without endangering the glass.

Q. What are the properties of sulphuric acid? — *A.* It is a dense, colourless, oily fluid; having a strong affinity for the alkalies and for water, with which, when mixed in the propor-

tion of three of acid to one of water, it produces great heat; it explodes when mixed with hot water; reddens vegetable blues, and boils at 620°.

Q. What is its specific gravity? — *A.* From 1·847 to 1·850 when in its most concentrated form.

Q. What is the best test for sulphuric acid? — *A.* Baryta, with which it forms an insoluble precipitate of sulphate of baryta.

Q. What phenomena are produced by sulphur when heated in contact with the metals? — *A.* If the metals be finely divided combustion ensues, which also takes place when iron is exposed to a jet of the vapour of heated sulphur.

Selenium and Tellurium. — *Q.* What are selenium and tellurium? — *A.* Bodies belonging to the basacigen class, and whose compounds are not used in medicine or the arts: their symbols are Se, and Te.

RADICALS.

Q. How may the radical bodies be divided? — *A.* Into metallic and non-metallic radicals.

Q. Do the radicals when in combination act as electro-negatives or electro-positives? — *A.* As electro-positives; always appearing at the negative pole of the battery, when subjected to electrolyzation.

Q. What are the non-metallic radicals? — *A.* Hydrogen, nitrogen, phosphorus, carbon, boron, silicon, and zirconium.

Hydrogen. — *Q.* How does hydrogen exist in nature? — *A.* It exists in combination with oxygen in the form of water, whence its name, which is derived from two Greek words signifying *to produce water.*

Q. What other names had it formerly? — *A.* Inflammable air, from its combustibility; and phlogiston, because it is the principal constituent in all ordinary flame, and was thence supposed to be the matter of heat.

Q. How is it obtained in a separate state? — *A.* It may be obtained in the purest state by the action of dilute sulphuric acid upon pure distilled zinc, or by the decomposition of water by the galvanic battery; but it is usually obtained by the action of dilute sulphuric acid upon iron filings; or by passing steam through a gun-barrel filled with iron turnings, or wire heated to a red heat.

Q. What is the *rationale* of the evolution of hydrogen by the action of dilute sulphuric acid upon iron wire or turnings, or upon zinc? — *A.* The water is decomposed; its oxygen uniting with the metal to form an oxide, with which the sulphuric acid unites to form a sulphate, while the hydrogen escapes.

Q. What is the *rationale* of the evolution of hydrogen by the action of heated iron filings upon steam? — *A.* The steam is decomposed, the oxygen uniting with the iron, while the hydrogen escapes.

Q. What are the properties of hydrogen? — *A.* It is a colourless, inodorous gas; the lightest of all ponderable bodies; inflammable, and capable (when mixed with oxygen or atmospheric air in the proportion of two to one) of being exploded by flame, or by an electric spark; incapable of supporting combustion or respiration, and producing a remarkable alteration in the voice when breathed.

Q. What is the symbol, and what the specific gravity and equivalent number of hydrogen? — *A.* Its symbol is H; its specific gravity, 0·0689; its equivalent number, 1.

Q. What are the proportions of hydrogen and oxygen in water? — *A.* One volume of hydrogen to half a volume of oxygen. (The combining proportion of oxygen being one-half the size of that of hydrogen.)

Q. How may water be formed artificially? — *A.* By burning a jet of hydrogen in a vessel containing oxygen, water will be condensed upon the sides of the vessel.

Q. What substance is generally contained in water? — *A.* Atmospheric air.

Q. How may this be proved? — *A.* By exposing water to the action of an air-pump, when bubbles of air will escape in rapid succession.

Q. What term is applied to bodies from which all the moisture has been expelled? — *A.* They are said to be anhydrous.

Q. What term is applied to those bodies in which water exists as an essential constituent? — *A.* They are called hydrates, excepting the combination of water with the acids, with which water acts as a base.

Q. What term is applied to acids containing water? — *A.* The term aqueous or hydrous is prefixed.

Q. How does water act with the alkalies and alkaline earths? — *A.* It acts as an acid; combining with them with much heat, as in the case of lime.

Q. What is the specific gravity, and what the symbol, equivalent, and boiling and freezing points of water? — *A.* Its specific gravity is 1; its symbol, H O; its equivalent, 9; its boiling point, under the ordinary pressure of the atmosphere, 212°, and its freezing point, 32° of Fahrenheit.

Q. What other compound of oxygen and hydrogen is there? — *A.* Deutoxide, or peroxide, or binoxide of hydrogen, or oxy-

genated water; consisting of two proportions of oxygen to one of hydrogen.

Q. How is it obtained? — *A.* By dissolving deutoxide of barium in liquid muriatic acid (a saturated solution of chlorohydric or muriatic acid in water), and precipitating the baryta (or protoxide of barium) by sulphuric acid, and the chlorine by silver.

Q. What are the properties of deutoxide of hydrogen? — *A.* It is a colourless liquid, of a specific gravity of 1·452; of a pungent metallic taste; acting upon the skin like a caustic; whitening vegetable colours; has never been frozen by any degree of cold; is more slowly volatilized than water; and explodes violently when heated, or when brought into contact with finely divided gold, silver, or platinum.

Q. What effect is produced by throwing a jet of hydrogen upon a piece of dry platinum sponge? — *A.* The sponge becomes red hot and sets fire to the hydrogen.

Q. To what are these phenomena (of the decomposition of deutoxide of hydrogen, and the combustion of hydrogen by the presence of platinum), attributed? — *A.* To the operation of a principle not yet explained, and which has received the name of catalysis or, the action of *presence.*

Q. How may the quantity of oxygen or of hydrogen in any gaseous compound be determined? — *A.* By introducing a quantity of the mixture into a graduated tube over water, and causing it to explode by an electric spark; the diminution in the quantity of the mixture denotes the quantity of oxygen and hydrogen which have disappeared; (having been converted into water;) one-third of the quantity which has disappeared representing the oxygen, and two-thirds the hydrogen.

Q. What caution is necessary? — *A.* That a slight excess of hydrogen be present to insure the explosion.

Q. What name is given to this process? — *A.* It is called eudiometry, and was first used to analyse the atmospheric air.

Q. What compound does hydrogen form with chlorine? — *A.* Chlorohydric or muriatic acid, composed of equal volumes of chlorine and hydrogen.

Q. What takes place when equal volumes of these gases are exposed at the same time to the rays of the sun? — *A.* They combine with an explosion, without any reduction of volume.

Q. How may chlorohydric acid be obtained? — *A.* By introducing, into a tubulated retort, a certain quantity of chloride of sodium or common salt, and adding, in divided portions, three-fourths as much (by weight) of strong sulphuric acid; and col-

lecting the gas evolved by means of a pneumatic trough in which mercury is used instead of water.

Q. What is the *rationale* of this process? — *A.* The water in the sulphuric acid is decomposed; its oxygen uniting with the sodium to form oxide of sodium or soda, with which the sulphuric acid combines, to form sulphate of soda; while the hydrogen of the water and the chlorine of the chloride unite to form chlorohydric acid, which is collected over the mercury in the pneumatic trough.

Q. What are the properties of chlorohydric acid? — *A.* It is a colourless gas, incapable of being inflamed or of supporting combustion; producing extremely irritating and even fatal effects when breathed; it has a great affinity for water, which absorbs four hundred and twenty times its own bulk of the acid; when allowed to escape into the air it gives rise to white fumes, from combining with moisture; and is rendered liquid when subjected to a pressure of forty atmospheres.

Q. What is its specific gravity? — *A.* 1·2694.

Q. What takes place when it is brought into contact with the metallic oxides, or with those metals which decompose water? — *A.* When brought into contact with the metallic oxides, the oxygen of the oxide and the hydrogen of the chlorohydric acid unite to form water, while the chlorine unites with the metal to form a chloride; and the metals which decompose water unite with the chlorine of the chlorohydric acid, and free its hydrogen.

Q. How may liquid muriatic or chlorohydric acid be procured? — *A.* By saturating water with the gas by means of Woulfe's apparatus; or by distilling a solution of chloride of sodium in water with sulphuric acid.

Q. What are the properties of this liquid? — *A.* It is generally straw-coloured from the presence of iron, though when pure it is colourless; and if strong, it produces suffocating fumes when exposed; its combinations with the alkalies, earths, and oxides, are always soluble.

Q. What effect does heat produce upon its compounds? — *A.* It drives off the hydrogen and converts them into chlorides.

Q. What are the muriates or chlorohydrates supposed by some to be? — *A.* Combinations of a chloride with water.

Q. What compounds does hydrogen form with bromine and with iodine respectively? — *A.* Bromohydric and iodohydric acids (sometimes called hydrobromic and hydriodic), consisting of equal proportions of each of their constituents.

Q. What compound does hydrogen form with fluorine? —

A. Fluohydric acid, remarkable for its volatilizing at a little below 60°, and for its power of corroding glass.

Q. What compounds does hydrogen form with sulphur? — *A.* Suphydric (or hydrosulphuric) acid, commonly called sulphuretted hydrogen; an indefinite compound, called the polysulphuret or polysulphide of hydrogen, composed of one proportion of hydrogen with four, six, or even eight of sulphur.

Q. How may sulphydric acid be obtained? — *A.* By the action of diluted sulphuric acid upon a sulphide or sulphuret.

Q. What is the *rationale?* — *A.* Water is decomposed; its oxygen uniting with the metal to form an oxide, with which the sulphuric acid unites to form a sulphate; while the hydrogen of the water and the sulphur unite to form sulphydric acid, which is evolved.

Q. Where does it exist in nature? — *A.* In the water of many mineral springs.

Q. What is its composition and what are its properties? — *A.* It is composed of equal proportions of sulphur and hydrogen; is a gas of very fetid odour, absorbed by water, and decomposed by mercury, and requiring to be collected over water saturated with salt; it reddens vegetable blues, and combines with many of the metals, precipitating them from their solutions (particularly the preparations of lead); is fatal to animal life; does not support combustion; is inflammable, and decomposed by chlorine, potassium, sodium (and other metals which have an affinity for both sulphur and hydrogen), or by being exploded by electricity.

Nitrogen. — *Q.* Where does nitrogen exist in nature? — *A.* In the atmosphere, mechanically mixed with oxygen, and a small quantity of aqueous moisture and carbonic acid.

Q. How may nitrogen be obtained? — *A.* By burning phosphorus in a vessel containing air, until all the oxygen is consumed; or by introducing a mixture of iron filings and sulphur moistened, with which the oxygen combines to form a sulphate, leaving the nitrogen, which must be purified from carbonic acid by means of limewater.

Q. What are the properties of nitrogen? — *A.* It is a colourless gas, incapable of supporting animal life, or combustion; destitute of any active properties except that it has a great affinity for caloric; and is an ingredient in almost all the fulminating compounds.

Q. Give its symbol, equivalent number, and specific gravity. — *A.* Its symbol is N; its equivalent, 14·15; its specific gravity, 0·9727.

Q. What is the composition of the atmospheric air? — *A.*

Not quite four-fifths of its bulk is nitrogen; a little more than one-fifth of oxygen; and a very small proportion of carbonic acid gas, and aqueous vapour.

Q. What is that process called by which the air may be analysed and the proportions of its constituents determined? — *A.* Eudiometry. (See *Hydrogen.*)

Q. How may it be shown that the air has weight? — *A.* By exhausting the air from a vessel and weighing it, and afterwards admitting the air and then weighing the vessel again.

Q. What is meant by the elasticity of the air? — *A.* Its capability of being condensed by pressure, and of expanding when the pressure is removed.

Q. How may this be shown? — *A.* By placing a bladder, partially filled with air and tightly closed in a glass vessel, and exhausting the air from the vessel, when the air in the bladder will expand and distend the bladder; and on the air being again admitted into the vessel, the bladder will collapse to its former size.

Q. What is the average weight or pressure of the atmosphere? — *A.* Fifteen pounds to the square inch.

Q. How is this shown? — *A.* If a glass tube, closed at one extremity, be exhausted of air, and placed vertically in a vessel of mercury with the open extremity downward, the pressure of the air will force into the empty tube a column of mercury thirty inches above the surface of the mercury contained in the vessel; showing the weight of the atmosphere to be equal to a column of mercury thirty inches high, which would show a pressure of fifteen pounds to the square inch. (In a similar way the pressure of the air will support a column of water between thirty-three and thirty-four feet high.)

Q. Is the pressure of the air constant? — *A.* It is not; and its variations may be measured by the height of the column of mercury which it will support, in an instrument called a barometer.

Q. Is the pressure of the air the same in all directions? — *A.* It is; as may be seen by cutting off the neck of a vial at the middle of its neck, filling it with water, and inverting it, when the water will be prevented from escaping by the upward pressure of the air.

Q. How does the pressure of the air vary according to its height? — *A.* It decreases one-half for every three miles; thus, at six miles it is one-fourth that at the earth; at nine miles, one-eighth; at twelve miles, one-sixteenth, &c.

Q. Why is it not possible to produce a complete vacuum in a vessel by means of an air-pump? — *A.* Because the air be-

comes at length so much rarefied as to be unable by its elasticity to lift the valves of the pump.

Q. What effect has the pressure of the air upon the boiling point of liquids? — *A.* Liquids boil at a much higher temperature in atmospheric air than in vacuo. (Thus, water boils in the air at 212°; in vacuo, that is, when the atmospheric pressure is removed, at 72°; water also boils at one degree lower for every five hundred and thirty feet we ascend above the earth's surface.)

Q. How may the quantity of moisture in the air be ascertained? — *A.* By an instrument called an hygrometer.

Q. What chemical compounds does nitrogen form with oxygen? — *A.* Nitrous oxide, containing one volume of nitrogen and half a volume of oxygen; nitric oxide, containing one volume of nitrogen and one of oxygen; hyponitrous acid, containing one volume of nitrogen and one and a half of oxygen; nitrous acid, containing one volume of nitrogen and two of oxygen; and nitric acid, containing one volume of nitrogen and two and a half of oxygen; each volume of oxygen containing two combining proportions.

Q. How may nitrous oxide be obtained? — *A.* By the action of dilute nitric acid upon zinc; by exposing nitric oxide gas to iron filings, which take from it one proportion of its oxygen; or by heating nitrate of ammonia, and collecting the gas over water saturated with salt.

Q. What is the *rationale* of the last method? — *A.* The nitric acid contains one volume or proportion of nitrogen, and two and a half volumes or five proportions of oxygen; and the ammonia contains one volume of nitrogen and three of hydrogen; the three volumes of hydrogen take one and a half volumes or three proportions of oxygen, and form water, while the remaining volume, or two proportions of oxygen, unite with the two of nitrogen to form nitric oxide.

Q. What are the properties of nitrous oxide? — *A.* It is a colourless gas, absorbed by water; supporting combustion almost as well as oxygen; explodes and forms water and free nitrogen, when inflamed with hydrogen; and when breathed, at first intoxicates, but if long continued produces death.

Q. What other name is sometimes given to it? — *A.* Laughing gas; from its peculiarly exhilarating and intoxicating effects.

Q. How is nitric oxide formed? — *A.* It is given off during the action of nitric acid upon the metals.

Q. What are its properties? — *A.* It is a colourless gas, irri-

tating, and incapable of being respired; extinguishes the flame of a candle, but supports the combustion of previously ignited charcoal or phosphorus; ignites Homberg's pyrophorus; is slightly absorbed by water; absorbs oxygen from the air, and gives rise to red fumes of nitrous acid gas; when mixed with hydrogen in equal quantity it is inflammable, forming water and nitrogen; explodes with ammonia; does not redden vegetable blues; and is decomposed by freshly ignited platinum sponge, by moistened iron filings, by strong heat, and by repeated shocks of electricity.

Q. In what process is it used? — *A.* In eudiometry, or analysis of air.

Q. What is its specific gravity? — *A.* It is heavier than air, having a specific gravity of 1·0375.

Q. By what other names is it sometimes designated? — *A.* Deutoxide or binoxide of nitrogen, and nitrous air.

Q. What are the properties of hyponitrous acid? — *A.* It is a dark green liquid, extremely volatile, and is not used in the arts.

Q. How is nitrous acid procured? — *A.* By mixing two volumes of nitric oxide (containing one proportion of nitrogen and two of oxygen), with one volume (containing two proportions) of oxygen; or by heating nitric acid in contact with air, and collecting the fumes; or by distillation from the nitrate of lead.

Q. What are the properties of nitrous acid? — *A.* When moist, it is a gas of a deep red colour; irritating, and incapable of being respired; supports the combustion of most bodies, but extinguishes burning sulphur; when dry or anhydrous, it is a lemon-coloured liquid, of a density = 1·451, very volatile, is decomposed by heat, and also by the metals, to which it gives up a portion of its oxygen; when mixed with water it is converted into nitric acid and nitric oxide, and if the quantity of water be small, the change takes place slowly, the water becoming successively blue, green, yellow, and orange.

Q. What is the commercial name of nitric acid? — *A.* Aqua fortis.

Q. With what substance is it always combined? — *A.* With a small quantity of water.

Q. How is it obtained? — *A.* By the action of sulphuric acid and heat upon nitrate of potassa, commonly called nitre, or saltpetre.

Q. What is the *rationale?* — *A.* It is a case of simple affinity or single elective attraction; the sulphuric acid have an affinity

for potassa superior to that of the nitric acid, unites with the potassa, and sets free the nitric acid, which is vaporized by the heat, and passes over into a receiver and is condensed.

Q. How may nitric acid thus obtained be purified? — *A.* The sulphuric acid may be precipitated from it by baryta, and the chlorohydric acid by a solution of silver.

Q. What are the properties of nitric acid? — *A.* It is colourless when pure; but as it is found in commerce, it is of an orange colour, from the presence of nitrous acid or nitric oxide; when concentrated it has a specific gravity of 1·55, boils at 175°, and freezes at —40° of Fahrenheit: the officinal nitric acid has a specific gravity of 1·5, boils at 248°, and contains two proportions of water to one of acid; it reddens vegetable blues; acts as a caustic upon animal tissues; and reacts with almost all the metals except silver; and is used in medicine, and as a colouring material.

Q. What name was formerly given to a mixture of nitric and muriatic acids? — *A.* It was called aqua regia, from its property of dissolving gold.

Q. What is nitroso-nitric acid? — *A.* An orange-coloured fuming liquid (resulting from the absence of a sufficient quantity of water during the formation of nitric acid), consisting of a mixture of nitric acid, and nitric oxide or nitrous acid.

Q. What are its properties? — *A.* It ignites the essential oils and carbon, and burns explosively with phosphorus; and when exposed to heat, gives up nitrous acid gas, and is converted into pure nitric acid.

Q. What combinations does nitrogen form with chlorine and iodine? — *A.* A chloride, and an iodide of nitrogen, remarkable for their explosive properties.

Q. What combination does nitrogen form with hydrogen? — *A.* Ammonia, frequently called volatile alkali, consisting of one equivalent of nitrogen and three of hydrogen.

Q. How is ammonia obtained? — *A.* By mixing equal parts of unslaked lime (oxide of calcium) and sal ammoniac (chlorohydrate or muriate of ammonia), both pulverized, applying heat, and collecting the gas over mercury.

Q. What is the *rationale?* — *A.* The chlorohydric acid having a greater affinity for lime than for ammonia, unites with the former to form a muriate or chlorohydrate of lime, while the ammonia escapes.

Q. What are the properties of ammonia? — *A.* It is a colourless gas, of a very pungent odour, very irritating to the eyes and nose; is incapable of being respired, of supporting combus-

tion, or of being inflamed in the air; it inflames with chlorine spontaneously, is exploded with oxygen, and by the electric spark; it restores vegetable colours that have been changed by acids, and changes the colour of turmeric from yellow to brown; combines with and neutralizes the acids; is absorbed rapidly by water, which takes up from 450 to 670 times its own bulk; it has a specific gravity of 0·5897; and is rendered liquid by intense pressure, or by a temperature of —40° of Fahrenheit.

Q. How is the aqua ammoniæ, or liquid ammonia obtained?—*A.* By conveying the gas into water surrounded by ice, until the water becomes saturated with the gas.

Q. Why is it necessary to surround the water that is to be saturated with ice?—*A.* Because the absorption of the gas would, otherwise, cause such an elevation of temperature as would interfere with the process.

Phosphorus.—*Q.* From what may phosphorus be obtained?—*A.* From bones, in which it exists as a phosphate of lime; or from urine, in which it exists as a phosphate of soda.

Q. How is it obtained from bones?—*A.* The bones are first burned until the animal matter contained in them is destroyed, sulphuric acid is then added, which unites with the lime and sets the phosphoric acid free; the oxygen is separated from the phosphoric acid by igniting it with charcoal or carbon, which unites with the oxygen, and the phosphorus escapes from the retort, and is condensed in the water in which the beak of the retort is immersed.

Q. How is phosphorus obtained from urine?—*A.* By adding nitrate of lead; the nitric acid of which unites with the soda, and the phosphoric acid of the phosphate of lead unites with the oxide of lead to form phosphate of lead, from which the phosphorus may be distilled with charcoal, and condensed in water, as in the former process.

Q. How is phosphorus afterwards prepared for use?—*A.* By being melted in hot water, and pressed through chamois leather.

Q. What are the properties of phosphorus?—*A.* When pure it is colourless and translucent; but, as generally found, it is of a fleshy colour, and of a lustre and consistence resembling wax; emitting a peculiar odour, from its combining with oxygen; is rendered brittle by a very small proportion of sulphuric acid; undergoes a slow combustion in the open air at ordinary temperatures; is readily ignited by friction; melts at 108°; inflames at 148°; is vaporized at 550°; when ignited in oxygen, burns with extreme brilliancy; is insoluble in water,

but is soluble (with the aid of heat) in naphtha, and in the fixed and volatile oils.

Q. What is the specific gravity, and what its symbol and the chemical equivalent of phosphorus? — *A.* Its specific gravity is 1·77, its symbol is P, its equivalent 16, or more accurately 15·7.

Q. What combinations does it form with oxygen? — *A.* Oxide of phosphorus = one proportion of oxygen and three of phosphorus; hypophosphorous acid = one of oxygen and two of phosphorus; phosphorous acid = three of oxygen and two of phosphorus; and phosphoric acid = five of oxygen and two of phosphorus.

Q. How is phosphoric acid obtained? — *A.* By adding sulphuric acid to a solution of phosphate of baryta; the sulphuric acid, by its superior affinity for baryta, precipitates an insoluble solution.

Q. Can it ever be obtained entirely free from water? — *A.* It cannot, but it may be concentrated by evaporation.

Q. What are its properties? — *A.* It is a viscid, inodorous, colourless liquid, reddening vegetable blues, and producing a yellow precipitate with nitrate of silver; and when heated to redness, acquires the property of corroding glass or porcelain.

Q. What is formed when phosphoric acid is heated to a red heat, and allowed to cool? — *A.* A transparent, brittle glass, which produces a white precipitate with nitrate of silver; and has received the name of paraphosphoric or metaphosphoric acid.

Q. What effect is produced upon paraphosphoric acid by exposure to the air? — *A.* It deliquesces, and is converted into phosphoric acid.

Q. What name is given to the acid contained in phosphate of soda after it has been exposed to a red heat? — *A.* Pyrophosphoric acid.

Q. What are these three acids said to be? — *A.* Isomeric bodies; because they consist of the same proportions of the same constituents, but differ in their properties.

Q. What is the only other compound of phosphorus possessing any remarkable properties? — *A.* Perphosphuretted hydrogen, consisting of phosphorus and hydrogen united in proportions that have not been accurately ascertained.

Q. What are its properties? — *A.* It is a colorless gas, having a bitter taste, and an odour like garlic; is absorbed in a slight degree by water; and when allowed to escape into oxygen or atmospheric air, it explodes with a brilliant flash, leaving a wreath of smoke, consisting of watery vapour and phosphoric acid.

Carbon. — *Q.* How does carbon exist in nature? — *A.* It exists in a state of purity in the diamond, and combined with various substances in coal, wood, and animal matter.

Q. How is it generally obtained for use? — *A.* It is obtained in a state sufficiently pure, in the form of charcoal, by heating wood to redness without access of air; so that the hydrogen and oxygen are driven off.

Q. What are the properties of charcoal obtained from wood? — *A.* It is black, hard, brittle; without taste or smell; a very good radiator, but a bad conductor of heat; a very good conductor of electricity; insoluble in water; not affected by exposure to air and moisture; has a great affinity for oxygen; is acted upon with difficulty by nitric acid; is highly combustible, burning brilliantly in oxygen; absorbs large quantities of gases, and gives them up again when heated; and absorbs the odoriferous and colouring principles of most animal and vegetable substances.

Q. What is animal charcoal? — *A.* Charcoal obtained from bones, usually in the form of a powder called ivory black; and principally used in the arts as a decolorizing and antiseptic material.

Q. In what form is carbon sometimes precipitated in a pure state from coal gas? — *A.* In the form of long brittle filaments, resembling tufts of hair.

Q. What is the symbol, and what the chemical equivalent and the specific gravity of carbon? — *A.* Its symbol is C, its equivalent number 6·12, its specific gravity when in the form of diamond or of charcoal reduced to powder, is about 3·5.

Q. What are the principal compounds of carbon and oxygen? — *A.* Carbonic oxide, consisting of one proportion or volume of carbon and one proportion or half a volume of oxygen; carbonic acid, = one proportion of carbon and two of oxygen; and oxalic acid, = two proportions or volumes of carbon and three proportions or one and a half volumes of oxygen.

Q. How is carbonic oxide obtained? — *A.* By heating chalk (carbonate of lime) with iron filings; when one proportion of the oxygen unites with the iron, while one proportion of carbon and one of oxygen are liberated and form carbonic oxide.

Q. What are the properties of carbonic oxide? — *A.* It is a colourless gas, not decomposed by heat or electricity; burns in oxygen, and is converted into carbonic acid; is incapable of supporting life or combustion; does not redden vegetable blues; and has a specific gravity of 0·9727.

Q. Where does carbonic acid exist in nature? — *A.* In lime-

stone and marble in the form of carbonate of lime, and in the atmosphere.

Q. How may it be obtained? — *A.* By the action of heat or of acids upon any of the carbonates, by the combustion of charcoal, and by the vinous fermentation.

Q. What are its properties? — *A.* It is a colourless, inodorous gas, having a specific gravity of 1·5239; is fatal to life, or to combustion, even when diluted with four times its bulk of oxygen; reddens vegetable blues; is absorbed by water; is not inflammable; forms insoluble carbonates with lime, baryta, strontia, magnesia, and oxide of lead; is capable of being liquefied by a pressure equal to forty atmospheres; is antiseptic; and gives up its oxygen to potassium, which burns in it. (For oxalic acid, see *Organic Chemistry.*)

Q. What are the general characteristics of the compounds of carbon and hydrogen? — *A.* Their inflammability; their inability to support respiration or combustion; the property that they possess of neutralizing powerful acids; and from many of them being isomeric, or consisting of the same ingredients in the same proportions; and some being also polymeric, or consisting of the same ingredients or elements in the same proportions, but differing in their degrees of condensation.

Q. What are the most important of these? — *A.* Light carburetted hydrogen or fire damp, and deuto-carbo-hydrogen or olefiant gas, sometimes called carburetted hydrogen or hydroguret of carbon.

Q. How is light carburetted hydrogen or fire-damp generated? — *A.* It is evolved from the mud of stagnant waters, and is also generated in many coal mines; but cannot well be prepared artificially.

Q. What are its properties? — *A.* It is a colourless gas; incapable of supporting respiration; highly inflammable; and having a specific gravity equal to 0·5593.

Q. What is the principal of Sir Humphry Davy's safety lamp? — *A.* The inflammable gas passes through the gauze and burns upon the inside of the lamp, while the gas on the outside is prevented from taking fire, by the cooling effect produced upon the gas by its passage through the wire gauze, unless the gauze be allowed to become red hot, and a current of the inflammable gas were passed through it so rapidly, as not to allow it to be cooled.

Q. How may olefiant gas be obtained? — *A.* By heating a mixture of alcohol and sulphuric acid; during which process the sulphuric acid takes the water which is essential to the con-

stitution of alcohol, and leaves the gas; or the alcohol may be deprived of its water by passing its vapour through a red hot porcelain tube.

Q. What are the constituents and the properties of this gas? — *A.* It is composed of two volumes of carbon (in vapour), and two of hydrogen, condensed into one volume; is a colourless gas, having a specific gravity equal to 0·9808; is destructive to life when respired; burns brilliantly when ignited in oxygen, or atmospheric air, and is used for the purpose of illumination; explodes violently when mixed with oxygen and ignited; and forms, with chlorine, a yellow oily liquid, sometimes called chloric ether.

Q. What is naphtha? — *A.* A volatile liquid, of a strong peculiar odour, very inflammable; has a specific gravity equal to 0·753; boils at 158° of Fahrenheit; insoluble in water, but soluble in pure alcohol and in the oils; contains no oxygen, but consists of carbon and hydrogen in the proportion of 6 to 5; and is found native, or obtained by distillation from the tar of bituminous coal.

Q. What important compound does carbon form with nitrogen? — *A.* Cyanogen, which is classed by Berzelius among the halogen, and by Professor Hare among the basacigen bodies.

Q. How is it obtained? — *A.* By decomposing the bicyanide (or bicyanuret) of mercury to heat in a retort, and collecting the gas over mercury.

Q. What are its properties? — *A.* It is a colourless gas, of a pungent and peculiar odour; extremely irritating, and incapable of supporting respiration or combustion; burns with a violet-coloured flame, from which it derives its name; is rendered liquid by pressure; and is solidified by cold; is absorbed by alcohol, and by water; is decomposed by electricity; combines with various bodies as an electro-negative; and has a specific gravity equal to 1·8157.

Q. What is its composition? — *A.* It is a bicarburet of nitrogen; containing two volumes of carbon and one of nitrogen condensed into one volume.

Q. What is its symbol and its equivalent number? — *A.* Its symbol may be written 2 C + N, or Cy; its equivalent is 26·39.

Q. What is the most important compound of which cyanogen forms a part? — *A.* Cyanhydric acid, otherwise called hydrocyanic or prussic acid, consisting of one volume of cyanogen and one of hydrogen.

Q. In what does prussic acid exist in nature? — *A.* In the leaves of the laurel and peach trees, and in the kernel of the bitter almond.

Q. How is it obtained? — *A.* By the action of chlorohydric or muriatic acid upon bicyanide of mercury; the chlorine of the chorohydric acid, uniting with the mercury to form a chloride, while the cyanogen and hydrogen unite to form cyanhydric or prussic acid, which is condensed in a receiver surrounded with ice.

Q. What are its properties? — *A.* It is a colourless liquid, having a powerful odour, resembling that of peach leaves; very volatile, boiling at 79°, freezing at 0°, and evaporating so rapidly, when exposed, that one portion is frozen by the evaporation of the other; is extremely poisonous when its vapours are breathed, or when it is spilt upon the skin; has a very slight acid action, scarcely reddening vegetable blues; and is decomposed by the metallic oxides, forming with them, by an interchange of elements, cyanides or cyanurets of the metals, and water; its specific gravity is 0·7058.

Boron. — *Q.* From what source is boron obtained? — *A.* From borax, which is a native biborate of soda.

Q. How is the process conducted? — *A.* Sulphuric acid is added to a saturated solution of the biborate of soda in water, when the sulphuric acid unites with the soda, displacing the boric or boracic acid, which is precipitated in the form of crystals, and from which boron is obtained by heating the acid in contact with potassium, which takes away its oxygen.

Q. What are the properties of boron? — *A.* It is a solid, of a dark olive colour, insipid, inodorous, slightly soluble in water, and insoluble in alcohol, ether, or the oils; is a non-conductor of electricity, is infusible, but when heated in air or oxygen, to 600° Fahrenheit, its surface takes fire, and forms a crust of boric acid around the interior portion, which is rendered denser and more difficult of ignition.

Q. What is the symbol, and what the equivalent number and the specific gravity of boron? — *A.* Its symbol is B; its equivalent is 11 (or nearer 10·9); its specific gravity 1·83.

Q. What are the properties of boric (or boracic) acid? — *A.* It is a crystalline solid, consisting of one combining proportion of boron and three of oxygen; is changed into the form of a glass by heat, which deprives it of its water of crystallization; is colourless, inodorous, slightly soluble in water; infusible, and at low temperatures displaced from its combinations by

sulphuric and nitric acids, but at a higher temperature they, in turn, are decomposed by heat and displaced by boric acid.

Silicium or Silicon. — *Q.* How is silicon obtained? — *A.* By heating sulphuric acid with Derbyshire spar (fluoride of calcium), and powdered quartz or rock crystal (silicic acid); and heating potassium in the gas thus obtained.

Q. What is the *rationale* of this process? — *A.* The sulphuric acid combines with the calcium and oxygen to form sulphate of lime, while the fluorine and silicic acid combine to form fluoride of silicon; which, being heated with potassium, the fluorine and potassium unite to form fluoride of potassium, and the silicon being insoluble, may be obtained separately, by repeated washing in water.

Q. What are the properties of silicon?—*A.* It is a dark brown solid; a non-conductor of electricity; incapable of fusion, or volatilization; insoluble, except in a mixture of nitric and fluohydric acids; and as ordinarily obtained burns readily in oxygen, or atmospheric air; but after being exposed to a high temperature is incombustible; inflames when heated to redness in contact with the carbonates of the fixed alkalies, or with nitrate of potassa; and explodes when dropped upon the fused hydrates of potassa, soda, or baryta.

Q. What is its symbol and what its chemical equivalent? — *A.* Its symbol is Si, its chemical equivalent 8, or, more accurately, 7·5.

Q. How does silica or silicic acid exist in nature? — *A.* In quartz, and especially in rock crystal, which is pure silicic acid.

Q. How may it be obtained? — *A.* By melting together powdered quartz and pearlash (or carbonate of potassa), a glass is formed which, when dissolved in water, forms liquor silicum, or liquor of flints, which is a solution of the silicate of potassa, and from which silicic acid may be precipitated by adding another acid which combines with the potassa.

Q. What are its properties? — *A.* It is a white powder, without taste or smell; of a specific gravity of 2·66; does not redden vegetable blues; is infusible except by the compound blow-pipe; cannot be volatilized; is soluble in water when in its forming state, but insoluble after exposure to heat, or when crystallized; and consists of oxygen and silicon, each one combining proportion.

Q. What is glass? — *A.* A silicate of potassa, the clearer kinds containing, also, oxide of lead.

METALLIC RADICALS.

Q. What are the essential properties of the metals? — *A.* They are conductors of heat and electricity; are opaque even when reduced to very thin leaves; have a peculiar lustre, termed metallic; and form compounds with the basacigen bodies, in which they act as electro-positives.

Q. How do they differ among themselves? — *A.* In the degree and permanence of their lustre; in their malleability, ductility, elasticity, weight, tenacity, capability of oxidation, of being welded, of fusion, &c.

Q. Which are the heaviest of the metals? — *A.* Platinum, gold, tungsten, mercury, palladium, lead.

Q. Which are remarkable for ductility? — *A.* Gold, silver, platinum, iron, and copper.

Q. Which are least capable of being oxidized? — *A.* Gold, silver, platinum, rhodium, nickel, and palladium.

Q. What metals possess magnetic properties? — *A.* Iron, nickel, and cobalt.

Q. What is meant by an alloy? — *A.* A compound formed by the union of two or more metals.

Q. What is an amalgam? — *A.* A compound formed by union of mercury with another metal.

Q. How are metals divided? — *A.* Into the metals of the earths proper, the metals of the alkaline earths, the metals of the alkalies, and the metals proper.

Q. What are the peculiar properties of the earths proper? — *A.* They are white, insoluble in water, and do not affect vegetable colours; and are oxides of their respective metals.

Q. What are the properties of the alkalies? — *A.* They are distinguished by their causticity, their solubility in water; by their restoring colours changed by the acids, and changing the colour of turmeric; and by their neutralizing the acids, forming with them salts which are neutral (that is, neither acid nor alkaline), in their properties; and are oxides of metals, which have so strong an affinity for oxygen as to decompose water.

Q. What are the properties of the alkaline earths? — *A.* They resemble the alkalies in their effect upon colours, and in neutralizing the acids; and (excepting magnesia), are oxides of metals which decompose water; but only two of them are at all soluble in water.

Q. What are the distinguishing properties of the proper metals? — *A.* Their oxides are insoluble in water, and do not

affect vegetable colours; most of them form salts with the acids, but are separated from their combinations by the alkalies and alkaline earths.

Q. What are the metals of the proper earths? — *A.* Aluminium, glucinium, yttrium, and thorium; and, according to some, zirconium and silicon.

ALUMINUM. — *Q.* How does aluminum exist in nature? — *A.* It exists in the form of alumina or oxide of aluminum in clay, and in the ruby, sapphire, amethyst, topaz, and other gems; as a hydrate in certain stalactites; and in alum, which is a sulphate of alumina and potassa.

Q. How may aluminium be obtained? — *A.* By heating aluminia (oxide of aluminium), or chloride of aluminium with potassium.

Q. What are its properties? — *A.* As ordinarily obtained, it is a gray powder, which is a non-conductor of electricity; when fused, it becomes a conductor of electricity; it fuses at a temperature higher than that required to melt iron; it takes fire when heated to redness in the air or in oxygen, or chlorine; and is not acted upon by water, or by nitric or sulphuric acids without the aid of heat.

Q. What is formed when aluminium is burned in oxygen? — *A.* A glass or vitrified oxide, which is so hard as to cut window glass.

Q. What is the symbol and what the equivalent number of aluminium? — *A.* Its symbol is Al, its chemical equivalent 14, or, more accurately, 13·7.

Q. How is aluminia obtained? — *A.* It is obtained from a solution of alum, by adding an excess of carbonate of potassa to saturate the excess of sulphuric acid; dissolving the precipitate in chlorohydric acid, and precipitating it by ammonia, to remove the excess of ammonia; this last precipitate is then washed, and the water expelled by heat.

Q. What are the properties of alumina? — *A.* It is white, inodorous, fusible only by the blowpipe, does not affect vegetable colours, is insoluble in water, which it nevertheless absorbs, and is thus rendered plastic; it consists of two proportions of aluminium and three of oxygen, and is therefore a sesquioxide.

Q. What are the metals of the alkaline earths? — *A.* Magnesium, calcium, barium, and strontium.

MAGNESIUM. — *Q.* How is magnesium obtained? — *A.* By the action of potassium and heat upon the chloride of magnesium.

Q. What are its properties? — *A.* It is a solid, of a metallic lustre, and white colour like silver; is malleable, and fusible at a red heat; is oxidized by moist air; it burns brilliantly, and is converted into magnesia or protoxide of magnesium; takes fire spontaneously in chlorine; and is acted upon by dilute acids.

Q. Give its symbol and chemical equivalent. — *A.* Its symbol is Mg; its equivalent, 12·7.

Q. How is magnesia obtained? — *A.* It is obtained from sulphate of magnesia or Epsom salt, which exists in sea-water, by adding a solution of potassa or of soda (both of which form, with the sulphuric acid, soluble sulphates), and magnesia is precipitated.

Q. What are the properties of magnesia? — *A.* It is a white powder, of a slightly alkaline taste; has a specific gravity of 2·3; is almost insoluble in pure water, but soluble in water containing carbonic acid; is separated from its combinations by the other alkaline earths, and by the alkalies; is infusible except by the compound blowpipe; and forms, with sulphuric acid, a sulphate which is soluble in water.

Calcium. — *Q.* How is calcium obtained? — *A.* By the action of a galvanic battery upon lime (protoxide of calcium) in contact with mercury; by which means the metal is deoxidized and unites with the mercury to form an amalgam, from which it is obtained by evaporating the mercury.

Q. What are the properties, the symbol, and the equivalent of calcium? — *A.* It is a white metal, having a great affinity for oxygen, with which it combines spontaneously, forming lime; its symbol is Ca; its equivalent, 20·5.

Q. How is lime obtained? — *A.* By the action of heat upon marble, limestone, or oyster-shells, in which lime exists in the state of carbonate; the carbonic acid being driven off by heat.

Q. What are the properties of lime? — *A.* It is a white solid, composed of one proportion of oxygen and one of calcium; has a great affinity for water, with which it forms a hydrate, accompanied, at the same time, with a great increase of temperature; is slightly soluble in water, which takes up one seven-hundredth of its own bulk; is precipitated from lime-water, or from its soluble salts, by carbonic or oxalic acid, in the form of carbonate or oxalate of lime; is fusible only by the compound blowpipe; operates on vegetable colours like an alkali; and has a specific gravity of 2·3.

Barium. — *Q.* How is barium obtained, and what are its properties? — *A.* It is obtained from baryta (protoxide of barium),

by a process similar to that employed to obtain calcium; is a dark gray solid, of a lustre inferior to that of cast iron; when exposed to the air, it combines spontaneously with oxygen, forming baryta; is capable of being fused and evaporated at a heat below redness, and, when in the form of vapour, acts violently upon glass; it decomposes water, combining with the oxygen and setting free the hydrogen; and is of a greater specific gravity than strong sulphuric acid.

Q. Give its symbol and its chemical equivalent? — *A.* Its symbol is Ba, its equivalent 69, or, more accurately, 68·7.

Q. How is baryta (or barytes) obtained? — *A.* By decomposing the native carbonate, mixed with charcoal, by exposing it to a white heat; or by the action of heat upon the native sulphate in contact with charcoal, by which means it is converted into a sulphuret of barium, and then, by adding nitric acid, into a nitrate of baryta, which must be filtered, evaporated, crystallized, and the acid driven off by long-continued heat.

Q. What are the properties of baryta? — *A.* It is a gray powder, having a specific gravity equal to 4; fuses at a very high temperature; slakes with water like lime, but is more soluble; absorbs water from the atmosphere and becomes white; is precipitated from all its solutions by sulphuric acid, for which it is the best test; its watery solution is rendered milky, and covered with a pellicle by absorbing carbonic acid from the atmosphere; is insoluble in alcohol; is acrid and poisonous; and acts like an alkali upon vegetable colours.

Strontium. — *Q.* How is strontium obtained, and what are its properties, &c.? — *A.* It is obtained from strontia (or strontites), in the same way that calcium is procured from lime, and is a metal of a dark grey colour, decomposing water, oxidizing quickly in the air, and strongly resembling barium.

Q. Give its symbol and equivalent number? — *A.* Its symbol is Sr, its equivalent number 44 (or, accurately, 43·8).

Q. How is strontia obtained, and what are its properties? — *A.* It is obtained from the native carbonate, or sulphate, by a method similar to that for obtaining baryta; and is similar to baryta in most of its properties, but may be distinguished from it by being more soluble in boiling water, and less so in cold; by its compounds communicating a red colour to flame, and by their being destitute of poisonous properties.

Q. Which are the metals of the alkalies? — *A.* Potassium, sodium, and lithium.

Potassium. — *Q.* How is potassium obtained? — *A.* It is obtained by heating potassa, mixed with charcoal or with iron

filings, to a white heat, in an iron gun-barrel, by which means the oxygen is separated from the potassa, and combines with the iron, or with the carbon of the charcoal; and potassium is condensed in the cool part of the apparatus.

Q. What are the properties of potassium? — *A.* It is a solid, resembling silver in appearance, malleable, and soft at ordinary temperatures, and becoming brittle at 32°, breaking with a crystalline fracture; it melts at 106°, and is vaporized at a heat below redness; absorbs oxygen rapidly from the air, sometimes with flame; burns brilliantly when thrown upon water or ice, forming potassa, and a compound of hydrogen and potassium which burns with a rose-coloured flame.

Q. Give its symbol, equivalent, and specific gravity? — *A.* Its symbol is Po, or K (for kalium, from *kali*, the name for potassa); its equivalent is 40 (accurately, 39·15), and its specific gravity is 0·86.

Q. How is potassa obtained? — *A.* By lixiviation, or the formation of a lye from wood-ashes, which is then evaporated, ignited so as to destroy the colouring matter, redissolved, boiled with wine, filtered, evaporated, dissolved in alcohol, again evaporated, and melted at a red heat.

Q. What are its properties? — *A.* It is properly a hydrate of potassa; is of a grayish-white colour; has an alkaline taste; changes vegetable colours; neutralizes acids; acts as a caustic upon animal fibre; deliquesces on exposure; is soluble in water; absorbs carbonic acid from the atmosphere; and fuses at a red heat.

Sodium. — *Q.* How is sodium obtained? — *A.* It is obtained from soda in the same way that potassium is obtained from potassa.

Q. What are its properties? — *A.* It resembles potassium in its properties and appearance; but does not become brittle at 32°, and decomposes water without inflammation, and has a specific gravity of 0·97.

Q. Give the symbol and chemical equivalent of sodium? — *A.* Its symbol is So, or Na (from *natrium*, the German name of sodium), its equivalent is 24 (or 23·3).

Q. Whence is soda obtained, and what are its properties? — *A.* It is obtained from the ashes of sea-weeds, or from sea-salt (chloride of sodium), or from Glauber's salt (sulphate of soda), and resembles potassa in its properties, but may be distinguished by its effloresceing, instead of deliquescing; by being less soluble than potassa (although its salts are more soluble than those of potassa); by potassa forming a yellow precipitate

with chloroplatinic acid, which soda does not; and by potassa being precipitated by citric acid.

Q. What are the names of the metals proper? — *A.* Gold, platinum, silver, mercury, copper, lead, tin bismuth, iron, zinc, arsenic, antimony, palladium, rhodium, iridium, osmium, nickel, cadmium, chromium, cobalt, columbium, manganese, molybdenum, titanium, tungsten, uranium, cerium, and vanadium.

Gold. — *Q.* How is gold obtained? — *A.* It is found pure, or else combined with other metals; from which it may be obtained by dissolving it in nitro-muriatic acid, and precipitating the gold by sulphate of iron; or by the action of nitric acid, or of heat and air (as in cupellation), by which the other metals are oxidized.

Q. What are the properties of gold? — *A.* It is the most malleable and ductile of all metals; fuses at a white heat; is not oxidized or volatilized except by the aid of electricity; is not soluble except in nitro-muriatic acid; its chloride is decomposed by sulphuric ether, which holds the gold in solution; it is also precipitated from its oxides in the metallic form by phosphorus, carbon, the baser metals, and by hydrogen and its compounds; and combines with oxygen and ammonia to form muriate of ammonia or fulminating gold.

Q. Give its symbol, specific gravity, and chemical equivalent? — *A.* Its symbol is Au, its specific gravity is 19·3, its equivalent 200 (or 199·2).

Q. What is the best test for gold? — *A.* Protoxide or sesquioxide of tin, which throws down a purple precipitate, called the *purple of Cassius.*

Platinum. — *Q.* How is platinum obtained? — *A.* It is obtained from the native grains by dissolving it in chlorohydric or muriatic acid, by which means chloroplatinic acid is formed, from which pure platinum may be obtained by adding chloride of potassium, igniting the precipitate, redissolving, precipitating by muriate of ammonia, and again igniting, and, finally, by heat and pressure, condensing the *sponge* thus obtained.

Q. What are the properties of platinum? — *A.* It resembles silver in colour; is the heaviest of all metals, having a specific gravity equal to 21·53; is less malleable and ductile than gold; is capable of being welded at a high temperature, like iron; is not oxidized nor melted by the heat of a furnace, but is melted and oxidized by the galvanic battery, or by the compound blowpipe; is not a good conductor of heat: at high temperatures it combines with most of the metals, particularly lead and tin, and also with the hydrates of the alkalies; and when in the form of

platinum sponge (providing it be dry), possesses the property of igniting a mixture of hydrogen and oxygen gases.

Q. Give its symbol and chemical equivalent? — *A.* Its symbol is Pl, its equivalent 98·8.

Q. What is the best test for platinum? — *A.* Protomuriate of tin, which throws down a claret-coloured precipitate.

Silver. — *Q.* How is silver obtained? — *A.* It is obtained from the alloys in which it exists by amalgamation with mercury; or by cupellation or oxidation of the more oxidizable metal in a cupel; or when it is alloyed with gold, it may be separated by nitric acid (which acts upon silver, but not upon gold), provided that (if more than one-fourth of the alloy be gold), sufficient silver be added to make up the proper proportion. (This process is called quartation; and the separation by means of nitric acid is called parting.)

Q. What are the properties of silver? — *A.* It is of a white colour and brilliant lustre; is very malleable, ductile, and soft when pure; is the best conductor of heat; fuses at a low white heat; is more easily tarnished by exposure than gold, and is blackened by sulphur and chlorine; is fused, oxidized, and dissipated by the compound blowpipe; and is dissolved by nitric acid, but not by chlorohydric acid, nor by sulphuric acid, unless at a boiling heat.

Q. Give its symbol, specific gravity, and chemical equivalent? — *A.* Its symbol is Ag (from *argentum*, silver); its specific gravity is 10·5; its equivalent number, 108.

Q. What are the precipitants of silver? — *A.* The chlorides, which throw down a white precipitate; and also the phosphates, chromates, and salts of arsenic, copper, and mercury.

Q. What is its most important compound? — *A.* Nitrate of silver or lunar caustic, consisting of one proportion of silver and one of nitric acid.

Mercury. — *Q.* How is mercury obtained? — *A.* It is obtained by distillation from cinnabar (which is a native sulphuret or sulphide of mercury) in contact with lime or iron filings, with which the sulphur combines, while the mercury is carried over pure.

Q. What are its properties? — *A.* It is a metal of a colour and lustre resembling silver; but is liquid at ordinary temperatures, from which circumstance it has derived the name of quicksilver; is solidified at —39°, and boils at 600°; is not oxidized by exposure to air and moisture, unless adulterated with other metals, or in the form of vapour; when agitated for a long time in a bottle containing air, it forms an oxide called *Ethiops'*

mineral per se, owing probably to the presence of some other metal.

Q. What effects are produced upon mercury by acids? — *A.* It is dissolved by nitric acid, forming a nitrate; and when boiled with sulphuric acid, it takes oxygen from a portion of the acid, and the oxide thus formed combines with the remaining acid to form a sulphate; but mercury is not affected by any other acids.

Q. Give the symbol, specific gravity, and chemical equivalent of mercury? — *A.* Its symbol is Hg (from *hydrargyrum*); its specific gravity when liquid is 13·6, when solid, 14·4; its equivalent is 202.

Q. What compounds does mercury form with oxygen? — *A.* Protoxide or black oxide, consisting of mercury and oxygen, each, one proportion; and peroxide or binoxide of mercury or red precipitate, consisting of one of mercury and two of oxygen.

Q. How is the protoxide formed? — *A.* The protoxide is formed by digesting protochloride of mercury or calomel in an alkaline solution; by which means a chloride of the alkali is formed, and protoxide of mercury is precipitated in the form of *black wash.*

Q. What are the properties of the protoxide? — *A.* It is a black powder, which is converted, by exposure to light or heat, into binoxide and metallic mercury; is insoluble in water, and is precipitated from its salts by the alkalies.

Q. How is the binoxide or peroxide of mercury formed? — *A.* By long exposure to a heat sufficient to cause gentle ebullition, allowing the access of air.

Q. What are its properties? — *A.* When in the form of scales it is bright red, but, when powdered, is of an orange or yellow colour; is slightly soluble in water; and forms, with ammonia, a fulminating compound.

Q. What are the most important salts of mercury? — *A.* The nitrate; formed by the action of nitric acid upon mercury; the subsulphate, or *Turpeth mineral*, or yellow sulphate of mercury, consisting of four proportions of the binoxide of mercury and three of sulphuric acid; formed by throwing the bi-persulphate or bisulphate of the peroxide or binoxide into hot water; and the bipersulphate, formed by mixing mercury, sulphuric and nitric acids, and evaporating to dryness; the nitric acid furnishing the oxygen.

Q. What compounds does mercury form with chlorine? — *A.* Protochloride of mercury or calomel, consisting of one pro-

portion of mercury and one of chlorine ; and bichloride or deutochloride of mercury, or *corrosive sublimate*, consisting of one proportion of mercury and two of chlorine.

Q. How is the protochloride of mercury obtained ? — *A.* By mixing the nitrate of the protoxide of mercury in solution with chlorohydric acid, or a soluble chloride ; or by mixing protosulphate of mercury and chloride of sodium, and subliming ; by which means the chlorine and mercury are sublimed together in the form of protochloride of mercury, while the oxygen and sulphuric acid previously united with the mercury, now unite with the sodium to form sulphate of soda.

Q. What are the chemical properties of the protochloride ? — *A.* It is a solid, of a white colour, tasteless, inodorous, insoluble ; not altered by exposure to air, if it be kept from the light, and is decomposed by the alkalies and alkaline earths, and their carbonates, by soaps and by sulphydric acid.

Q. How is bichloride formed ? — *A.* By heating mercury in chlorine until it ignites ; or by mixing bisulphate of the peroxide of mercury with chloride of sodium (or common salt), in the proportion of one of the bipersulphate to two of the chloride ; when, by the action of heat, the two proportions of sodium give up their chlorine to the single proportion of mercury, which is sublimed as the bichloride of mercury, while the two proportions of oxygen from the single proportion of peroxide of mercury combine with the two proportions of sodium to form two proportions of soda, with which the two proportions of sulphuric acid unite to form two proportions of sulphate of soda.

Q. What are the properties of the bichloride of mercury ? — *A.* It is a semitransparent, crystalline solid, of an acrid burning taste ; is soluble in water, alcohol, and ether ; is poisonous in its effects ; forms, with muriate of ammonia, a soluble double salt called *sal alembroth ;* is decomposed by albumen and gluten, which convert it into calomel ; is decomposed by ammonia, which throws down white precipitate, consisting of ammonia, binoxide, and bichloride of mercury ; is decomposed by alkalies, which, when in excess, throw down a yellow hydrated binoxide, and when deficient, a brick-red precipitate, composed of bichloride and binoxide of mercury ; is also decomposed by sulphydric acid, which throws down black sulphide (or sulphuret) of mercury.

Q. What is Ethiops' mineral ? — *A.* A mixture of the bisulphide of mercury with sulphur, which is formed by rubbing mercury and sulphur together ; and is called by the Pharmacopœia, hydrargyri sulphuretum nigrum.

Q. What is artificial cinnabar? — *A.* A bisulphide of mercury, formed by melting one proportion of sulphur, and gradually adding from five to seven of mercury, and then subliming.

Q. What are its properties? — *A.* It is crystalline, and fibrous in its texture; insoluble in water and in alcohol; of a deep red colour; when powdered it is of a brilliant red, and forms the pigment called vermilion; is decomposed by heat; is also decomposed by nitro-muriatic acid, forming chloride of sulphur and bichloride of mercury; but is not acted on by nitric, muriatic, or sulphuric acids.

COPPER. — *Q.* How is copper obtained? — *A.* It is obtained principally from the native sulphide, by volatilizing the sulphur by means of heat; and as the metal is oxidized by this process the oxide must be decomposed by heat and charcoal.

Q. What are the properties of copper? — *A.* It is a malleable, ductile, elastic, and very tenacious metal, of a red colour; fuses at a white heat; is not tarnished by exposure to air, unless moisture be present, when its surface is converted into a carbonate of the black oxide; it is acted upon with difficulty by sulphuric and chlorohydric acids; but is violently acted upon by nitric acid; its specific gravity is 8·895, its symbol Cu, (from *cuprum*), and its equivalent is 32, or accurately 31·6.

Q. What are the more important alloys of copper? — *A.* *Bronze*, consisting of copper and tin; *bell-metal*, consisting of copper, with a larger proportion of tin than exists in bell-metal; and *brass*, consisting of copper and zinc.

Q. What are the tests for copper? — *A.* Polished iron or steel, upon which copper is precipitated from its solutions; ammonia in excess, which produces a blue colour arising from ammoniated copper; cyanoferrite or ferrocyanuret or ferrocyanide of potassium, which precipitates a reddish-brown cyanoferrite of copper; and albumen, which throws down a yellowish-white precipitate.

Q. What compounds does copper form with oxygen? — *A.* The di or din-oxide, consisting of two proportions of copper and one of oxygen, formed spontaneously upon the surface of copper which has been exposed to air and moisture, and is of a dull red colour; the protoxide, consisting of equal proportions of copper and oxygen, is of a brownish-black colour, and is formed by heating copper to redness in contact with air; and the superoxide, consisting of one proportion of copper and two of oxygen, formed by mixing deutoxide of hydrogen (oxygenated water) with a weak solution of nitrate of copper, decomposing

the nitrate by an alkali, washing the precipitate, which is of a brownish-yellow colour, and drying it in the vacuum of an air-pump.

Q. What is the most important salt of copper? — *A.* Sulphate of copper or *blue vitriol*, formed by boiling sulphuric acid upon copper.

Q. What is ammoniated copper? — *A.* A compound formed by rubbing together sulphate of copper and carbonate of ammonia; it is of a deep blue colour, and consists of ammoniacal sulphate, and ammoniacal carbonate of copper.

Q. What is the verdigris of commerce? — *A.* A mixture of the neutral acetate and the subacetate of copper.

Q. What name has been given to the crystals of the neutral acetate of copper? — *A.* Crystals of Venus, or distilled verdigris.

LEAD. — *Q.* From what source and in what way is lead obtained? — *A.* It is obtained principally from a native sulphide (or sulphuret) called Galena; by exposing the ore to heat and air in a reverberatory furnace; by which means the sulphur is converted into sulphurous acid, which escapes; while a part of the lead is obtained pure, and a part of it in combination with oxygen, from which it may be separated by heating it in contact with charcoal.

Q. What are the properties of lead? — *A.* It is a solid, of a bluish-gray colour; and when cut, has a brilliant metallic lustre, which is soon dulled by a coating of carbonate of protoxide of lead, which forms upon its surface, owing to the carbonic acid of the atmosphere; it is very malleable and ductile, but not very tenacious; fuses at 600°, is dissolved by nitric and oxidized by boiling sulphuric acids; and is precipitated from its solutions by sulphydric acid or sulphuretted hydrogen.

Q. Give its symbol, specific gravity, and chemical equivalent. — *A.* Its symbol is Pb (from *plumbum*); its specific gravity, 11·352; its equivalent is 104, or, more accurately, 103·6.

Q. What are the combinations of lead with oxygen? — *A.* Dinoxide, obtained by decomposing oxalate of lead by heat, is of a gray colour, and consists of two proportions of lead and one of oxygen; protoxide, or *massicot*, obtained by collecting the dross from lead melted in open air, and exposing it to heat until it assumes a uniform yellow colour; it consists of one proportion of lead and one of oxygen; binoxide, consisting of one proportion of lead and two of oxygen; and red oxide or *minium*, consisting of three proportions of lead and four of oxygen,

formed by heating the protoxide nearly to redness, and allowing it gradually to cool; by which means three proportions of the protoxide take an additional proportion of oxygen; and from this the binoxide is formed by the action of nitric acid by which the minium is decomposed, into protoxide and bioxide, the former of which unites with the nitric acid to form nitrate of lead.*

Q. What is litharge? — *A.* It is a mixture of the protoxide with a very small proportion of red oxide; and is formed by partially melting the protoxide.

Q. What are the only important salts of lead? — *A.* The carbonate, or *white lead*, and the acetate, or *sugar of lead*.

Q. What characterizes the salts of lead? — *A.* They are precipitated by sulphydric acid, and by all the soluble salts of other metals, except those salts formed by nitric or acetic acids.

Q. To what are the poisonous effects produced by water conveyed through leaden tubes, to be attributed? — *A.* To the formation of a carbonate of the protoxide, which is slightly soluble in water that does not contain any salt in solution.

Q. What is plumbum corneum? — *A.* A solid resembling horn; formed by melting the chloride of lead.

Tin. — *Q.* How is tin usually obtained, and what are its properties? — *A.* It is usually obtained from the native oxide by the action of heat and charcoal, and is a very malleable and ductile solid, of a lustre resembling silver; is flexible, but inelastic, emitting a crackling noise when bent; is not oxidized by exposure to air or moisture; is oxidized with violence, but not dissolved, by nitric acrid; melts at 442°; and when heated to whiteness, takes fire and is converted into a peroxide.

Q. Give its symbol, specific gravity, and chemical equivalent. — *A.* Its symbol is Sn (from *stannum*); its specific gravity 7·9; its equivalent, 59; or, accurately, 58·9.

Q. What is the fuming liquid of Libavius? — *A.* A liquid bichloride of tin, emitting dense suffocating fumes.

Q. What are the only other remarkable compounds containing tin? — *A.* The bisulphide, or mosaic gold (*aurum musivum*), sometimes applied to the cushions of electric machines to in-

* The red oxide or minium, consisting of three of lead and four of oxygen, is equivalent in composition to two proportions of the protoxide (each proportion consisting of one of lead and one of oxygen), and one proportion of binoxide, consisting of one of lead and two of oxygen; thus —

2 of protoxide = $Pb^2 + O^2$
1 of binoxide = $Pb^1 + O^2$
= 1 of red oxide = $Pb^3 + O^4$

crease their exciting power; and the protoxide and sesquioxide of tin, used as tests of gold; precipitating the purple of Cassius, the mixture of the peroxide of which is tin, and protoxide of gold.

Bismuth. — *Q.* How is bismuth obtained? — *A.* It is obtained by fusion from its ores, in which it exists native; and is purified by dissolving it in nitric acid, precipitating it in the form of subnitrate, by mixing it with water; and, finally, reducing it by heat and charcoal.

Q. What are the properties of bismuth? — *A.* It is a solid, of a reddish-white colour, and considerable lustre; is crystalline; brittle when cold, but malleable when heated; is not oxidized by air without moisture or heat; fuses at 476°, and at a higher temperature is vaporized, and burns with a bluish-white flame; is acted on with difficulty by sulphuric or chlorohydric acids, but is violently oxidized and converted into a nitrate by nitric acid.

Q. Give its symbol, specific gravity, and chemical equivalent. — *A.* Its symbol is Bi; its specific gravity, 9·82; its equivalent, 71.

Q. What is the subnitrate of bismuth? — *A.* It is a white powder, tasteless, and slightly soluble in water; called, also, white oxide or *magistery of bismuth;* formed by throwing the nitrate into water; and consisting of oxide of bismuth, combined with a small proportion of nitric acid.

Iron. — *Q.* How does iron exist in nature? — *A.* In the form of oxides or sulphides; and is sometimes found native in ærolites or minerals of meteoric origin.

Q. What peculiar property resides in some of its ores? — *A.* The magnetic property.

Q. How is it usually obtained? — *A.* By heating its ores with charcoal and lime; which latter combines with the impurities of the ore, and forms a glass or *slag*, through which the melted iron sinks and is drawn off.

Q. What are the properties of iron? — *A.* It is of a well-known colour; has considerable lustre when polished; is easily oxidized by moist air; is very hard and tenacious; is very malleable and ductile, especially when heated; is hardened by being heated and suddenly cooled; is fused with difficulty; is capable of being welded; and is acted upon with difficulty by pure acids.

Q. Give its symbol, specific gravity, and chemical equivalent. — *A.* Its symbol is Fe (from *ferrum*); its specific gravity, 7·788; and its equivalent, 28.

Q. What are the compounds of iron with oxygen? — *A.* Protoxide, obtained by precipitation from the sulphate of the protoxide, or green vitriol, consisting of iron and oxygen, each one equivalent; per, sesqui, or red oxide, or colcothar, found native in hæmatite (or formed by heating the sulphate), consisting of two equivalents of iron and three of oxygen; and black or magnetic oxide, formed by exposing iron at a red heat to steam, and consisting of three of iron and four of oxygen, or of a mixture of equal parts of the protoxide and peroxide.

Q. What are the peculiar characteristics of the protoxide? — *A.* The protoxide is of a blue colour; is converted into peroxide, when exposed to air, by absorbing oxygen; is not changed in colour by nutgalls; but is precipitated in the form of a black sulphide of iron, by the alkaline sulphydrates, as a white hydrate by the alkaline carbonates, and a white cyanoferrite by cyanoferrite of potassium.

Q. What are the properties of the peroxide? — *A.* It is of a dull red colour; forms, with the acids, salts of a red colour; is precipitated from its solutions by the alkalies and alkaline carbonates, forms Prussian blue with cyanoferrite (ferrocyanuret) of potassium, and forms with sulphocyanhydric, or with meconic acid, a red, and with infusion of galls, a dark blue colour.

Q. With what other substances does iron combine? — *A.* With all the simple basacigen bodies, with cyanogen, and with carbon.

Q. What are the most important of these compounds? — *A.* The protiodide, which is used in medicine; the sulphide or sulphuret or iron pyrites, which is found native; and the compounds of iron with carbon, in the form of cast iron and steel.

Q. What are the most important salts of the oxide of iron? — *A.* The sulphate of iron or green vitriol, the carbonate, the tartrate, the acetate, the muriate or chlorohydrate, and the phosphate; all of which are used principally in medicine.

ZINC. — *Q.* How is zinc usually obtained? — *A.* It is procured from *calamine*, or the native carbonate; or from *blende*, or the native sulphide, by heating it with charcoal.

Q. What are its properties? — *A.* It is a metal resembling lead in colour; is slightly crystalline in structure; malleable at a temperature of between 210° and 300° of Fahrenheit, but brittle at high or low temperatures; melts at 680°, according to some chemists, and at 773°, according to others; crystallizes when allowed to cool after fusion; is sublimed at a very high

temperature; is slightly oxidized by exposure to air, and moisture; but at a high heat, exposed to the atmosphere, is oxidized and volatilized with combustion; it decomposes the water in dilute sulphuric or chlorohydric acids; and takes from one portion of nitric acid its oxygen to form an oxide, with which the rest of the acid combines to form a nitrate.

Q. Give its commercial name, its symbol, specific gravity, and chemical equivalent. — *A.* It is sometimes called *spelter*, in commerce; its symbol is Zn; its specific gravity, 6·86; its equivalent, 32·3.

Q. What are the principal compounds of zinc with oxygen and chlorine? — *A.* Protoxide of zinc, otherwise called *flowers of zinc*, *nihil album*, and *lava philosophica*, a light fleecy substance of a white colour, formed by the combustion of zinc, or by precipitation from the sulphate by liquid ammonia, and consisting of zinc and oxygen, each one proportion; and chloride of zinc, called also *butter of zinc*, formed by burning zinc in chlorine, and consisting of one proportion of zinc and one of chlorine.

Q. What are the only important salts of zinc? — *A.* The acetate and the sulphate of zinc, or *white vitriol.*

Q. What is a test for detecting the presence of zinc? — *A.* Pure potassa or ammonia, which throw down a white precipitate, which is redissolved by adding the alkali in excess.

Arsenic. — *Q.* How is arsenic obtained? — *A.* It is obtained from an ore, called in commerce *cobalt* (consisting of arsenic in the form of an oxide, combined with cobalt), by distillation.

Q. What are its properties? — *A.* It is excessively brittle; of a colour and lustre resembling steel; burns with an odour resembling garlic, at 356°, and cannot be melted without a pressure exceeding that of the atmosphere; if volatilized in the open air, is converted into an oxide; is tarnished by partial oxidizement when exposed to air and moisture, and is closely oxidized and dissolved by being boiled in water.

Q. What are the most important compounds of arsenic with other substances? — *A.* Arsenious and arsenic acids, and arseniuretted hydrogen.

Q. Give the composition and properties of arsenious acid. — *A.* It is formed by igniting arsenic in the air, consists of two proportions or equivalents of arsenic and three of oxygen; it is of a white colour, whence it has been called *white arsenic*, or *white oxide of arsenic*; has a taste at first slightly acid, then sweetish; reddens vegetable colours; slightly soluble in water; when heated in open vessels, sublimes at 380°, but, if

in close vessels, fuses, becomes opaque, more soluble in boiling water, and has an alkaline reaction with vegetable colours; when digested with nitro-muriatic or strong nitric acid, and the solution evaporated, it takes two additional proportions of oxygen, and is changed into arsenic acid; it is a virulent poison, and is the form in which arsenic is usually employed for that purpose.

Q. Describe the formation and properties of arsenic acid. — *A.* It is formed by digesting arsenious acid in nitro-muriatic or strong nitric acid, and then expelling the nitric acid by heat; consists of two proportions of arsenic and five of oxygen; is a white solid; acts as a caustic upon animal fibre; reddens vegetable blues; is more soluble than arsenious acid; is deliquescent; is first melted into a glass, and afterwards decomposed into arsenious acid and oxygen by heat; is poisonous; and is more virulent and energetic in its properties than arsenious acid.

Q. What is Fowler's solution? — *A.* An arsenite of potassa, formed by boiling together arsenious acid and carbonate of potassa in distilled water.

Q. What is arseniuretted hydrogen? — *A.* It consists of arsenic and hydrogen, in the proportion of two to three; may be obtained by adding arsenic to the materials for generating hydrogen (see *Hare's Compendium*, p. 187); is an inflammable gas, burning with a bluish-white flame, with the odour of arsenic; and is fatal to life, though destitute of acid qualities.

Q. What are the other important compounds of arsenic? — *A.* The sesquichloride, which resembles the *fuming liquor of Libavius;* the protosulphide, or *realgar*, which is of a red colour; and the sesquisulphide, called also *orpiment*, forming the colouring matter of *king's yellow.*

Q. Give the symbol, specific gravity, and chemical equivalent of arsenic. — *A.* Its symbol is As; its specific gravity, 5·8843; its chemical equivalent, 37·7.

Q. What are the ordinary tests for detecting the presence of arsenic? — *A.* Sulphydric acid, which precipitates from arsenious acid, the yellow sesquisulphide or orpiment, and from arsenic acid, a yellow precipitate resembling orpiment, but containing more sulphur; ammoniacal nitrate of silver, which precipitates from solutions containing arsenious acids, the yellow arsenite of silver, and from arsenic acid, the brick-red arseniate; ammoniacal nitrate of copper, which precipitates from arsenious acid, a green arsenite of copper, called *Scheele's green;* but the most accurate method is to put the suspected material into the self-generating reservoir (see *Hare's Compendium*, p. 187), together with the materials for generating hydrogen, and upon

inflaming the jet of arseniuretted hydrogen thus produced, and holding a cool porcelain plate over the flame, a *tache* or ring of metallic arsenic will be condensed upon the plate.

Q. What different treatment is necessary where organic matter is present, as in cases of poisoning? — *A.* The stomach, intestines, &c., supposed to contain arsenic, together with their contents, must be thrown into water, evaporated at a moderate heat, and when dry treated with strong nitric acid, which carbonizes and reduces the bulk of the mass, and converts the arsenic, if it be in the form of arsenious acid, into the more soluble and less volatile arsenic acid; then, on digesting the whole in water, the arsenic acid may be precipitated as arseniate of lime, by adding lime-water; the arseniate of lime should then be dried, mixed with one-fourth its weight of charcoal, and placed in the sealed extremity of a long and narrow tube, whose other extremity is open; care should be taken to wipe the tube dry by means of cotton-wick wound upon a wire; heat is then applied to the tube, beginning at the open and proceeding toward the sealed extremity, and the resulting moisture carefully removed by the cotton-wick; the heat is then reapplied to the sealed extremity, and carried as high as the tube will bear without melting, when the arsenic will be deposited in minute crystals, at the part of the tube beyond the part that was heated.

Antimony. — *Q.* How is antimony obtained? — *A.* It is obtained from the native sulphide (anciently called *stibium*, which is the antimony of commerce), by mixing it with bitartrate of potassa and nitrate of potassa, and throwing the mixture into a red hot crucible.

Q. What is the *rationale* of this process? — *A.* The oxygen of the nitrate converts the sulphur into sulphurous acid; the carbon of the tartaric acid unites with the oxygen; while the potassa acts as a flux in promoting the fusion of the antimony, which subsides to the bottom of the crucible.

Q. What further process is necessary? — *A.* It must be purified by dissolving it in nitro-muriatic acid; precipitating it in the state of oxychloride, by throwing it into water; and reducing it again, by ignition with bitartrate of potassa.

Q. Give the commercial name and chemical properties of antimony. — *A.* Metallic antimony is called, in commerce, *regulus of antimony;* it is of a silvery colour; is very brittle; emits an odour when rubbed; fuses at 810°; is not sublimed at a white heat in close vessels; but in the open air, it takes fire at a white heat and burns with a white light, condensing in

minute crystals of the sesquioxide, called *argentine flowers of antimony;* boiling sulphuric acid and nitric acid are partially decomposed by antimony, which forms thus an oxide, with which the remaining acid combines.

Q. Give the symbol, specific gravity, and equivalent number of antimony. — *A.* Its symbol is Sb (from *stibium*); its specific gravity, 6·7; its equivalent number, 64·6.

Q. What is the test for antimony? — *A.* Sulphydric acid, which precipitates Kermes's mineral, which is known by its orange-yellow colour.

Q. What are the most important compounds of antimony? — *A.* The sesquioxide, consisting of two equivalents of antimony and three of chlorine, formed by throwing the sesquichloride into water, which precipitates the oxychloride of antimony or *powder of Algaroth*, which, by digestion with carbonate of potassa, yields the sesquioxide; and the sesquichloride, or *butter of antimony*, consisting of two equivalents of antimony and three of chlorine, formed by burning antimony in chlorine gas, or by distilling a mixture of antimony and corrosive sublimate.

Q. What are the compounds known as red antimony, glass, liver, crocus of antimony? — *A.* Compounds of oxide and sulphide of antimony.

Q. What are *Kermes's mineral*, and *golden sulphur* of antimony? — *A.* Substances whose composition is somewhat uncertain, probably consisting of hydrated sesquisulphide and sesquioxide of antimony.

SALTS.

Q. What other classes of salts are sometimes admitted, beside compounds consisting of an acid and a base? — *A.* Binary compounds of a halogen body and a metal; and compounds of acids with organic bases.

Q. Which is the most numerous and important class of salts? — *A.* The *oxysalts*, or those whose acids contain oxygen as their electro-negative.

Q. What are the peculiar properties of the nitrates? — *A.* They deflagrate with charcoal, sulphuric, and other combustibles, with which their oxygen combines to form carbonic acid, sulphuric acid, &c.; when added to liquid chlorohydric acid, they free the chlorine and enable it to dissolve gold; when dry, they emit nitric acid fumes, if subjected to concentrated sulphuric acid; and such of them as are neutral are soluble, and, generally, deliquescent.

Q. What are the distinguishing characters of the sulphates? —*A.* They are precipitated from their solutions by baryta; yield their oxygen, when heated with charcoal or hydrogen, being converted into sulphides or sulphurets; and are almost all of them insoluble in alcohol.

Q. What are the distinguishing qualities of the carbonates? —*A.* They are decomposed by almost all the acids, yielding carbonic acid with effervescence; are decomposed, also, by heat, except the carbonates of the proper alkalies, and of barium and strontium; and all the carbonates except those of soda, potassa, and ammonia, are sparingly soluble in water.

ORGANIC CHEMISTRY OF VEGETABLES.

Q. What is meant by the proximate and ultimate principles of vegetables? —*A.* Every distinct compound (as sugar, starch, morphia, quinia, &c.), existing already formed in a vegetable, is called a proximate principle; its ultimate principles are those simple elements (as carbon, hydrogen, &c.), beyond which analysis cannot be carried.

Q. What particular elements or ultimate principles exist in almost every vegetable substance? —*A.* Carbon, hydrogen, and oxygen; although oxygen is absent from some vegetable substances (as the essential oils, caoutchouc, &c.); and hydrogen from others (as in oxalic acid, &c.).

Q. What other ultimate principles are found in vegetables? —*A.* The vegetable alkaloids (morphia, quinia, brucia, strychnia, &c.), contain nitrogen; and magnesium, calcium, potassium, sodium, silicon, &c., are found to exist in minute quantity, in very many vegetable products.

Q. What effect is produced upon vegetable substances by heat? —*A.* They first yield the water and essential oils existing in them; at a higher heat, pyrolignous acid, carbonic oxide, and compounds of carbon and hydrogen; if nitrogen be present, it unites with hydrogen to form ammonia; and if heat and pressure be employed together, the vegetable matter is converted into a species of bitumen, resembling that of coal; but if burned in the open air, water and carbonic acid are the only products.

Q. How may the analysis of vegetable or other organic matter be accomplished? —*A.* By heating the substance with oxide of copper, by which the carbon and hydrogen are oxidized, and the nitrogen (if any be present), is set free.

Q. How are the ultimate elements of vegetable matter arranged? —*A.* They are combined in groups, which unite with

each other, just as if they were simple or ultimate elements. (Thus, oxalic acid is composed of two equivalents of carbon and three of oxygen, not combined directly, but as carbonic acid and carbonic oxide, acting as compound radicals.)

Q. What are some of the compound radicals, or groups which act as radicals? — *A.* Carbonic oxide, cyanogen, benzule, acetyl, formyl, ethyl, amide, methyl, &c.

Vegetable Acids.

Q. What are the peculiar characteristics of the vegetable acids? — *A.* They contain a greater proportion of oxygen than of hydrogen; most of them can be obtained solid; most of them are soluble in water, and very many of them in alcohol; they are separated by heat into their ultimate elements; they redden vegetable blues; combine with bases to form salts; are generally converted by nitric acid into oxalic acid; and they abstract from sulphuric acid a portion of its oxygen.

Q. What are the constituents and properties of acetic acid? — *A.* It is said to be a hydrated trioxide of acetyl (which consists of four of carbon and three of hydrogen), its ultimate elements being four of carbon, three of hydrogen, three of oxygen, united with one proportion of water; it exists in the sap of almost all vegetables, generally combined with lime or potassa; exists in vinegar combined with water and impurities; when pure, is crystallizable, colourless, volatile, inflammable, pungent, and caustic; freezes at a lower temperature than the freezing point of water; and forms salts, almost all of which are soluble.

Q. How is it obtained? — *A.* It is obtained in the form of pyrolignous acid by the destructive distillation of wood; in which state, it is combined with creosote, resinous and other matters; it is obtained pure by distillation of its acetates, or by displacing it from its salts by sulphuric acid; and it is formed by the process termed fermentation.

Q. How is tartaric acid obtained? — *A.* It is obtained from the juice of many vegetables, in which it exists, generally, as a bitartrate of potassa, by saturating the excess of acid with chalk, and displacing the tartaric acid by sulphuric acid.

Q. What are its constituents and properties? — *A.* It is composed of eight equivalents of carbon, four of hydrogen, and ten of oxygen, with two of water (symbolically expressed thus, $C^8\ H^4\ O^{10} + 2\ H\ O$); is extremely sour, and has a tendency to unite with two bases at once, forming a triple salt, as in tartrate of antimony and potassa, or tartar emetic.

Q. Give the composition, source, and mode of obtaining citric and malic acids. — *A.* Citric acid is composed of C^{12} H^5 O^{11} + 3 H O; and is obtained from the juice of fruits of the genus citrus or lemon, by saturating it with chalk, and displacing it again by sulphuric acid; malic acid is obtained in the same way from the juice of the apple, and consists of C^5 H^4 O^5 + 2 H O.

Q. What are the properties and constituents of oxalic acid? — *A.* It is a crystalline solid, very sour, and extremely poisonous, existing in various species of sorrel, as a binoxalate of lime, or formed artificially by the action of nitric acid upon sugar, and is composed of carbonic oxide (C O), and carbonic acid ($C O^2$), of each one proportion.

(For Cyanhydric Acid, see *Carbon.*)

Q. Give the properties and composition of tannic acid (or tannin), and gallic acid. — *A.* Tannin is an uncrystallizable acid, existing in the bark of many vegetables; is very astringent, forming an insoluble compound with gelatin, and precipitating the alkalies and metallic oxides; and is composed of C^{18} H^{15} O^9 + 3 H O. Gallic acid exists in nut-galls, and in many vegetables, in union with tannin; gives a dark-blue colour with iron, forming ink; and is composed of C^7 H O^3 + 2 H O.

Q. Where does meconic acid exist, and what are its properties and constituents? — *A.* It exists in opium as a meconate of morphia; is precipitated by salts of lead, and produces a red colour with iron, thus furnishing a test for opium; and is composed of C^{14} H O^{11} + 3 H O.

Q. What is benzoic acid? — *A.* A concrete, volatile acid, forming an essential constituent of the balsams, and consisting of one proportion of benzule or benzyl (C^{14} H^5 O^2), and one of oxygen.

VEGETABLE ALKALIES, OR ALKALOIDS.

Q. What characterizes the vegetable alkalies as a class? — *A.* They all contain nitrogen; are decomposed by a moderate heat; are but slightly soluble in water; do not form soaps with oil; they all contain hydrogen in quantity exceeding that requisite for forming water with the oxygen they contain; and are all obtained by dissolving in a slightly acid menstruum, precipitating by an inorganic alkali, dissolving in pure boiling alcohol, and evaporating the alcohol.

Q. What are the most important of these alkalies? — *A.* Morphia, quinia, strychnia, veratria, brucia, emetia, and sabadilla or sabadillin.

GUM, SUGAR, STARCH, AND LIGNIN. — *Q.* What are the ge-

neral properties of the gums? — *A.* They form a clammy, adhesive solution with water; are insoluble in ether, and in alcohol, which also precipitate them from water; contain hydrogen and oxygen in the proportions that form water; are decomposed by sulphuric acid, forming water, acetic acid, and charcoal; and when boiled with concentrated nitric acid, yield a peculiar acid, called mucic, or saccholactic.

Q. To what are the different properties of the different kinds of gums owing? — *A.* To certain proximate principles, viz., arabin, bassorin, and cerasin; the first of which exists in gum arabic and gum senegal, and is soluble in cold water; the second exists in gum bassora and gum tragacanth, which swell into a jelly but do not dissolve in water; the third exists in the gum of the cherry, peach, and other trees, and is insoluble in cold, but soluble in boiling water.

Q. What are the formulæ representing the composition of these proximate principles? — *A.* That of arabin is $C^6 H^5 O^5$; that of bassorin, $C^{10} H^{10} O^{11}$; that of cerasin is the same as that of arabin, with which it is isomeric, and into which it is changed by solution in boiling water.

Q. What are the two forms in which sugar occurs? — *A.* Crystallizable sugar, and syrups which cannot be crystallized. (Molasses, for example.)

Q. What are the essential properties of all the kinds of sugar? — *A.* The property of imparting a sweet taste, and the property of undergoing vinous fermentation. (Liebig asserts that all sugars before undergoing vinous fermentation are converted into *grape sugar*.

Q. What are the different kinds of sugar? — *A.* Cane sugar, or that obtained from the sugar-cane; grape sugar, existing in grapes, and other fruit, and also in honey; mushroom sugar; liquorice sugar; and mannite, or sugar of manna. (There are also two animal sugars, viz., sugar of milk, or *lactin*, and the sugar found in diabetic urine.)

Q. What are the proportions of hydrogen, oxygen, and carbon in the different kinds of sugar? — *A.* In their anhydrous state they contain the same number of proportions of carbon, hydrogen, and oxygen (and consequently oxygen and hydrogen, in the proportions which form water); except mannite, in which there is an additional proportion of hydrogen.

Q. What are the properties and constituents of fecula? — *A.* It is a white nutritious substance, obtained from various vegetables, and found in commerce under the names of *starch*, *sago*, *tapioca*, *arrow-root*, &c.; consisting of globules, which are soluble in hot, but insoluble in cold water, which is attributed

to the insolubility of the membrane which envelopes the globule; is rendered soluble by trituration with potash; is precipitated from solution by lead, and by gallic acid; is insoluble in alcohol or ether; strikes a purple colour with iodine; is converted by heat into a substance resembling gum; by heat and nitric acid, into oxalic acid; and by boiling with sulphuric acid, into grape sugar; its formula is C^{12} H^{10} O^{11}.

Q. What is dextrine? — *A.* A sweetish, gummy matter, into which starch is changed by digestion with malt; and which is afterwards, by a species of fermentation, converted into grape sugar.

Q. What is diastase? — *A.* It is the principle existing in malt, by which starch is converted into sugar; it has been obtained separately in the form of a white amorphous solid, soluble in water and in dilute alcohol, but insoluble in absolute alcohol; and exists in malt in the proportion of one five hundredth.

Q. What are the substances designated as vegeto-animal? — *A.* Gluten or vegetable glue, vegetable albumen, and legumen or vegetable caseine have been thus classed, because they resemble those proximate animal principles from which they are named; they all contain nitrogen, and are identical in composition with each other, and with the animal principles from which they are named.

Q. What are their distinguishing properties? — *A.* Gluten is viscid, insoluble in water or ether, but soluble in hot alcohol; vegetable albumen is not adhesive, is soluble in cold water, but is coagulated and rendered insoluble by heat; while legumen or vegetable caseine is intermediate between gluten and albumen, not being coagulable by heat like albumen, nor soluble in alcohol, and insoluble in water like gluten.

Q. What is lignin? — *A.* It is the most abundant proximate principle in plants, constituting almost the whole of their fibrous structure; is inodorous, and tasteless; insoluble in alcohol, ether, water, or the dilute acids; is converted by strong sulphuric acid, first into gum, and then into grape sugar; and by nitric acid, into oxalic, malic, and acetic acids.

Vegetable Oils.

Q. What properties distinguish the *fixed* and *volatile* oils from each other? — *A.* The *fixed* oils cannot be vaporized without decomposition; burn only when in contact with an ignited body sufficiently large to raise them to a red heat; and are capable of forming soaps with alkalies; while the *volatile*

oils, though they resemble the fixed oils as regards their solubility in ether and insolubility in water, and in their absorption of oxygen, are more inflammable; more soluble in alcohol; are capable of being distilled with boiling water without decomposition; and are incapable of forming soaps with the alkalies.

Q. What are the constituents of the fixed oils? — *A.* Oleine or elaine, consisting of the oxide of a compound radical called *glyceryl* (C^6 H^7), *oleic* acid (C^{44} H^{39} O^4), and two of water; *stearine*, consisting of oxide of glyceryl; *stearic* acid (C^{68} H^{66} O^5), and water; and *margarine*, consisting of oxide of glyceryl, *margaric* acid (C^{34} H^{33} O^3), and water.

Q. What are the distinguishing properties of these proximate elements? — *A.* Oleine constitutes the liquid parts of the oils, remains liquid at zero (Fahrenheit), and is soluble in hot or cold alcohol; stearine is a white, crystallizable solid, destitute of greasiness to the touch, and soluble in alcohol when boiling, but insoluble in cold alcohol, water, or ether; and margarine resembles stearine in its properties, except that it is more fusible, and is soluble in alcohol and ether.

Q. What takes place in saponification or the formation of a soap? — *A.* The glyceryl parts with its acid, which combines with the alkali.

Q. What are the proximate elements or constituents of the volatile oils? — *A.* They consist of a more fluid, and a less fluid oil, the former called *elaopten*, the latter, *stearopten*.

Q. How do the volatile oils differ in their composition? — *A.* Some consist merely of carbon and hydrogen, while others contain oxygen, which is owing to an acid which may be obtained separately, leaving an oil destitute of oxygen; and the ultimate constituents of all the oils destitute or deprived of oxygen is C^5 H^4.

Resins, Balsams, Gum-resins, Wax. — *Q.* From what sources are the resins obtained? — *A.* From the juices of plants in which they exist, combined with the volatile oils.

Q. What are their peculiar properties? — *A.* They are brittle when pure; but as generally obtained, are adhesive and tenacious; are insoluble in water, but generally soluble in alcohol, from which they are precipitated by adding water; are susceptible, to some extent, of saponification; cannot be distilled without decomposition; are dissolved by acetic and chlorohydric acids; are decomposed by sulphuric acid; and react with nitric acid, sometimes explosively.

Q. What is the composition of resins? — *A.* From their

resemblance to the volatile oils they are supposed to be formed by the union of volatile oils with oxygen; the proportions of their ultimate elements have not been accurately determined.

Q. What are the essential properties of the balsams? — *A.* They are native compounds of resin and benzoic acid; although substances are classed by some, as resins, which consist of a resin dissolved in a volatile oil, with or without an acid.

Q. What are the gum-resins? — *A.* They are the concrete juices of certain plaints, and consist of resin, essential oil, gum, and extractive vegetable matter; the first two of these proximate elements being soluble in alcohol; the latter two in water.

Q. What is the proper solvent of the gum-resins? — *A.* Proof spirit, which contains not quite one-half its bulk of pure alcohol.

Q. What is the substance called caoutchouc or gum-elastic? — *A.* It is the concrete juice of certain tropical plants, is soft, elastic, tenacious; insoluble in water and in alcohol; soluble in ether, in the volatile oils, in naphtha, &c.; is fusible, inflammable; decomposed by nitric and sulphuric acids; and consists of C^8 H^7.

Q. What is the nature of *vegetable* wax? — *A.* It is a solid substance, obtained from the myrtle and other plants, and is intermediate between the concrete fixed oils and the resins; and is capable of saponification, yielding oleic, stearic, and margaric acids, and glycerine.

Q. How does *animal*, or bees' wax differ from *vegetable* wax? — *A.* Animal wax is capable of only a partial saponification, and consists of a substance called *myricine*, which is insoluble in alcohol, and of *cerine*, which is soluble in boiling alcohol; it also differs from vegetable wax, in the ratio of its ultimate elements.

Naphtha, Petroleum, Bitumen, Mineral Coal, Amber. — *Q.* What is the nature of these substances? — *A.* They are substances found in nature ready formed, and supposed to be of vegetable origin; the first two being oily liquids and the rest solids; they are highly inflammable, and consist chiefly of carbon and hydrogen.

Alcohol. — *Q.* How is alcohol obtained? — *A.* It is obtained by distillation, from the fermented liquors; but in order to be absolutely free from water it must be redistilled, and mixed with chloride of calcium, and again distilled.

Q. What are its properties? — *A.* When absolute or free from water, it is a clear, colourless liquid, of the specific gravity

of 0.796° ; but the officinal alcohol contains water, and has a specific gravity of 0·835 ; it has a peculiar odour and a pungent taste ; boils at 176° F., and is said to have been frozen at 90° F. ; is highly inflammable ; is a powerful solvent, forming solutions called tinctures ; has a great affinity for water, with which it combines with an increase of temperature ; and is decomposed by combustion into carbonic acid and water ; and by being passed through a heated porcelain or copper tube, is resolved into water and olefiant gas.

Q. What are its proximate and its ultimate elements ? — *A.* It is a hydrate of the oxide of ethyl, consisting of one proportion of ethyl, (C^4 H^5,) one of oxygen, and one of water ; and its ultimate elements may consequently be represented by the formula C^4 H^5 O + Ho.

Ethers. — *Q.* What are ethers ? — *A.* Volatile, inflammable liquids formed by the reaction of alcohol with acids.

Q. How are ethers divided ? — *A.* Into *ethylic* ethers, or those containing ethyl ; and *methylic* ethers, or those containing methyl.

Q. What are the most important of the ethylic ethers ? — *A.* Common ether, or oxide of ethyl (erroneously called sulphuric ether), and hyponitrite of the oxide of ethyl, commonly called nitric or nitrous ether.

Q. What is etherine ? — *A.* It is a compound of carbon and hydrogen (C^4 H^4), of which ether was formerly supposed to be the hydrate, and is formed during the reaction of the sulphuric acid and alcohol.

Q. How does common ether differ in composition from alcohol ? — *A.* Only in being destitute of water, its formula being C^4 H^5 O. (That of alcohol is C^4 H^5 O + HO.)

Q. What is sulpho-vinic acid ? — *A.* A double sulphate of the oxide of ethyl and water, formed during the first part of the process for obtaining common ether ; consisting of two proportions of the acid, one of the oxide, and one of water.

Q. What is the oil of wine ? — *A.* It is the active ingredient in Hoffman's anodyne ; and is obtained from a mixture of sulphuric acid, oxide of ethyl, and etherine, which is generated in the process for obtaining ether, by removing the acid and the ether, by exposing them, in vacuo, first to lime, and then to sulphuric acid.

Q. What are the properties of oxide of ethyl or common ether ? — *A.* It is a colourless, transparent liquid, of a hot pungent taste and fragrant odour ; of the specific gravity 0·725 ; exceedingly volatile and inflammable ; boiling at 97°, and freezing

at — 47° ; unites with ether, in the proportion of one of ether to ten of water, and also in the proportion of one of water to thirty-six of ether.

Q. What is the composition of the nitrous or nitric ether? — *A.* It is a hyponitrate of the oxide of ethyl, consisting of one proportion or equivalent of the acid, and one of the oxide. (C^4 H^5 O + No^3.)

Q. How is it obtained? — *A.* By distilling alcohol with dilute nitric acid ; taking care to mix the materials gradually, lest the reaction be too violent.

Q. What is sweet spirit of nitre? — *A.* A solution of the nitrous or hyponitrous ether in alcohol.

Q. What is pyroxylic spirit? — *A.* A hydrated oxide of methyl, consisting of methyl (C^2 H^3), oxygen, and water (= C^2 H^3 + HO), intermediate in its properties between alcohol and ether ; and is obtained in the distillation of acetic acid from wood.

Fermentation. — *Q.* What is meant by fermentation? — *A.* A spontaneous change which takes place in certain organic substances, whereby they form new combinations of their elements.

Q. What are the principal kinds of fermentation? — *A.* The saccharine, the vinous, and the acetous fermentations.

Q. What is the saccharine fermentation? — *A.* It is the change that takes place in barley, the malting of and in the germination of plants, by which the starch existing in the germ takes two parts of water, and is converted into sugar.

Q. What are necessary for this process? — *A.* Moisture, a moderate temperature, and the presence of diastase.

Q. What is the vinous fermentation? — *A.* The process by which the sugar existing in the juice of the grape and other plants is converted into alcohol and carbonic acid. (Sugar of grapes = C^6 H^6 O^6; alcohol = C^4 H^6 O^2; carbonic acid = C^2 O^4.)

Q. What are necessary for this fermentation? — *A.* Sugar, water, a certain temperature, and the presence of yeast or some other ferment.

Q. How does the vinous fermentation of the juice of grapes and other fruits differ from that of barley? — *A.* The juice of grapes, &c., appear to contain a natural ferment, while barley requires the addition of an artificial ferment, or yeast ; and the starch of barley must first pass through the saccharine fermentation, and be converted into sugar, before it can undergo the vinous fermentation.

Q. What change must cane-sugar undergo before it is capable of the vinous fermentation? — *A.* It must pass into the form of *grape-sugar.*

Q. What is the acetous fermentation? — *A.* That process by which fermented or spirituous liquors are converted into acetic acid or vinegar.

Q. What are necessary for the production of this fermentation? — *A.* A certain degree of warmth, access to oxygen, and some substance capable of acting as a ferment.

Q. What is the *rationale* of this process? — *A.* By the oxidizing of two proportions of its hydrogen, the ethyl ($C^4 H^5$) of the alcohol is converted into acetyl ($C^4 H^3$), with which three proportions of oxygen combines to form a tritoxide, and this, uniting with water, forms a hydrate of the tritoxide of acetyl, or vinegar.

ANIMAL ORGANIC CHEMISTRY.

Q. What are the ultimate elements of animal matter? — *A.* Carbon, hydrogen, oxygen, and nitrogen, with phosphorus, sulphur, iron, lime, &c., in a less quantity.

Q. How does animal matter resemble vegetable matter in the arrangement of its ultimate elements? — *A.* They are arranged in groups, forming compound radicals analogous to the vegetable proximate principles.

Q. What is protein? — *A.* A compound radical, of which albumen, fibrin, and gelatin have been discovered to be modifications.

Q. Give its symbol, composition, properties, and the manner of obtaining it. — *A.* Its symbol is Pr; its composition is $C^{48} H^{36} N^6 O^{14}$ ($= C^{24} H^{18} N^3 O^7$); it is a yellowish, brittle mass, insoluble in water or alcohol, combining with both acids and bases; and is obtained by digesting albumen, fibrin, or gelatin in a heated solution of caustic potassa, and precipitating it by the addition of acetic acid.

Q. Where is albumen found? — *A.* It forms the white of eggs, and exists in the serum of the blood and in the secretions of the serous membranes.

Q. What is its composition and what are its properties? — *A.* It consists of protein, with a very minute proportion of sulphur, phosphorus, and earthy matters; is soluble in water, but insoluble in alcohol; is coagulated and rendered insoluble by heat; is coagulated, also, by acids, except acetic, phosphoric, and pyrophoric acids; when coagulated is redissolved by the caustic alkalies; it is also precipitated by the infusion of galls,

by acetate of lead, and by the bichloride of mercury (corrosive sublimate), for which it forms a test and an antidote.

Q. Where is fibrin found? — *A.* It is found dissolved in the blood, from which it coagulates on exposure to air; and exists coagulated in muscular fibre.

Q. What are its properties and composition? — *A.* It resembles albumen in being coagulable by heat and by acids, and in being soluble in alkaline solutions; it gives a purple colour when mixed with strong chlorohydric (muriatic) acid, and consists, like albumen, of protein, sulphur, phosphorus, and lime, but contains a larger proportion of sulphur than does albumen.

Q. What changes take place during incubation and digestion? — *A.* In incubation, albumen is changed into fibrin; in digestion, fibrin is changed into albumen.

Q. What is casein? — *A.* A substance found in milk, coagulable only by acids, and constituting almost the whole of cheese.

Q. To what is the spontaneous coagulation of milk owing? — *A.* To the presence of lactic acid, which is formed by a species of fermentation, and which then forms with caseine a coagulated lactate.

Q. How is the coagulation of milk by rennet (the mucous membrane of a calf's stomach), explained? — *A.* The membrane being in a state of decomposition, acts as a ferment, and causes the formation of lactic acid.

Q. With what are animal albumen, fibrin, and casein identical in properties and composition? — *A.* With the albumen, fibrin, and casein or legumen, found in vegetables.

Q. Of what is the coagulated portion of the blood composed? — *A.* Of fibrin, and of two compounds existing in the blood globules, viz., hæmosin and globulin, which resemble albumen in most of their properties, and the former of which contains iron.

Q. How has it been proved that the colour of the blood is not owing to the presence of iron? — *A.* The iron has been removed by strong sulphuric acid, without destroying the colour of the blood.

Q. What is contained in the serum of the blood? — *A.* Albumen; a watery liquid called the serosity, consisting of water, chloride of sodium (common salt), sulphates, phosphates, and carbonates; and fatty matter or animal oil.

Q. Of what does muscular fibre consist? — *A.* Of fibrin, mechanically mixed in its ordinary state, with blood, cellular tissue, fat, and nervous matter.

Q. Where is gelatin found? — *A.* In many of the solid parts of the body, as in the bones, ligaments, tendons, skin, and membranes; from which is obtained in an impure form as glue, and comparatively pure, as ichthyocolla or isinglass.

Q. What are the properties of gelatin? — *A.* It is soluble in water (forming jellies), and in dilute acids, but insoluble in alcohol; is precipitated by tannic acid (as in the operation of tanning); with nitric acid, it forms a compound acid; and when acted upon by sulphuric acid, yields a species of sugar which is not susceptible of vinous fermentation.

Q. How does gelatin differ from protein in composition and properties? — *A.* Its composition is equivalent to two proportions of protein, with three of ammonia, one of water, and seven of oxygen ($2\ Pr + 3\ N\ H^3 + H\ O + O^7$); but cannot be converted into albumen, fibrin, or casein, and therefore is not capable of supporting animal life, without other food.

Q. How is it then that gelatin is useful as an article of diet for convalescents? — *A.* It serves to nourish the gelatinous tissues. (Liebig, *Animal Chem.*, part iii., sec. 17–18.)

Q. What is the composition of the coats of the bloodvessels? — *A.* One proportion of protein and two of water. ($Pr + 2\ H\ O$.)

Q. What is the composition of the scales of epidermis and of the epithelium of the lining membranes, and of hair, horn, the nails, &c.? — *A.* One of protein, one of ammonia, and three of oxygen. ($= Pr + N\ H^3 + O^3$.)

Q. How do feathers differ in their composition from horn, &c.? — *A.* They contain one proportion less of oxygen. ($= Pr + N\ H^3 + O^2$.)

Q. What is the composition of the brain and nervous matter generally? — *A.* It is intermediate between fat and protein, containing more carbon than protein, but less nitrogen, and also containing phosphorus. (Nervous matter contains cerebric, oleo-phosphoric, oleic and margaric acids, and also olein, margarin, and cholesterin.)

Q. What is the composition of bones? — *A.* They contain phosphate of lime, which forms more than half their weight; gelatin, and fatty matter.

Q. How does the enamel of the teeth differ from the bone? — *A.* It contains fluoride of calcium, but not animal matter.

Q. How may the earthy matter be removed from bones? — *A.* By the action of dilute chlorohydric (muriatic) acid.

Q. With what is animal fat identical in composition? — *A.* With the vegetable fixed oils.

Q. What is the composition of milk? — *A.* It contains casein, lactin, or sugar of milk (= C^{24} H^{24} O^{24}, or C^{24} H^{19} O^{19} + 5 H O); fatty matters and volatile acids, constituting butter, water, salts, and albumen.

Q. Of what does saliva consist? — *A.* Of water, with about one per cent. of solid matter, principally saline.

Q. How does the pancreatic juice differ from saliva? — *A.* It is acid, and contains albumen and casein.

Q. What are the properties of the gastic juice? — *A.* In the empty stomach it is neutral, but during digestion becomes acid from the evolution of chlorohydric (muriatic) acid.

Q. To what are its solvent properties owing? — *A.* To the presence of a peculiar principle called *pepsin*, formed in the stomach during the fermentation induced by the presence of organic matter in a state of decomposition.

Q. What are the properties of mucus and pus? — *A.* Mucus swells, but is not soluble in water, but dissolves in a solution of caustic potassa; pus contains minute globules resembling those of the blood, and is rendered thick and ropy by caustic potassa.

Q. What is the composition of bile? — *A.* It is exceedingly complex, containing soda, water, margaric, oleic, acetic, phosphoric, chlorohydric, cholic, and other acids, together with picromel, cholesterin, &c.; and is alkaline in its reaction.

Q. Give the composition and properties of lymph. — *A.* It contains water, with more or less of albumen and chloride of sodium; and is consequently coagulated by heat, and by nitric acid.

Q. What is the composition of chyle? — *A.* It contains water, albumen, and a small quantity of fibrin.

Q. What is the composition of urine? — *A.* It is very complex and variable, but when healthy is acid or neutral (in man or in the carnivora), and is principally made up of water, urea (or cyanate of ammonia), uric acid, lactic acid, lactate of ammonia, and mucus; together with chorohydric, phosphoric, and sulphuric acids, combined with potassa, soda, and ammonia. (In the herbivorous animals the urine is alkaline; and in birds and serpents it is a soft solid, consisting principally of urate of ammonia.)

Q. What is kyestein or kiestine? — *A.* A substance formed in the urine of pregnant females; the composition of which is not ascertained.

Q. What are the names of the principal urinary calculi? — *A.* Uric acid calculus, urate of ammonia, bone earth, ammo-

niaco-magnesian phosphate, fusible calculus, mulberry calculus, xanthic oxide, and cystic oxide calculus.

Q. What are the properties of the first two species? — *A.* They are of a fawn colour, arranged in concentric layers, are soluble in caustic potassa (in which urate of ammonia gives out ammonia); soluble also in nitric acid with the aid of heat, and entirely consumed before the blowpipe.

Q. How are bone, earth, ammoniaco-magnesian phosphate, and fusible calculus known? — *A.* Bone earth is soluble in dilute acids (except acetic), insoluble in a solution of caustic potassa, and indestructible by heat; ammoniaco-magnesian phosphate is soluble in acetic acid, and precipitated by ammonia, and gives up ammonia when heated; and fusible calculus is a mixture of the two former, is white and chalky, and melted easily by the blowpipe.

Q. How is mulberry calculus known? — *A.* It is dark coloured, rough, and very hard, consisting of oxalate of lime, and is converted into carbonate of lime, by a red heat.

Q. How are xanthic and cystic oxide known? — *A.* The first is of a light brown colour, is rendered resinous by friction, dissolves in a solution of caustic potassa, from which it is precipitated by carbonic acid; the second is yellowish-white, and crystalline, and is dissolved by caustic potassa, ammonia, and by the mineral acids.

Q. What are the constituents of fæces? — *A.* Water, phosphates, and other salts, and nitrogen; and on putrefaction they form ammonia.

Q. To what process is putrefaction analogous? — *A.* To fermentation.

PART V.

MATERIA MEDICA.

Q. What is materia medica? — *A.* That science which treats of medicines.

Q. What is pharmacy? — *A.* The art of preparing them for use.

Q. What are medicines? — *A.* Articles which are used in the cure of diseases, and which as an ordinary result produce modifications of the vital powers.

Q. What influences may modify the action of medicines? — *A.* Age, sex, disease, climate, mode of life, habit, temperament, idiosyncrasies, and mental operations.

Q. In what forms are medicines used? — *A.* In powders, pills, troches, electuaries and confections. In mixtures and solutions, in liniments, cerates, ointments, plasters, cataplasms and vapours.

Q. What classification of medicines is considered the best? — *A.* That founded upon the relation they bear to the system in an healthy state.

ASTRINGENTS.

Q. What is an astringent? — *A.* A medicine which produces contraction of the living fibre.

Q. How are astringents divided? — *A.* Into vegetable and mineral.

Q. What is the peculiar astringent principle in vegetable astringents? — *A.* Tannin.

Vegetable Astringents.

Quercus. — *Q.* What are the officinal names for the varieties of quercus?—*A.* Quercus alba, or white oak; and Quercus tinctoria, or black oak.

Q. What part of these is used? — *A.* The bark.

Q. What are the sensible properties of the oak bark? — *A.* It has a feeble odour, and rough, astringent, bitterish taste.

Q. What extracts its virtues? — *A.* Water and alcohol.

Q. In what form is it used? — *A.* In powder, decoction, and extract.

Q. What is the dose of these? — *A.* In powder from xx. to xxx. grs.; decoction, f℥ij.; extract, grs. xij.

Q. Are not the leaves and acorn cups possessed of astringent properties? — *A.* Yes.

Galls—Galla. — *Q.* What are these?—*A.* Excrescences upon the young branches of the Quercus infectoria and other varieties.

Q. Where is the tree found which produces them? — *A.* In Asia Minor and the countries neighbouring.

Q. What are the varieties of galls, and which is the best? — *A.* The blue and the white. The blue is the best.

Q. What are their sensible properties? — *A.* They are astringent, bitter, and inodorous.

Q. What extracts their virtues? — *A.* Boiling water and alcohol.

Q. With what substances are they incompatible? — *A.* With the sulphuric and muriatic acids, gelatin, preparations of iron, &c.

Q. How are they used, and what are the doses? — *A.* In powder, gr. x. — xx.; infusion made ℥ss. to Oj., and the dose f℥ij. They are also used in ointments, &c.

Kino. — *Q.* What are the varieties of Kino? — *A.* The African, Jamaica, Botany Bay, and East India or Amboyna kino.

Q. Which is the variety most used, and what is it? — *A.* The East India; it is an extract.

Q. What are its characteristics? — *A.* It is in small, irregular, angulated, and shining fragments, of a dark-brown colour, and easily pulverized; and it has a bitter, astringent, and sweetish taste.

Q. To what does it yield its virtues? — *A.* To water and alcohol.

Q. What are its incompatibles? — *A.* Those of galls.

Q. How is it used, and what are the doses? — *A.* In powder from grs. x. to xxx.; infusion made with ℥ij. to f℥vj. of water; dose f℥ss. to f℥iss.

Q. What is objectionable in the tincture? — *A.* It becomes thick when long kept.

Catechu. — *Q.* From what is this derived? — *A.* From the acacia catechu as an extract.

Q. Whence does it come? — *A.* From Hindostan.

Q. What is its appearance and qualities? — *A.* It is of different shapes; the colour, externally, is brown, internally lighter; it is inodorous, and of an astringent bitter taste, and very brittle; the powder is dark brown.

Q. To what does it give its virtues? — *A.* To water and alcohol.

Q. What are its impurities? — *A.* Sand and sticks.

Q. What are its incompatibles? — *A.* The same as the preceding.

Q. How is its used? — *A.* In powder, infusion, and tincture; the latter is the only recognised officinal form.

Q. What is the dose of the tincture? — *A.* From f℥ss. to f℥iij.

Rhatany—Krameria. — *Q.* What is the name of the officinal variety, and where does it grow? — *A.* Krameria triandra, and grows in Peru.

Q. What part is officinal, and what are its peculiarities? — *A.* The root which is in pieces of various sizes, with a dark, brownish-red, fibrous, easily separable bark, and a liquorous portion less coloured.

Q. What are its sensible properties, and to what does it impart them? —*A.* It is without smell, but has a bitter, astringent, and slightly sweetish taste, all of which it imparts to boiling water and to alcohol. The colour of the powder is reddish.

Q. How is it used, and what are the doses? — *A.* It is used in powder, grs. xx.—xxx.; decoction or infusion, made ℥j. to Oj. of boiling water, f℥j.—f℥ij.; tincture, f℥j.—f℥ij.; extract, grs. x.—xv.

Logwood—Hæmatoxylon. — *Q.* What is the name of the tree from which this is derived, and what is the part used? — *A.* It is the wood of the tree Hæmatoxylon campechianum.

Q. Where does it come from? — *A.* From Campechy and the shores of Honduras Bay.

Q. How is it kept in the shops? — *A.* In chips or powder.

Q. What are its sensible properties, and to what does it impart them? — *A.* It has a slight peculiar odour, and an astringent, sweetish taste, which it imparts to water and alcohol.

Q. What is its peculiar principle? — *A.* Hematin.

Q. How is it used, and what are the doses? — *A.* It is used n decoction and extract. The decoction is made by putting ℥j. to Oij. of water, and boiling to Oj.; the dose is f℥ij. The extract which is prepared by evaporating the decoction to dryness, is given in from grs. x.—xxx.

Cranesbill — Geranium. — *Q.* What part is used? — *A.* The root of the Geranium maculatum.

Q. Where is this found? — *A.* In the forests of our own country.

Q. What is the appearance of the root? — *A.* It is horizontal and fleshy, with short fibres, and sends up annually an herbaceous stem. The root when dried is in pieces from one to three inches in length, flattened and contorted, and of an amber-brown colour.

Q. What are its sensible properties, and to what does it impart them? — *A.* It is inodorous and astringent, and imparts its virtues to water and alcohol.

Q. How is it given, and what are the doses? — *A.* In powder, grs. xx. — xxx.; in decoction, made by boiling ℥i. in a Ojss. of water to Oj.; the dose is f℥j.—f℥ij.

Blackberry Root. — Rubus villosus; and Dewberry Root —Rubus trivialis.— *Q.* What part of these plants are used? — *A.* The roots; and they are similar in their medicinal qualities.

Q. What is the distinction between these plants? — *A.* The former is the high blackberry, the latter is the creeping.

Q. In what part of the roots does the most medicinal quality lie? — *A.* In the bark.

Q. What are their sensible qualities, and to what do they impart their virtues? — *A.* They are inodorous, bitterish, and strongly astringent, and impart their virtues to boiling water and to diluted alcohol.

Q. How are the roots used, and what is the dose of each? — *A.* In powder, grs. xx. — xxx. and decoction, made by boiling ℥j. in Ojss. of water to Oj.; the dose, f℥j.—f℥ij.

Uva Ursi. — *Q.* What is the common name for this plant? — *A.* Bearberry.

Q. What part is officinal? — *A.* The leaves of the Arbutus uva ursi.

Q. What is the character of the plant? — *A.* It is a small, trailing evergreen shrub, native in this country and in Europe.

Q. What are the characteristics of the dried leaves, and to what do they impart their virtues? — *A.* They are about an inch long, a bright green on the upper surface, and pale and vesicular below; and when powdered they have a light-brown colour, bitterish, strongly astringent and sweetish taste, and impart their virtues to water and alcohol.

Q. In what form are the leaves used, and what are the doses? — *A.* In powder ℈j.—℥j., three or four times a day; and of the decoction, made ℥j. to Oj. of water; dose, f℥j.—f℥ij.

Q. What are some of the other vegetable astringents which possess properties alike, and which are used in the same cases as those mentioned before?—*A.* The pipsissewa; the Rosa gallica; the Rosa centifolia; the Diospiros virginiana; the tormentil, &c.

MINERAL ASTRINGENTS.

Alum — Alumen. — For the chemical relations, &c., see *Chemistry*.

Q. What is its sensible properties? — *A.* It has a white colour, the taste is astringent, sour, and sweetish, and it is without odour.

Q. In what cases is it used? — *A.* In the same cases as the vegetable astringents.

Q. Is it ever used locally? — *A.* Yes.

Q. How is alum curd formed, and for what is it used? — *A.* By briskly agitating a solution of alum with the white of egg, and is used in ophthalmia.

Q. How is alum administered internally, and what is the

dose? — *A.* In powder, grs. v.—xv. every three or four hours. In pill or solution.

Q. How is alum whey prepared? — *A.* By boiling alum ℥ij. in Oj. of milk, and straining; the dose, f℥ij.

Q. How is dried alum prepared, and for what is it used? — *A.* It is prepared by driving off the water of crystallization by heat, and is used as an escharotic.

Lead — Plumbum. — For the chemical relations, see *Chemistry*.

Q. Is metallic lead medicinal? — *A.* No.

Q. What effects have the preparations of lead when taken in large doses? — *A.* Poisonous.

Q. What preparation of lead is probably not poisonous? — *A.* The sulphate.

Q. What are the antidotes for the poisonous action of lead? — *A.* The sulphate of soda or magnesia.

Q. What are the preparations of lead used in medicine? — *A.* The semivitrified oxide, or litharge; the carbonate, acetate, and subacetate.

Litharge. — For chemical properties and relations, see *Chemistry*.

Q. What is its appearance? — *A.* It is in small, vitrified, brilliant scales, sometimes red and sometimes yellow.

Q. Has it any smell or taste? — *A.* No.

Q. What are its impurities? — *A.* Iron, copper, silver, and silica.

Q. For what is it chiefly used? — *A.* For the preparation of the lead plaster.

Q. How is this prepared? — *A.* By taking litharge powdered, ℔v., Ol. oliv., Aqua, Oij., and boil them over a fire, continually stirring them.

Plumbi Carbonas. — *Q.* What is the ordinary name for this? — *A.* White lead. See *Chemistry*.

Q. What are its sensible properties? — *A.* It is white, heavy, opaque, and insoluble.

Q. Is not this one of the most poisonous salts of lead? — *A.* Yes.

Q. Is it often used internally? — *A.* No.

Q. How is it applied externally? — *A.* By sprinkling the powder on the surface, or else in the form of ointment.

Plumbi Acetas. — *Q.* What is the ordinary name for this? — *A.* Sugar of lead.

Q. How is it prepared, and what is it chemically? — *A.* By boiling the carbonate in dilute acetic acid; chemically it consists of one part of acetic acid, one of the protoxide, and three of water.

Q. What is the appearance of the crystals, and what effect has exposure upon them? — *A.* They are white and needle-shaped, and prismatic, and they effloresce on exposure.

Q. What are the sensible properties? — *A.* It has a sweet astringent taste, and without smell.

Q. In what is it soluble? — *A.* In water and alcohol.

Q. What are its incompatibles? — *A.* The mineral acids and their soluble salts, the alkalies and their carbonates, vegetable astringents and mucilages, excepting gum.

Q. How is it used? — *A.* Both externally and internally; externally in grs. j.—ij. to f℥i. of water, and to the sound skin, ℥ij. to Oj. of water; internally, in combination with opium, gr. ss. to grs. iij., every two or three hours, in pill or solution.

Liquor Plumbi Subacetas. — *Q.* What is the common name for this? — *A.* Goulard's extract of lead.

Q. How is it prepared? — *A.* By boiling litharge either in vinegar or a solution of the acetate of lead.

Q. What is its taste, and colour? — *A.* It is of a yellowish colour when made with vinegar, but otherwise lighter coloured, and it has a sweet astringent taste.

Q. What effect has exposure upon it? — *A.* It decomposes it.

Q. How much is it diluted for use? — *A.* In the proportion of from ℥ij.—℥iij. to the pint of water.

Ceratum Plumbi Subacetas. — *Q.* What is the common name for this? — *A.* Goulard's cerate.

Q. From what is this prepared? — *A.* From the solution of the subacetate, by combining with it yellow-wax, olive oil, and camphor.

TONICS.

Q. What are tonics? — *A.* Medicines which moderately and permanently exalt the energies of all parts of the system without necessarily producing any apparent increase in their natural actions.

Q. In what state of the system are tonics indicated? — *A.* When the vital actions are depressed below the standard of health.

Q. How would you classify tonics? — *A.* Into pure bitters; bitters peculiar in properties, aromatics, and mineral tonics.

Pure Bitters.

Q. What are the peculiar characteristics of the pure bitters?

— *A.* They are less stimulant than the others, and more purely tonic.

Quassia.—*Q.* What is this? — *A.* The wood of the Quassia excelsa and amara, trees of the West Indies.

Q. How is it kept in the shops, and how does it come to market? — *A.* It comes in billets, but is kept in shavings or raspings.

Q. What are the properties of the wood? — *A.* The texture is fibrous, the colour is yellow, but becomes dark by exposure; it is inodorous, and of a bitter taste.

Q. What is its active principle, and to what does it impart its virtues? — *A.* The active principle is quassin, and it imparts its virtues to water and alcohol.

Q. In what form is it used, and what is the dose? — *A.* In infusion, made with ʒij. to Oj. of cold water; dose, fʒij. three or four times a day; extract, grs. ij.; tincture, fʒj.—fʒij.

Gold thread — Coptis. — *Q.* What is this? — *A.* The root of the Coptis trifolia, which grows in this country.

Q. What is the appearance of the root, and to what does it impart its virtues? — *A.* It is in threads, yellow in colour, and imparts its virtues to water and alcohol.

Q. What is the dose? — *A.* Similar to quassia.

Gentian. — *Q.* What part is used? — *A.* The root of the Gentiana lutia, which grows in the Appenines, Pyrenees, and Alps.

Q. Describe this medicine. — *A.* It is brought to market either in longitudinally or transversely sliced pieces, twisted and wrinkled, grayish-brown externally and yellowish within, and of a soft spongy texture. The powder is dirty yellow.

Q. What are its sensible properties, and to what does it yield its virtues? — *A.* It has a feeble and peculiar odour, and the taste is sweetish bitter, and it yields its virtues to water and alcohol.

Q. How is it used, and what are the doses? — *A.* In powder, grs. x.—xl.; infusion, made ℥ss. to Oj. water; dose, f.ʒij.; compound infusion and tincture, of each the dose is fʒj.—fʒij.; extract, gr. v.—xxx.

Q. In what was this a chief ingredient? — *A.* In Portland powder.

Q. Does not the infusion ferment when kept too long? — *A.* Yes.

American Centaury — Sabbatia. — *Q.* What is the name of the plant from which this is derived, and what part is used?

—*A.* The whole of the plant Sabbatia angularis, an indigenous plant, which should be collected when in bloom.

Q. What is its appearance? — *A.* It has an annual, herbaceous, fibrous root, with an erect, smooth, foursided stem rising one or two feet in height; the leaves are considerable in length and width, ovate, acute, entire, and nerved; the flowers are numerous.

Q. What are its sensible properties, and to what does it impart its virtues? — *A.* It is a strong and pure bitter, and imparts its virtues to water and alcohol.

Q. How is it given, and what is the dose? — *A.* In infusion, ℥i. to Oj. of water; the dose is f℥ij.

Colombo—Colomba. — *Q.* What is this? — *A.* The root of the Cocculus palmatus, a plant growing in Mozambique and the south eastern coast of Africa.

Q. What is the appearance of the root when it reaches us? — *A.* It is in slices; the cortical portion is bright yellow and slightly greenish, and covered with a brownish, wrinkled cuticle; the medullary portion is light spongy yellow, more or less shrunk, and marked with concentric circles and radiated lines.

Q. What is the odour and taste, and to what does it impart its virtues? — *A.* It has an aromatic odour, and the taste is bitter; it imparts its virtues to water and alcohol.

Q. What is the colour of the powder? — *A.* It has a greenish tinge, which becomes brown by exposure.

Q. What are its chief ingredients? — *A.* Columbin, starch, mucilage, and volatile oil.

Q. How is it used, and what are the doses? — *A.* In powder, grs. x.—xxx.; infusion, made ℥ss. to Oj. of water; dose, f℥j.—f℥ij.; tincture, f℥ss.—f℥j.

Q. What is the objection to the infusion? — *A.* It undergoes spontaneous change from the presence of starch.

Bitters of Peculiar Properties.

Peruvian Bark — Cinchona. — *Q.* Whence is this derived? — *A.* From the bark of the different species of cinchona, a native of the Andes in South America, extending from La Paz in Bolivia to Santa Martha on the north coast.

Q. What are the officinal varieties? — *A.* The pale bark (Cinchona pallida); the yellow bark (Cinchona flava); the red bark (Cinchona rubra).

Q. Under what name do the other varieties go? — *A.* Carthagena barks.

Q. Which are the pale barks, and describe them? — *A.* The commercial Loxa and Lima barks, which come to market in pieces of various sizes, singly and doubly quilled; the finer varieties are about the size of a goose-quill; externally they are more or less rough, and of a grayish colour; internally they are smooth and velvety, but in the coarser kinds they are rough and ligneous; the colour is brownish-orange. The colour of the powder is pale fawn.

Q. What are their sensible properties? — *A.* Their taste is bittter and moderately astringent, and the better kind have an agreeable feeble odour.

Q. What is the chemical characteristic of the pale barks? — *A.* They contain a larger proportion of cinchonia than of quinia.

Q. What is the yellow bark called in commerce? — *A.* Calisaya bark (this is different from the common yellow bark).

Q. What are the forms of this variety? — *A.* The quilled and the flat.

Q. Describe these varieties. — *A.* The quilled bark is in pieces of various lengths and thicknesses; the epidermis is brownish, with yellow lichens upon it; it is covered with fissures and wrinkles, which surround the quills; it is of a fibrous texture, and, when broken, presents shining, yellow, transparent points. The flat bark comes in larger pieces; destitute of epidermis; it has a yellowish colour both inside and out; it is more fibrous than the quilled, less compact and less bitter; the powder is between an orange and a brown in colour.

Q. What are the sensible properties of this variety? — *A.* It has a strong bitter taste, with little astringency, and a faint odour.

Q. What is the peculiarity of this variety of bark? — *A.* It contains more quinia than cinchonia; and hence is the best.

Q. What are the varieties of the red bark, and describe them? — *A.* The quilled and the flat; some entirely rolled, some partially; the quilled are in pieces, which vary in size and thickness; the flat variety is often very large and thick, and covered with a reddish-brown or gray epidermis, which is rugged and wrinkled, and often covered with warts; there is a dark red, brittle, compact, fibrous layer beneath the epidermis, which has some bitterness and astringency; the colour of the powder is reddish-fawn.

Q. What are the sensible qualities of the red bark, and how

is it characterised? — *A.* It has a bitter and astringent taste; the odour is similar to that of the other good barks; it is characterised by containing equal quantities of quinia and cinchonia.

Q. What are the varieties of the Carthagena barks? — *A.* The yellow Carthagena or common yellow bark, the brown, and the red.

Q. What is the general appearance and taste of all the Carthagena barks? — *A.* They have a white, micacious appearance of epidermis, with a taste less bitter and more nauseous than the officinal varieties.

Q. What is the proportion of quinia and cinchonia in this variety, compared with the officinal varieties? — *A.* It contains less of these than the officinal do.

Q. What are the active principles of bark? — *A.* Quinia and cinchonia, combined with kinic acid. They also contain tannin and colouring matter.

Quinia. — *Q.* How is quinia obtained? — *A.* By treating its sulphate with the solution of an alkali; collecting the precipitate, and washing it till the water comes away tasteless; then drying it, and dissolving it in alcohol at 97° Fahrenheit, and slowly evaporating the solution.

Q. Describe quinia. — *A.* It is a whitish, flocculent powder, not crystallizable like cinchonia, but it may be crystallized in pearly, silky needles; it is fusible, intensely bitter, insoluble in water, soluble in alcohol and ether, and the fixed and volatile oils.

Cinchonia. — *Q.* What are the properties of cinchonia? — *A.* It a white, crystalline substance, almost insoluble in cold water, soluble in boiling alcohol, slightly soluble in ether and the fixed oils, and is less bitter than quinia.

Q. With what acids of difficult solubility do these alkalies form salts? — *A.* With the tartaric, oxalic, and gallic.

Q. What are the incompatibles of bark? — *A.* The alkalies, alkaline earths, astringent infusions, &c.

Q. How is bark most powerful? — *A.* In substance; but it nauseates and vomits in this form.

Q. What is the dose of the bark? — *A.* ʒi., repeated so that from ʒi. to ℥ij. may be taken between the paroxysm of an intermittent fever.

Q. How is the infusion and decoction made, and what are the doses? — *A.* The infusion, with ℥i. to Oj. of boiling water; the decoction, ℥i. to Oj. of water, and boil ten minutes in a covered vessel; dose, fʒij. three or four times a day.

Q. How is the compound infusion made? — *A.* With ℥i. of

bark to Oj. of water, with f℥i. of sulph. acid. arom.; the dose is f℥ij.

Q. What are the other preparations and doses? — *A.* The tincture, dose f.℥i. to f℥ss.; compound tincture, dose f℥i. to f℥ss.; extract, dose grs. x. — xxx.; sulph. quinia, and sulph. cinchonia.

Sulphate of Quinia. — *Q.* How is this prepared? — *A.* By taking Calisaya bark, lime, sulphuric acid, alcohol, and animal charcoal and distilled water; boil the bark with the water acidulated, filter the liquor, then add lime, while constantly stirring; then wash the precipitate with distilled water; then dry and digest it with heated alcohol, and repeat the process till the alcohol is no longer bitter; mix the tinctures, and distil the alcohol till a brown, viscid liquid remains in the retort; then add sufficient diluted sulph. acid to saturate it; then add the animal charcoal; and after evaporating sufficient liquor filter it, and set it aside to crystallize.

Q. What is the character and taste of the crystals? — *A.* Fine, silky, and flexible, and intensely bitter.

Q. In what is it soluble? — *A.* It is slightly soluble in cold water, more so in boiling water, and soluble in alcohol and ether; the dilute acids favour its solubility.

Q. How much sulph. quinia is equal to an ounce of bark? — *A.* Grs. viii.

Q. What are the doses of it? — *A.* As an anti-intermittent, gr. i. every hour or two; as a tonic, gr. ¼—gr. ½, three or four times a day.

Q. How is it given? — *A.* In pill and solution.

Q. How has the sulphate been adulterated, and how may you detect the adulterations? — *A.* It has been adulterated with lime, sugar, mannite, starch, and stearine, Epsom salts, &c. These may be detected by noticing the solubility of the sulphate in different menstrua, by the chemical relations to other substances, the presence of any mineral substance not readily volatilizable may be detected by exposing the sulphate to heat, when all the sulphate will be driven off.

Q. What are the peculiarities of the sulphate of cinchonia? — *A.* The crystals are larger and more soluble than the sulph. quinia, and it has a peculiar bitter taste.

Dogwood — Cornus Florida. — *Q.* What part of this is officinal? — *A.* The bark of the branches and of the root.

Q. Is this tree exotic or indigenous? — *A.* Indigenous.

Q. What is the appearance and sensible properties of the bark? — *A.* The bark is reddish-gray and brittle, the epidermis

is fawn coloured, the powder is reddish-gray, it has a feeble odour and a bitter astringent aromatic taste.

Q. To what does it yield its virtues? — *A.* To water and alcohol.

Q. How is it used, and what are the doses? — *A.* In powder, the dose ʒj.; in decoction, made ℥j. to Oj. of water, dose fʒj.—fʒij.

Prunus Virginiana, or Wild Cherry Tree Bark. — *Q.* Where is the tree found? — *A.* In this country.

Q. Whence is the bark obtained? — *A.* From the stems, branches, and root.

Q. What is the appearance of the bark in market? — *A.* It is in pieces of various sizes, curved, and of a lively cinnamon colour, brittle and pulverizable; the powder is fawn coloured, and darkens by exposure.

Q. What is its odour and taste, and to what does it impart its virtues? — *A.* The odour is that of peach blossoms, the taste is bitter and aromatic; it imparts its virtues to water and alcohol.

Q. What are its active principles? — *A.* Hydrocyanic acid, tannic acid, and bitter extractive matter.

Q. What effect has heat upon it? — *A.* It drives off the hydrocyanic acid.

Q. In what form is it used, and what are the doses? — *A.* In powder, dose ʒj.—ʒss; cold infusion, made with ʒss. to Oj. of water, dose fʒij. three or four times a day.

Chamomile—Anthemis. — *Q.* The flowers of what plant is this? — *A.* The Anthemis nobilis, an European plant.

Q. Which flowers are the best, the single or the double? — *A.* The single.

Q. What are their sensible properties, and to what do they impart their virtues? — *A.* They have a fragrant peculiar odour, and bitter pleasant taste, and impart their virtues to water and alcohol.

Q. What are their active principles? — *A.* Bitter extractive and volatile oil.

Q. How are they used? — *A.* In cold infusion, ℥j. to Oj. of water, the dose is fʒij. several times a day.

Thoroughwort — Eupatorium. — *Q.* What part is used? — *A.* The whole of the plant Eupatorium perfoliatum, or boneset, an indigenous herb.

Q. What are its sensible properties, and to what does it impart them? — *A.* It has a faint odour, strongly bitter and peculiar taste, which it imparts to water and alcohol.

Q. As a tonic how is it used, and what are the doses? — *A.* In powder, the dose is grs. xx.—xxx., every two or three hours; cold infusion, made ℥j. to Oj. of cold water; dose, f℥j.—f℥ij. every three or four hours.

Virginia Snakeroot — Serpentaria. — *Q.* What part is used?—*A.* The root of the Aristolochia serpentaria, an indigenous herbaceous plant.

Q. What is the appearance and sensible properties of the root? — *A.* It is in tufts of long, slender, interlaced fibrils, attached to a head; it has a yellow colour when fresh, but becomes dark by exposure; the powder has a grayish tinge. It has a camphorous and aromatic odour; the taste is warm, bitter, and camphorous.

Q. What are its active principles, and to what does it impart its virtues? — *A.* Its active principles are a bitter principle and volatile oil; it imparts its virtues to water and alcohol.

Q. How is it used and what are the doses? — *A.* In powder, the dose is grs. x.—xxx.; infusion made, ℥j. to Oj. of warm water, dose, f℥j.—f℥ij. every 2 or 3 hours; tincture, the dose f℥j.—f℥ij.

Myrrh—Myrrha. — *Q.* What is this? — *A.* The gum or extract of the Amyris myrrha, a small stunted tree of Arabia felix.

Q. What are the varieties of this? — *A.* The India and the Turkey. The Turkey is the best.

Q. What is the appearance of myrrh and its sensible properties? — *A.* It is in small, irregular fragments, of various sizes, sometimes agglutinated together; it is translucent, of an orange colour; the powder is brownish-yellow, the fracture is shining; it has a strong, peculiar, fragrant odour, and bitter aromatic taste.

Q. What is it chemically? — *A.* A gum resin, with volatile oil.

Q. To what does it yield its virtues? — *A.* Partially to water, alcohol, and ether.

Q. What effect has distillation upon it? — *A.* It drives off the volatile oil.

Q. How is it used and what are the doses? — *A.* In powder and pill, dose, grs. x.—xxx.; tincture, dose, f℥ss.—f℥j.

Q. Why are the tinctures of the gum resins made with undiluted alcohol? — *A.* Because on account of the absence of water a better preparation is made.

Cascarilla. — *Q.* What is this? — *A.* The bark of the

Croton eleutheria and cascarilla, shrubs growing in the West Indies and imported from Eleutheria.

Q. What is its appearance and sensible properties? — *A.* It is in small pieces, thin and curved in its length, with sometimes the woody fibre attached. It has a dull brown colour, an aromatic odour, which is like musk when burnt; the taste is warm and spicy bitter.

Q. What are its active principles, and to what does it impart them? — *A.* Its active principles are bitter extractive and volatile oil, and it imparts them to water and alcohol.

Q. How is it used, and what are the doses? — *A.* It is used in powder, dose, grs. x.—xxx; infusion, made with ℥j. to Oj. of water, dose, f℥ij.

AROMATICS.

Q. What are aromatics? — *A.* Substances having a fragrant odour, spicy taste, and containing volatile oil.

Q. What are the peculiarities of the volatile oils? — *A.* They have an odour like the articles from which they are derived, they are hot, pungent, and spicy to the taste, easily volatilized, very inflammable, soluble in water, alcohol, and ether, and fixed oils, and become dark by exposure.

Q. How are they prepared? — *A.* By distillation.

Orange Peel — Aurantii Cortex. — *Q.* What is the part used? — *A.* The rind of the fruit of the Citrus aurantium.

Q. What are the varieties in the market, and in what do their virtues consist? — *A.* We have the bitter or Seville orange, and the sweet; their virtues reside in the outer rind or yellow portion.

Q. What are the sensible qualities, and to what does it impart them? — *A.* It has a grateful aromatic odour, and warm bitterish taste; the rind of the Seville orange is more bitter than the other; both impart their virtues to water and alcohol.

Q. How is the infusion, the confection, and the water made? — *A.* The infusion, by adding ʒss. to Oj. of water; the confection from the fresh rinds, by bruising them, with sugar, and the water is made, by distillation, with the blossoms.

Cinnamon — Cinnamomum. — *Q.* What is this? — *A.* The prepared bark of the Laurus cinnamomum or cassia, a tree, native of Ceylon, and grows, also, in Sumatra, &c.

Q. How is it prepared? — *A.* By making longitudinal incisions in the tree, and removing the bark, rolling it into quills, and then into bundles, &c.

Q. What are the two varieties? — *A.* The Ceylon and the China. The Ceylon is the best.

Q. What are the sensible properties of cinnamon? — *A.* It has a light, brown-yellow colour; the colour of the powder is yellow-orange: it has a splintery fracture, and a pleasant fragrant odour, and a warm, aromatic, and pungent, sweetish taste.

Q. What are the active principles? — *A.* Volatile oil and tannin.

Q. What are the sensible properties of the oil? — *A.* The same as those of cinnamon itself, without its astringency.

Q. How is cinnamon given, and what are the doses? — *A.* In powder, gr. ix. — xxx; infusion, made with ʒi. — ʒij. to Oj. of water; dose, fʒi.

Q. How is cinnamon water made? — *A.* By rubbing the oil with magnesia, and adding water.

Q. What preparations of it are officinal? — *A.* The tincture and compound tincture; the dose of each is fʒi.

CANELLA. — *Q.* What part of the Canella alba is officinal? — *A.* The bark of the branches.

Q. Where is the tree native? — *A.* In the West Indies.

Q. What are the characteristics and properties of the pieces? — *A.* The pieces are partially or completely quilled, and of various sizes; they have a short fracture, and a pale orange colour; the powder is yellowish-white; they have an aromatic odour and warm bitterish taste, and yield their virtues partly to water and all to alcohol.

Q. What are the active principles? — *A.* Volatile oil and bitter extractive.

Q. In what powder is it an ingredient? — *A.* In the powder of aloes and canella, or Hiera-picra.

CLOVES — CARYOPHILLUS. — *Q.* What are these? — *A.* The dried, unexpanded flower-buds of the Eugenia caryophillata, an evergreen tree, a native of the Moluccas.

Q. What is the appearance and sensible properties of the clove? — *A.* It resembles a nail in shape, half an inch in length with a rounded head and four spreading points beneath it; externally, it is deep brown; internally, reddish; the powder is reddish-brown, the odour and taste are pungent and aromatic.

Q. To what do they impart their virtues? — *A.* To water and alcohol.

Q. What is the active principle? — *A.* A volatile oil, which may be procured by distillation, by adding a little salt to the water.

Q. How are they used, and what is the dose? — *A.* In pow-

der, dose, grs. v. — x.; infusion, made ʒij. — Oj. of water; dose, fʒij; the oil, dose, gtts. ij. to v.

Nutmeg — Myristica. — *Q.* What is this? — *A.* The kernel of the fruit Myristica moschata, a tree growing in the Moluccas.

Q. How is this obtained? — *A.* When the fruit becomes ripe it opens and discloses a reticulated membrane, which is the ordinary mace, beneath which we have a brown shell covering the nutmeg.

Q. How is the mace and nutmeg prepared? — *A.* The mace is prepared by taking off the exterior covering of the fruit; then separating the mace and drying it. The nuts are dried in the sun till the kernel rattles in the shell; the shell is then broken, and the kernel steeped in lime and water, and packed.

Q. Describe the nutmeg and its sensible properties. — *A.* It is of a round or oval shape, marked with furrows, the size of a hickory-nut; grayish in colour, and hard and smooth to the touch, and when broken has a variegated yellowish surface and aromatic odour; it is easily pulverized by grating; it contains a volatile and fixed oil,— or oil of mace.

Q. Describe the mace. — *A.* It is a flat membrane, irregularly slit, smooth, soft and flexible, of a reddish-orange colour, and is used for the same purposes as the nutmeg.

Q. How is nutmeg used, and what is the dose? — *A.* In powder, dose, grs. v.—xx.; volatile oil, gtts. ij.—iij.

Black Pepper — Piper. — *Q.* What is the part used? — *A.* The dried berries of the Piper nigrum, a vine growing on the coast of Malabar, in Cochin, China, &c.

Q. What are its constituents? — *A.* Volatile oil, and an acrid, concrete oil, and white crystalline principle, called *piperin*.

Cubebs — Cubeba. — *Q.* What part is officinal? — *A.* The dried fruit of the Piper cubeba, a vine growing in the East Indies.

Q. What are the appearances and sensible properties of cubebs? — *A.* They are round, the size of a pea, grayish-black in colour, furnished with a short stalk, which is continuous with a reticulated covering, which embraces the berry like a net; the shell of the berry is hard, ligneous, and contains within it a single loose seed, covered with a blackish coat; internally, white and oleaginous; the odour is aromatic, the taste warm and camphorous; time deteriorates them.

Q. What is the active principle? — *A.* A volatile oil.

Q. How is it given, and what are the doses? — *A.* In pow-

der, dose, ʒss.—ʒiss., three or four times a day; volatile oil, in emulsion, gtts. x.—xx.

Cardamom — Cardamomum. — *Q.* What is this? — *A.* The fruit of the Alpinia cardamomum, a plant growing in Malabar.

Q. What is the appearance of the fruit and its sensible properties? — *A.* It is in capsules, with three sides, and from three-fourths to one-half inch in length; these capsules contain dark-coloured seeds; they have a pungent aromatic odour, and a mild pungent taste.

Q. In what do their virtues reside, and to what do they yield them? — *A.* They reside in a volatile oil, and they yield them to water and alcohol.

Q. How are they used, and what is the dose? — *A.* Generally as an adjuvant to other medicines, or in infusion, made ʒij. to Oj. of water; dose, fʒi.—fʒij.

Q. What is the dose of the compound tincture? — *A.* Fʒi.

Fennel Seed — Fœniculum. — *Q.* What are these? — *A.* The seeds of the Anethum fœniculum, an herb, a native of Europe, but cultivated in this country.

Q. What is the appearance and sensible properties of the seeds? — *A.* They are oblong, oval, flat on one side and convex on the other, slightly curved, and of a grayish-green colour and aromatic odour.

Q. In what do their virtues consist, and to what does it impart them? — *A.* Their virtues consist in a volatile oil, and it imparts them to water and alcohol.

Q. How are they used? — *A.* In infusion, with ʒij. to Oj. of water. The oil is made by distillation, the dose is gtt. v. — xv.

Lavender — Lavandula. — *Q.* What part of this plant is used? — *A.* The flowering spikes of the Lavandula vera, a native of Europe, but cultivated in this country.

Q. In what do the virtues consist? — *A.* In the volatile oil.

Q. What preparations of it are officinal? — *A.* The tincture, and compound tincture.

Q. Of what does the compound tincture consist, and what is the dose? — *A.* Of the lavender, rosemary, cinnamon, cloves, nutmeg, and red saunders; the dose is fʒss. — fʒj.

Peppermint — Mentha Piperita. — *Q.* What part of this is officinal? — *A.* The whole herb, which is a native of Europe, but cultivated in this country.

Q. What are its sensible properties, and to what does it impart them? — *A.* It has a penetrating, grateful odour, and an

aromatic, warm, and pungent camphorous taste; it imparts its virtues to water and alcohol.

Q. To what does it owe its virtues, and what are the sensible properties of the oil? — *A.* It owes its virtues to a volatile oil, which has the properties of the herb itself; the oil is lighter than water.

Q. When alcohol is mixed with the oil, how will you detect it? — *A.* By its becoming turbid when mixed with water.

Q. How is it used, and what are the doses? — *A.* In infusion, made ℥ij. to Oj. of water; dose, f℥j.—f℥ii.; the dose of the oil is gtts. i.—iij.

Q. How is the essence prepared? — *A.* By dissolving f℥ij. of oil in Oj. of alcohol.

Q. How is the water prepared? — *A.* By rubbing the oil with magnesia, and adding water.

Ginger — Zingiber. — *Q.* What part of this is used? — *A.* The root of the Zingiber officinale, an herbaceous plant, native of the East Indies, and cultivated in the West Indies.

Q. What are the two varieties and their characteristics? — *A.* The black ginger, and the white or Jamaica; the black ginger is in pieces of different sizes, knotted and irregularly branched; externally it is of a light-ash colour, internally it is yellowish; the root is dug up when a year old, scalded and rapidly dried; the Jamaica ginger is prepared by depriving the root of its epidermis, and drying it.

Q. What are its sensible properties, and to what does it impart them? — *A.* It has an aromatic, penetrating odour, and the taste is spicy, pungent, hot, and bitter; and it imparts its virtues to water and alcohol.

Q. What are its chief ingredients? — *A.* Volatile oil, acrid resin, extractive matter, and starch.

Q. In what forms is it used, and what are the doses? — *A.* In powder, dose grs. x.—xxx.; infusion, made with ℥j. to Oj. of water, dose, f℥ij.; tincture, dose, f℥j.,—f℥ij., and syrup.

Mineral Tonics.

Iron — Ferrum. —For the general history of iron, see *Chemistry*.

Q. In what form is crude iron used? — *A.* In iron filings, — Ramenta ferri — in the dose of from grs. v.—xx. — Squamæ ferri — scales of iron, prepared by heating a bar red hot and pounding it, when the scales fly off, which are pulverized and levigated, and are of a grayish-white colour; dose, grs. v.—xx.

Q. How is the Rubigo ferri, or rust of iron prepared? — *A.* By taking iron wire in small pieces, exposing it to air and moisture, until it is covered with rust, which is to be rubbed in a mortar and prepared as the carbonate of lime.

Q. Is it much used? — *A.* No.

Subcarbonate of Iron—Ferri subcarbonas. — *Q.* What was this formerly called? — *A.* Precipitated carbonate.

Q. How is it prepared? — *A.* By dissolving sulphate of iron and carbonate of soda in boiling water, washing the precipitate formed, passing it through bibulous paper, and drying it.

Q. What is its form, sensible properties, and solubility? — *A.* It is a reddish-brown powder, of a slight styptic taste, soluble in the acids, and in water impregnated with carbonic acid.

Q. What is the dose? — *A.* Grs. v.—xx., three times a day.

Proto-carbonate of iron — Vallet's Ferruginous Pills — Pilulæ ferri carbonatis. — *Q.* How is this prepared? — *A.* By rubbing the precipitate carbonate with honey or sugar; dose, grs. v.—xx.

Sulphate of Iron — Ferri Sulphas — Green Vitriol. (Chemical characters, see *Chemistry.*) — *Q.* What are its sensible properties? — *A.* The crystals are bluish-green in colour, with a disagreeable styptic taste; they effloresce and absorb oxygen, and first become white, and afterwards yellow on the surface.

Q. In what is it soluble? — *A.* In warm and cold water, and insoluble in alcohol.

Q. What effect has heat upon it? — *A.* It causes it to undergo watery fusion, and become dry and white, &c.

Q. What are its incompatibles? — *A.* The alkalies and alkaline carbonates; muriate of lime and baryta; the borates and phosphates; nitrate of silver; acetate of lead; tannic and gallic acids, &c.

Q. What is the dose of the crystallized, dried, &c.? — *A.* Of the crystallized, grs. i. to v.; of the dried, grs. ss. to iij., three or four times a day.

Q. What are some of the other preparations of iron? — *A.* The mistura ferri composita; tinctura ferri chloridi; the dose, ♏x. to xxx., three or four times a day; tartrate of iron and potassa, dose, grs. x. to xxx.; phosphate of iron, dose, gr. v. to x.; iodide of iron, in substance, grs. ij. to v.; solution, gtts. xv. to xl., &c.

Copper — Cuprum. — General history, see *Chemistry.*

Q. Does metallic copper act upon the system? — *A.* It is uncertain.

Sulphate of Copper—Cupri sulphas—Blue vitriol; mode of preparation, &c., see *Chemistry*.

Q. In what is this soluble? — *A.* In water; the solution is blue.

Q. What is its taste? — *A.* Strong, metallic, and styptic.

Q. What are its incompatibles? — *A.* The alkalies and aline earths, carbonates, borax, acetate of lead, iron, and astringent vegetable infusions.

Q. What is its dose? — *A.* One-fourth of a grain, given two or three times a day in pill.

Q. What are its poisonous effects, and the treatment for them? — *A.* We have a coppery taste in the mouth, black and bloody stools, irregular, sharp, and frequent pulse, cold sweats, cramps, convulsions, and death. The treatment: you must neutralize the poison by albumen in large doses, administer water and demulcents, and excite vomiting, and use, if necessary, the stomach-pump.

Ammoniated Copper — Cuprum Ammoniatum. — *Q.* How is this prepared? — *A.* By rubbing together cupri sulph. et ammon. carb. in a glass mortar, and drying it on bibulous paper.

Q. What is its colour and odour, and in what is it soluble? — *A.* It has a fine blue colour, ammoniacal odour, and is soluble in water.

Q. What are its incompatibles? — *A.* Potassa, lime-water, and the acids, &c.

Q. What is the dose? — *A.* Gr. ss., twice a day.

Zinc — Zincum. — *Q.* Is metallic zinc inert? — *A.* Yes.

Sulphate of Zinc — Zinci Sulphas — White Vitriol. — Mode of preparation, &c., see *Chemistry*.

Q. What are the characters of this preparation? — *A.* It has a disagreeable, metallic, styptic taste; it is soluble in water, and effervesces slightly in the air; and it dissolves in its water of crystallization, when heated.

Q. What are its incompatibles? — *A.* The alkalies and alkaline carbonates, hydrosulphates, and lime water; and it precipitates in vegetable astringent infusions.

Q. What is its dose? — *A.* As a tonic, gr. ss. — iij.; as local applications to mucous surfaces, gr. i. — ij., to ℥j. of water, &c.

Q. What is the proportion of the acetate, in solution, for medical uses? — *A.* Gr. i. — ij. to f℥j. of water, &c.

Oxide of Zinc — Zinci Oxidum. — *Q.* How is this made? — *A.* By taking the sulphate, aqua ammon., and water, adding

them together, and then taking the precipitate formed and washing it, and drying it by a sand-bath.

Q. Describe this. — *A.* It is an odorous, tasteless, white powder, soluble in the acids or ammonia, and not in water or alcohol.

Q. What is the dose of it? — *A.* Grs. v.

Q. What is the name of the ointment made from it? — *A.* Unguentum zinci oxidum.

Q. What is the common name for the impure oxide? — *A.* Tutty.

Zinci Carbonas — Calamine — Carbonate of Zinc. — *Q.* What form of this is most used? — *A.* The prepared carbonate, made by taking the carbonate, heating it to redness, pulverizing it, reducing it to fine powder, and washing it.

Q. Describe it. — *A.* It is a reddish-yellow powder, with no odour, and a slight metallic taste; it is used chiefly for cerate.

Q. What is the ordinary name for the Ceratum zinci carbonas? — *A.* Turner's cerate.

Bismuth — Bismuthum — Subnitrate of Bismuth — Bismuthi Subnitras. — (For preparation, see *Chemistry*.)

Q. What is its form and sensible properties? — *A.* It is an insipid powder, of a pure white colour.

Q. What is the dose? — *A.* From grs. iij. — x., in pill or powder.

Q. What is the remedy in over-doses? — *A.* Mucilages internally, with emetics; and externally, counter-irritants, locally and generally.

Silver — Argentum. — See *Chemistry*.

Nitrate of Silver — Argenti Nitras — Lunar Caustic. — For preparation, &c., see *Chemistry*.

Q. How is this kept in the shops? — *A.* In sticks, and sometimes in white tubular crystals.

Q. Describe it. — *A.* It is hard and brittle, of a gray colour, with a crystalline fracture; soluble in warm and cold water, and in boiling alcohol; it has an austere, metallic taste; light changes it to a dark colour, and heat decomposes it.

Q. What are its incompatibles? — *A.* Common water, soap, the fixed alkalies and their carbonates, lime-water, the mineral acids, astringent vegetable infusions, &c.

Q. What substance on account of its incompatibility is an antidote for its over-doses? — *A.* Common salt.

Q. When taken internally for some time, what effect has it upon the skin? — *A.* It darkens it.

Q. What is its character as a caustic? — *A.* It is mild and efficient.

Q What is the dose of it internally? — *A.* Gr. $\frac{1}{8}$, in pill or emulsion, three times a day, gradually increased.

Q. What other preparations of silver have been used? — *A.* The chloride and oxide.

Sulphuric Acid — Acidum Sulphuricum. — For chemical relations and preparation, see *Chemistry*.

Q. How is this used medicinally? — *A.* In a diluted state.

Dilute Sulphuric Acid — Acidum Sulphuricum Dilutum. — *Q.* How is this prepared? — *A.* By adding gradually together sulphuric acid and water in a glass vessel.

Q. What are its sensible properties? — *A.* It has a slightly sour taste and smell, and should be swallowed through a quill to prevent injury to the teeth.

Q. What is the dose? — *A.* Gtts. x.—xxx., three times a day in sweetened water.

Q. What is the antidote for sulphuric acid in over-doses? — *A.* Magnesia, or a solution of soap, followed by mucilages and diluents.

Aromatic Sulphuric Acid — Acidum Sulphuricum Aromaticum — Elixir Vitriol. — *Q.* How is this prepared? — *A.* By mixing acid sulph., ginger, cinnamon, and alcohol together, digesting, macerating, and filtering them through paper.

Q. What are its sensible properties and dose? — *A.* It is of a reddish-brown colour, aromatic odour, and when diluted a grateful acid taste; the dose is the same as the preceding.

Q. How is the sulphuric acid ointment prepared? — *A.* In the proportion of f℥j. of acid to ℥j. of lard.

Nitric Acid — Acid Nitricum. — Sp. gr. 1·5. See *Chemistry*.

Q. What are its incompatibles? — *A.* The proto-sulphate of iron, carbonates, sulphates, and acetates of lead and potassa, &c.

Q. What is the treatment for over-doses? — *A.* Administer magnesia or soap in large quantities, and follow with mucilages, olive and almond oil, and use externally fomentations and counter-irritants.

Q. What is the dose? — *A.* The strong acid, from gtts. ij.—v. in water.

Q. What is Hope's camphor mixture? — *A.* A combination of nitrous acid, camphor water, and laudanum.

Q. How is nitric acid used externally? — *A.* Either as a caustic or as a stimulant to old ulcers, or as an ointment.

Muriatic Acid — Acidum Muriaticum. — (See *Chemistry*.) — *Q.* What are its incompatibles? — *A.* The same as the preceding.

Q. What is the dose? — *A.* Gtts. v.—xx. in f℥iij.—f℥iv. of sweetened water; and in gargles f℥j.—f℥iv. of water.

Nitro-muriatic Acid — Acidum Nitro-muriaticum. — *Q.* How is this prepared? — *A.* By mixing together one part of nitric acid and two parts of muriatic acid.

Q. What is the dose? — *A.* Gtts. ij. — x., three or four times a day in water.

Q. How is it used externally? — *A.* In baths, in the proportion of f℥j. to cong. i., temperature 96° Fahr.

STIMULANTS.

Arterial Stimulants.

Q. What are arterial stimulants? — *A.* Medicines which especially excite the circulation.

Cayenne Pepper — Capsicum. — *Q.* What part is officinal? — *A.* The fruit of the Capsicum annuum, which grows in this country, but is not native.

Q. Describe the fruit and its sensible properties, &c. — *A.* It is in long, conical, recurved pods; the surface smooth and red; internally, we have a medullary mass, and yellow-white seeds, in separate apartments; the powder is at first bright red, and then reddish-brown. It has an aromatic odour, and the taste bitter, hot, and pungent; it imparts its virtues to water and alcohol.

Q. What is the active principle? — *A.* Capsicin.

Q. In what forms is it used, and what are the doses? — *A.* In powder, grs. v. — x.; infusion made with ℥ij. to Oss. of boiling water; dose f℥ss.; tincture, dose, f℥j. — f℥ij.

Oil of Turpentine — Oleum Terebinthinæ. — *Q.* What is the common name for this? — *A.* Spirits of turpentine. (See *Chemistry.*)

Q. Describe it. — *A.* It is a limpid, colourless fluid, with a peculiar, penetrating, strong odour, and hot, pungent, bitterish taste. Sp. gr. 0·36, soluble in alcohol, ether, and slightly in water, and when exposed becomes thickened by absorbing oxygen.

Q. What is its dose? — *A.* Gtts. v.—xx., every hour or two, in emulsion, with gum. acac. and sugar.

Phosphorus. — (See *Chemistry.*) — *Q.* How should this be given? — *A.* In oleaginous and etherial solution; dose, gr. ss.

Carbonate of Ammonia — Ammoniæ Carbonas. — (See *Chemistry.*)

Q. Describe this, and its sensible properties, &c. — *A.* It is white, moderately crystallized, hard, transparent, with a pungent smell and sharp taste; soluble in water and insoluble in pure alcohol; and when exposed to the air becomes covered with a white powder, and becomes opaque, &c.

Q. What is the dose? — *A.* Grs. v. — x., in emulsion, frequently repeated.

Q. What other preparations of ammonia is in use? — *A.* The aromatic spirit.

Nervous Stimulants.

Q. What are nervous stimulants? — *A.* Substances which have an exciting tendency upon the nervous system.

Musk — Moschus. — *Q.* From what animal is this derived? — *A.* From the Moschus moschiferous, a native of the southern mountains of Siberia.

Q. From what part of the animal is this obtained? — *A.* From a sac on the belly, between the umbilicus and prepuce.

Q. What is the appearance and sensible properties of musk? — *A.* It is in grains or lumps, of a reddish-brown colour, with a peculiar, strong, diffusible, odour, and a bitter, disagreeable, acrid taste, and should be kept in well-corked bottles.

Q. How is it given, and what is the dose? — *A.* In pill or emulsion; dose, grs. v. — ʒi.

Q. How is artificial musk prepared? — *A.* By acting on amber with nitric acid.

Castor — Castorium. — *Q.* What is this? — *A.* The product of the Castor fiber or beaver; and it is derived from small bags situated between the anus and external organs of generation.

Q. What are its sensible properties, and dose, &c.? — *A.* It has a strong, fetid, and peculiar odour, and bitter, acrid, nauseous taste, and a more or less red colour. The dose, in substance, is from grs. x. — xv.; tincture, fʒi. — fʒij.

Assafetida — Assafœtida. — *Q.* What is this? — *A.* The inspissated juice of the Ferula assafœtida, an herbaceous plant of Persia.

Q. How is it kept in the shops? — *A.* In irregular masses, of a soft consistence, becoming hard by exposure.

Q. Give its sensible properties, &c. — *A.* The colour, externally, is yellowish or reddish-brown, and when broken it has an irregular, whitish, shining, surface, and changes its colour by keeping; the taste is bitter and acrid; the odour fetid and durable; it softens by heat.

Q. What is this chemically? — *A.* A gum resin, with volatile oil and bassorin.

Q. To what does it impart its virtues? — *A.* To alcohol, and partly to water.

Q. What are the doses of it? — *A.* Grs. v. — x., in pill or emulsion; in enema, ʃʒss. — ʃʒi., to Oj. of water; tincture, ʃʒi.; it is also used as a plaster.

Valerian — Valeriana. — *Q.* What is the medicine used? — *A.* The root of the Valeriana officinalis; an herbaceous plant of Europe.

Q. Describe this root and its sensible properties, &c.? — *A.* It consists of long, slender, cylindrical fibrils, coming from a tuberculated head; externally they are yellowish-brown, internally white; the powder is yellowish-gray; it has a strong odour in the old root; the taste is first sweet, and then bitter and aromatic; it yields its virtues to water and alcohol.

Q. What are the active principles? — *A.* A volatile oil and an acid.

Q. What are the sensible properties of the oil? — *A.* It is pale-greenish in colour, the odour is pungent, and has an aromatic taste, &c.

Q. How is it used, and what are the doses? — *A.* In powder, grs. xxx. — lx.; infusion, made with ʒi. to Oj. of water, dose, ʃʒij.; tincture, ʃʒi. — ʃʒiv.; oil, gtts. iv. — vi., and repeated. The ammoniated tincture has also been used.

Oil of Amber — Oleum Succini. — *Q.* What is the origin of amber? — *A.* It is supposed to be of vegetable origin, but is now found as a mineral in Prussia, on the sea-shore of the Baltic, &c.

Q. Describe it. — *A.* It is in small, irregular lumps, of a yellowish-brown colour, and when pure it is translucent and without taste or odour.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. What are the effects of distillation upon it? — *A.* It first yields a yellowish liquid, and then a yellowish oil, which becomes darker the more it is heated.

Q. How is the impure oil rectified? — *A.* By distilling it with water.

Q. What are the sensible properties of the rectified oil? — *A.* It is of a thin consistence, yellowish colour, and colourless; when perfectly pure, the odour is strong and peculiar, and the taste hot and acrid; heat decomposes it.

Q. To what does it yield its virtues? — *A.* To alcohol; sp.

gr. 0·847, 55° Fahr.; in all portions in absolute alcohol, and somewhat in water.

Q. What effect has exposure upon it? — *A.* Turns it black.

Q. What is the dose? — *A.* Gtts. v.—xv., in emulsion.

Cerebral Stimulants.

Q. What are these medicines? — *A.* Those which, together with a stimulating action upon the whole circulation, exert a peculiar influence on the brain.

Alcohol. — *Q.* What is this the product of? — *A.* Vinous fermentation.

Q. What are the fermented liquors? — *A.* Wine, brandy, whiskey, cider, perry, &c.

Q. What does the distillation of these afford? — *A.* The distilled liquors.

Q. What is proof spirit? — *A.* That of sp. gr. 0·920.

Q. How is officinal alcohol obtained? — *A.* By the redistillation of distilled liquors — sp. gr. 8·35, and contains 15 per cent of water.

Q. For what is officinal alcohol used? — *A.* For the tinctures of the gum resins, and the diluted for the tinctures of woods and leaves.

Q. Of what does diluted alcohol consist? — *A.* Of equal parts of alcohol and water.

Q. Which is the best distilled liquor for internal use? — *A.* Brandy.

Q. How are wines produced? — *A.* From the juice of the grape by vinous fermentation. The Madeira, Teneriffe, and sherry, are the best.

Q. How do you make wine whey? — *A.* By adding from a gill to a half-pint of wine to a pint of boiling milk, straining without pressure, and sweetening the whey with loaf sugar.

Sulphuric Ether — Æther Sulphuricus. — *Q.* How is this prepared? — *A.* By distilling a mixture of sulphuric acid and ether.

Q. What are its properties? — *A.* It is a colourless, limpid liquid, with a strong and sweet odour, and hot pungent, taste.

Q. What is its solubility in water and alcohol? — *A.* It unites with water in small proportions, and with alcohol in every proportion.

Q. What is the dose? — *A.* From ʒss. to ʒj. in sweetened water.

Q. What is the common name for the compound spirit of

sulphuric ether? — *A.* Anodyne, liquor of Hoffman, or Hoffman's anodyne.

Q. How is this prepared? — *A.* By taking spts. æth. sulph., Oj., etherial oil, fʒij., and mixing them; its properties are similar to the preceding.

Q. What is the dose?—*A.* Gtts. xxx.—fʒj., in a wineglassful of sweetened water.

Opium. — *Q.* What is this? — *A.* The concrete juice of the capsule of the Papaver somniferum, and probably of the P. orientale.

Q. What are the varieties of it, and where are they produced? — *A.* The white and black, produced in India, Europe, and partially in the United States.

Q. What are the characters of the capsules? — *A.* They are smooth and glaucous, and rounded in shape, flattened at the top and bottom, and crowned with the persistent stigma; internally they are cellulated and filled with seeds.

Q. What are the varieties of opium? — *A.* The Smyrna, Egyptian, and Constantinople; the variety generally used is the Smyrna.

Q. What is the character of this variety? — *A.* It is in different sized pieces, deformed and flattened, and covered externally with seeds and leaves like the Rumex; it blackens by exposure, and has a strong, virose odour, and a bitter, acrid taste.

Q. Are there any essential differences in the Constantinople and Egyptian opium? — *A.* None, excepting their inferiority to the Smyrna; they possess all the qualities of opium, but in a smaller degree than the Smyrna. (See *Dispensatory.*)

Q. What is the colour of the powder of opium? — *A.* Reddish-brown; opium is best pulverized by drying it.

Q. To what does it yield its virtues? — *A.* To water and alcohol.

Q. Of what is opium composed? — *A.* Of morphia, narcotina, codeia, meconia, narceia, meconic acid, extractive matter, gum, &c.

Q. In what state does morphia exist in opium? — *A.* In the state of a saline compound, combined with meconic acid, or as a meconate of morphia.

Q. What are the properties of narcotina? — *A.* It is a solid, tasteless, inodorous, white, crystallizable compound, fusible at a moderate temperature, insoluble in cold water, soluble in forty parts of boiling water, partially soluble in cold alcohol, soluble in ether.

Q. How may it be separated from opium and morphia? — *A.* From opium by water, &c.; from morphia by sulphuric ether.

Q. What is the treatment for the poisonous effects of opium? — *A.* First evacuate the stomach, either by an emetic or the stomach-pump; apply cold water from a height to the head; make the patient walk about, and administer stimulants, and if necessary, keep up artificial respiration till the effects of the opium passes off.

Q. In what form is it given? — *A.* In substance, dose, gr. i.; in tincture, and in the preparations of morphia.

Q. What is the ordinary name of tinctura opii? — *A.* Laudanum.

Q. How is it prepared? — *A.* By taking pulverized opium, ℥iiss.; alcohol, Oij.; macerate fourteen days, and filter through paper.

Q. What is the dose, equivalent to a grain of opium? — *A.* ♏xiij., or gtts. xxv.

Q. What effect is produced by keeping it? — *A.* It becomes stronger.

Q. What is the ordinary name for the tinctura opii camphorata? — *A.* Paregoric elixir.

Q. What does this contain? — *A.* Opium, benzoic acid, ol. anisi, ext. glycyrrhiza, mel. disp., camphor, and alcohol.

Q. What are its sensible properties? — *A.* It has a grateful, camphorous odour, and sweetish taste.

Q. How many grains of opium are there in a fluid ounce? — *A.* Two.

Q. What is the dose? — *A.* F℥i.

Q. For what is the tinctura opii acetas a substitute? — *A.* The black drop.

Q. How is it prepared? — *A.* By taking opium, ℥ij.; vinegar, f℥xxi.; alcohol, Oss.; macerating fourteen days, and filtering through paper.

Q. What is the dose equivalent to a grain of opium? — *A.* ♏x. or gtts. xx.

Morphia. — *Q.* How is morphia prepared? — *A.* By taking opium, distilled water and alcohol, and water of ammonia; macerating the opium with part of the water; filtering and washing with the residue of water; and again filtering, and then adding a small quantity of alcohol and the water of ammonia; setting it aside to crystallize; then purify it by boiling it with alcohol; then filter while hot, and crystallize.

Q. What are its general properties? — *A.* It is in small, shining, colourless, inodorous, and bitter crystals, but lose the crystalline form when heated. It is insoluble in cold water, slightly soluble in hot, insoluble in cold, but soluble in boiling alcohol; soluble in the fixed and volatile oils, and insoluble in ether. It restores the blue colour of litmus, is reddened by acids, and with the acids forms salts, and with nitric acid forms a blood-red colour, &c.

Q. How is morphia used? — *A.* In combination with an acid, as the sulphuric or muriatic.

Morphiæ Sulphas. — *Q.* How is this made, and what are its properties? — *A.* It is made by saturating morphia with dilute sulphuric acid, and then evaporating and crystallizing the solution; it is in slender, white, soft, and silky crystals, generally kept in powder, and it is soluble in water.

Morphiæ Acetas. — *Q.* What is its form and solubility? — *A.* It is in slender, needle-shaped crystals; united in bundles, and of easy solubility in water.

Q. Is morphiæ murias officinal? — *A.* No.

Q. What is the equivalent of *morphia sulphas* to a grain of opium? — *A.* The one-sixth of a grain.

Q. How is it given, and what is the officinal solution? — *A.* It is given in pill or solution; the officinal solution contains gr. i. to f℥i. of water.

Q. What is the dose of this solution? — *A.* From f℥i. — f℥ij.

Q. Are the salts of morphia ever applied externally? — *A.* Yes; sprinkled on blistered surfaces, &c.

Lactucarium. — *Q.* What is this, and what are its sensible properties, &c.? — *A.* It is the inspissated juice of the Lactuca sativa, or garden lettuce, which is absorbed from the broken stem by a sponge, and then pressed in a cup, and exposed until it becomes concrete; it is of a brownish colour, and of an odour and taste resembling opium; it yields its virtues to water and alcohol; it consists of a free acid, a narcotic principle, but contains no morphia.

Q. What is the dose? — *A.* Grs. ij. — iij.

Henbane Leaves — Hyosciami Folia — Henbane Seeds — Hyosciami Semen. — *Q.* What are these? — *A.* The leaves and seeds of the Hyosciamus niger; an herbaceous plant, a native of Europe.

Q. Describe the leaves and the seeds. — *A.* The recent leaves have a strong, disagreeable, aromatic odour, and muci-

laginous acrid taste; the dried leaves have little smell and taste; the seeds are small and yellowish; the virtues of both, which consist in a peculiar principle called hyosciamia, are imparted to water and alcohol.

Q. What is the dose of the leaves? — *A.* Grs. v. — x.

Extractum Hyosciami. — *Q.* What is this? — *A.* The inspissated juice, prepared by bruising the fresh leaves, sprinkling with water, and expressing and evaporating the juice; it is of a soft consistence at first, but gradually becomes harder.

Q. What are its sensible properties? — *A.* It is of a dark olive colour, with an unpleasant odour; and a bitterish, nauseous, and saline taste.

Q. What is the dose of the extract, and of the tincture? — *A.* The dose of the extract is from grs. ij. — iij.; tincture, dose, ʒi.

Hops — Humulus. — *Q.* What are these? — *A.* The fruit or strobiles of the Humulus lupulus; a vine; a native of Europe and America.

Q. What are the characteristics of hops? — *A.* They are conical in shape, of a pale green colour, becoming dark by age, and consist of numerous scales, which contain, at the base, two black seeds, and a powder called lupulin; they have a strong, aromatic odour, and a bitter, astringent, aromatic taste, and impart their virtues to water and alcohol; the active principles are a volatile oil and a bitter principle.

Q. What are the sensible properties of lupulin? — *A.* It is in a fine yellow powder, mixed with scales of the strobiles; and has the odour and taste of hops.

Q. In what forms are hops given, and what are the doses? — *A.* They are given in infusion, made with ℥ss. to Oj. of water; dose, ʒij.; tincture, dose, ʒss. — ʒi.; they are also used externally, as a poultice, &c.

Q. How is lupulin used? — *A.* In substance, dose, grs. vi. —xii; in tincture, dose, ʒj.—ʒij.

Camphor — Camphora. — *Q.* What is this? — *A.* The product of the Laurus camphora, an evergreen tree, growing in China and Japan.

Q. How is it obtained? — *A.* By sublimation from the roots and smaller branches, which affords the impure camphor, which is again refined and presented in cakes of a circular form, from one to two inches in thickness, convex on the one side and concave on the other, and perforated in the centre.

Q. Describe camphor and its sensible properties, &c.? — *A.*

It is white and translucent, unctuous to the touch, bitter, and of a tenacious crystalline texture. It has a peculiar odour, bitter, pungent, cooling taste, lighter than water, and very volatile. At a moderate temperature it melts and is inflammable.

Q. What are its relations to water and alcohol? — *A.* It is slightly soluble in water, soluble in alcohol, in ether, and the fixed oils. Water precipitates it from the tincture.

Q. What are its chemical constituents? — *A.* Carbon, oxygen, and hydrogen.

Q. How would you pulverize it? — *A.* By mixing it with alcohol.

Q. What are the forms of administration, and the doses? — *A.* In substance, grs. v.—x.; in emulsion, made with rubbing it up with gum, sugar and water; in camphor water, made by rubbing camphor, magnesia, alcohol and water together, the strength of it is ʒij. to Oj. of water. The dose is ℥j.—f℥ij.; tincture, made with camphor, ℥iv., to alcohol, Oij.; dose, gtts. v. to fʒj.

Q. How and in what forms is it used externally? — *A.* It is used in the camphorated tincture of soap, the camphorated soap liniment, and the comphorated liniment.

Q. What is the difference between the camphorated tincture of soap and the camphorated soap liniment? — *A.* The former is made with vegetable, the latter with animal oil.

Belladonna. — *Q.* Of what is this the product? — *A.* The leaves of the Atropa belladonna, or deadly nightshade, an herbaceous plant, native of Europe.

Q. What is the colour, odour, taste and smell of the dried leaves? — *A.* They are of a dull greenish colour, faint narcotic odour, and sweetish, subacrid, slightly nauseous taste.

Q. In what does its virtues reside? — *A.* In an alkaline principle, called *atropia.*

Q. What are its poisonous effects upon the system, and antidote? — *A.* Dryness of the mouth and fauces; great thirst; difficult deglutition; nausea and vertigo; the pupils of the eye dilated and insensible to light; feeble pulse; cold extremities; convulsions, &c. The antidote is to evacuate the stomach and administer mucilages, ammonia, and lime water.

Q. In what forms is it used, and what are the doses? — *A.* In substance; infusion, made with ℈j to f℥x. of water, dose f℥i.—f℥ij.; the extract, dose, grs. ¼ to ½, twice a day,

Q. In what other form is it used? — *A.* As a plaster and ointment.

Stramonium Leaves, Stramonii Folia, S. Root, Stra-

MONII RADIX, S. SEEDS, S. SEMEN. — *Q.* What is this? — *A.* The leaves, seeds, and roots of the Datura stramonium, an annual plant, growing every where.

Q. Describe the sensible properties, &c., of the leaves, seeds, and root. — *A.* The odour of the leaves is strong and fetid, with a bitter, nauseous taste. The seeds are small and kidney-shaped, dark brown in colour, inodorous, and of a bitter, nauseous, acrid taste, and the most powerful part of the plant. The root is yellowish-brown, and has not as much power as either the leaves or the seeds.

Q. In what does its active principle exist, and to what does it impart its virtues? — *A.* Its active principle is *daturia*, and it imparts its virtues to water and alcohol.

Q. What are its poisonous effects, and antidote? — *A.* They are similar to those produced by belladonna, and the antidotes are the same in both cases.

Q. What are the forms of administration and the doses? — *A.* In seeds, pulverized, dose, gr. j.; extract of the seeds, gr. $\frac{1}{4}$ to $\frac{1}{2}$; powdered leaves, gr. j. Externally it is used in the form of an ointment.

BITTER SWEET—DULCAMARA. — *Q.* Of what is this the product? — *A.* Of the Solanum dulcamara, or woody nightshade; a woody vine, growing in Europe and the United States.

Q. Describe this, and its sensible properties. — *A.* The twigs are of an ash-brown colour, consisting of a ligneous and cortical portion and pith, wrinkled externally; they emit, when bruised and fresh, a peculiar, rather nauseous smell; the taste is first bitter and then sweet.

Q. In what does its active principle consist, and to what does it impart its virtues? — *A.* Its active principle is solania, and it imparts its virtues to water and alcohol.

Q. How and in what forms is it given, and its dose? — *A.* In decoction, dose, f℥ij., four times a day; the extract is given in from gr. v. to x.

HEMLOCK LEAVES, CONII FOLIA—HEMLOCK SEED, CONII SEMEN. — *Q.* Of what are these the product? — *A.* Of the Conium maculatum, an umbelliferous plant, native of Europe, but naturalized in this country.

Q. When should the leaves be gathered, and what are their general characteristics? — *A.* They should be gathered when the plant is in flower, and quickly dried, and should be kept from the light and air. They have a green colour, heavy narcotic odour, and a bitter, nauseous taste, and impart their virtues to alcohol, ether, and moderately to water.

Q. Describe the seeds. — *A.* They are small, roundish,

ovate, striated, and composed of two plano-convex, easily separable parts; on the outer surface there are five crenated ribs.

Q. What is the active principle? — *A.* Probably *conia.*

Q. Is it not poisonous in large doses? — *A.* Yes.

Q. When an overdose has been given, what must be done? — *A.* Evacuate the stomach and bowels, and give mucilages.

Q. In what forms is it given, and the doses? — *A.* In the powdered leaves, dose, grs. iij. — iv.; extract, dose, grs. iij., three or four times a day.

SEDATIVES.

Arterial Sedatives.

Q. What are these? — *A.* Medicines which reduce the vital action of the heart and arteries.

ANTIMONY — ANTIMONIUM.—For chemical relations, &c., see *Chemistry.*

Q. Does metallic antimony produce any effect upon the system? — *A.* Yes, when powdered.

TARTRATE OF ANTIMONY AND POTASSA — ANTIMONII ET POTASSÆ TARTRAS. — *Q.* What is this chemically? — *A.* A double salt of the tartrate of potassa, and the tartrate of the sesquioxide of antimony.

Q. How is it prepared? — *A.* By taking prep. sulph. ant., acid. hydrochlor., acid nitric and water; mix the acids together, and add the sulph. of antimony; digest the mixture with heat, and pour it into the water, and then set it aside to crystallize. (See *Dispensatory.*)

Q. Describe the crystals, &c. — *A.* They are colourless and transparent when fresh, when exposed they become opaque, effloresce, and fall into a powder, which is inodorous, with a nauseous, styptic taste.

Q. What are their relations to water and alcohol? — *A.* They are freely soluble in water, insoluble in alcohol; time decomposes the aqueous solution.

Q. What are its incompatibles? — *A.* The mineral acids, the alkalies and their carbonates, sulphurets, lime-water, and the vegetable astringents.

Q. What are its poisonous effects and antidotes? — *A.* First, we have an austere metallic taste; followed by nausea and vomiting, with hiccup, pain in the stomach, fainting, small, frequent, accelerated pulse, and the general symptoms of malignant cholera. The treatment is to evacuate the stomach, allay vomiting, give mucilages, following it with green tea, infusion of bark, and support the strength, &c.

Q. What is the dose? — *A.* As an alterative, gr. $\frac{1}{4}$ to $\frac{1}{2}$ daily; as a sedative, gr. $\frac{1}{2}$ — $\frac{1}{6}$, or more; as an emetic, grs. i. — ij.

Antimonial Wine — Vinum Antimonii. — *Q.* What is this? — *A.* A solution of tartar emetic in wine, in the proportion of gr. ij. to f℥j.

Q. What is the advantage of this preparation? — *A.* It affords an excellent way of administering a minute dose, especially to children.

Q. What is the dose?—*A.* As an expectorant, gtts. x.—xxx.; as an emetic, gtts. xxx. — f℥j. — For children.

Antimonial Powder — Pulvis Antimonialis. — *Q.* Of what is this an imitation? — *A.* Of James's powder.

Q. How is it prepared? — *A.* By taking sulphuret of antimony, hartshorn shavings, mixed and placed in a crucible, heated to whiteness, and stirred till a vapour ceases to arise. (See *Dispensatory.*)

Q. What are its sensible properties and dose? — *A.* It is of a white colour, inodorous, tasteless, and insoluble in water; dose, grs. iij. — viij.

Nitrate of Potassa—Potassæ Nitras.—(See *Chemistry.*)

Q. How is it imported? — *A.* In a crude state, which is refined and crystallized after being received.

Q. Describe it, and its sensible properties, &c. — *A.* It has a white, striated appearance, with a sharp, cooling, and slightly bitter taste; it is semitransparent and inodorous, soluble in water, insoluble in alcohol.

Q. Has it any water of crystallization, and what are the effects of heat upon it? — *A.* Water is mechanically present in it, and moderate heat melts it, and red heat decomposes it.

Q. In very large doses is this not dangerous? — *A.* Yes.

Q. What are the antidotes in over-doses? — *A.* Administer ipecacuanha, with mucilaginous drinks; tr. opii, to allay pain and irritation, &c.

Q. What is the dose? — *A.* Grs. v. — x., in powder or solution, every hour or two; it is also given in combination with antimony and calomel.

Q. What are the nitrous powders? — *A.* Potassæ nitras, ℥i., ant. et potas. tart., gr. j., hyd. c. mit., gr. vj., made in six powders.

Q. Which are the principal vegetable acids used? — *A.* The citric and acetic. (See *Chemistry.*)

Q. How is citric acid prepared? — *A.* By saturating lemon juice with carbonate of lime, and the carbonate of lime is allowed to subside; it is then washed with water and decomposed by sulph. acid, and the citric acid remains in solution; this is concentrated

in leaden boilers until a pellicle forms, and then crystallized, and recrystallized before used.

Q. What is the strength of it in solution? — *A.* ℥j. — Oj. of water; and for lemonade, ℈j.—Oj. of water.

Nervous Sedatives.

Q. What are these medicines? — *A.* Those which, in their primary action, cause a reduction, both on the nervous powers and the force of the circulation.

Foxglove — Digitalis. — *Q.* What part is officinal? — *A.* The leaves of the Digitalis purpurea, a biennial, herbaceous plant, native in Europe, but cultivated in this country.

Q. What are its characteristics? — *A.* The leaves are ovate, upper surface green, under surface paler and softer; they should be dried in the sunshine and kept separate. The leaves, as prepared by the Shakers, are in oblong, compact masses.

Q. What are their sensible properties? — *A.* They have a bitter, nauseous taste, and the powder is fine deep green.

Q. To what does it yield its virtues? — *A.* To water and alcohol.

Q. When given in poisonous doses, what is its effect upon the system, and what is the antidote? — *A.* It nauseates and vomits, produces stupor and delirium, cold sweats, hiccup, convulsions, and syncope, &c. Antidotes are stimulants; as brandy, ammon. carb.; and if any digitalis is in the stomach, use diluents.

Q. How is it administered, and what are the doses? — *A.* In powder, dose, in chronic cases, gr. i., morning, noon, and night; in acute cases, gr. ss. to one-fourth, every three or four hours; infusion, made with ℥i. to Oss. of boiling water, with f℥i. of tr. cinnam; dose, f℥ss; dose of tincture, gtts. x., equal to one grain of powdered leaves.

Tobacco — Tobacum. — *Q.* What part of this is officinal? — *A.* The leaves of the Nicotiana tabacum, native of tropical America.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. What is its active principle? — *A.* Nicotia.

Q. What is the strength of the infusion? — *A.* ℥i. to Oj. of water, one-half to be given at a time, by injection.

Q. How else is it used? — *A.* As a poultice, and in snuff, &c.

Hydrocyanic Acid — Acidum Hydrocyanicum. — (See *Chemistry.*)

Q. Describe this acid. — *A.* It is transparent, colourless, volatile, having a taste, first cooling, afterwards irritating; has the odour of bitter almonds; it is decomposed by exposure.

Q. How is it used? — *A.* In the diluted form, of the sp. gr. 0·998.

Q. What must be done when its poisonous effects are produced? — *A.* Administer a strong emetic or purgative enemata, then stimulating liniments and mucilages should be used; and if cerebral congestion, bleed from the jugulars, and administer ammonia as an antidote.

Q. What is the dose? — *A.* Of the concentrated acid, one-half of a drop; of the officinal, gtt. i., every two or three hours.

EMETICS.

Q. What are emetics? — *A.* Medicines, in certain doses, and, as an ordinary result, capable of producing vomiting in the healthy state of the stomach.

Vegetable Emetics.

IPECACUANHA. — *Q.* What is the part used? — *A.* The root of the Cephaelis ipecacuanha; a small shrub, growing in Brazil and other parts of South America.

Q. Describe the root and its sensible properties. — *A.* It is of different lengths and the size of a goose-quill; having annular rugæ, and are contorted and twisted, and consist of a ligneous and cortical portion; the cortical portion is hard, horny, and semitransparent, and breaks with a resinous fracture, and is easily separated from the ligneous portion; it is of a deep brown, or reddish-brown colour, or reddish-gray or ash-coloured; hence, we have the brown, gray, and red varieties; the powder is light grayish-fawn, and has a nauseous odour; and the taste is bitter, acrid, and nauseous.

Q. What is the active principle? — *A.* Emetia.

Q. What is the dose? — *A.* As an emetic, grs xv. — xx.; as a nauseant, grs. ij. — iij.; as a diaphoretic, or expectorant, grs. ss. — ij.; as an alterative, grs. one-fourth to one-half, two, three, or four times a day.

Q. What is the dose of the wine of ipecacuanha? — *A.* For an adult, f℥i.; for an infant, f℥i.

Q. What other preparation has been used? — *A.* The syrup.

LOBELIA. — *Q.* What is the name of the plant from which this is derived? — *A.* Lobelia inflata, or Indian tobacco, an indigenous, herbaceous plant.

Q. When should it be collected? — *A.* In September.

Q. What are the sensible properties of the powder? — *A.* It is of a greenish-yellow colour, irritating odour; and when chewed, leaves an acrid taste on the tongue and palate.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. What are the effects of over-doses? — *A.* It produces extreme prostration, and death.

Q. In what forms is it used, and what are the doses? — *A.* In powder, grs. xv. — xx.; tincture, ʃʒi. — ʃʒii., every two or three hours, till it acts.

Mineral Emetics.

Tartar Emetic. (*Vide supra.*) — *Q.* What is its dose as an emetic? — *A.* Grs. ij. — iij., given in divided doses until it acts, or in combination with ipecacuanha, in the dose of — tart. emet., gr. i., to ipecac., gr. x.

Q. What is the dose of antimonial wine as an emetic? — *A.* For an adult, ʃʒi. — ʃʒss.; for a child of one or two years, gtts. xx. — xl.

Sulphate of Zinc. (*Vide supra.*) — *Q.* What is its dose as an emetic? — *A.* Ordinarily grs. x., but when the stomach is insensible, ʒss.

Sulphate of Copper. (*Vide supra.*) — *Q.* What is the dose as an emetic? — *A.* In ordinary cases, grs. ij. — iij., but when the stomach is insensible, grs. v. — xv., but not repeated too speedily.

CATHARTICS.

Q. What are these? — *A.* Medicines which produce evacuations from the bowels.

Vegetable Cathartics.

Manna. — *Q.* What is this? — *A.* The concrete juice of Fraxinus ornus, and other species of fraxinus growing in the south of Europe.

Q. How is it obtained? — *A.* From the juice, which exudes either spontaneously or from incisions made in the bark; the purest is collected in dry, hot weather, and is the flake manna.

Q. What are its peculiar features? — *A.* It is rough, white, light, porous, and brittle, and has a crystalline structure.

Q. What are the characters of the common and fat manna? — *A.* The common is the next in quality; whitish or yellowish

in colour, smaller than the flake, and mixed with a soft, viscid, uncrystallized mass; it is of a brown colour. The fat manna is a soft, viscous mass, yellowish-brown colour, and full of impurities.

Q. What are the sensible properties of manna, and what are its relations to water and alcohol? — *A.* It has a slight peculiar odour, sweet taste, which is very nauseous in the impure varieties; it is soluble in water and alcohol.

Q. What is the name of the saccharine principle? — *A.* Mannite: obtained by boiling manna in alcohol, letting the solution cool, and redissolving the crystalline precipitate; it is white, inodorous, crystallizable; in semitransparent, needle-shaped crystals.

Q. What is the dose of manna? — *A.* ℥j.—℥ij.

Purging Cassia — Cassia Fistula. — *Q.* What part of this is used? — *A.* The pulp of the fruit of the tree, growing in the East and West Indies.

Q. What is the character of the fruit, and the sensible properties of the pulp? — *A.* The fruit is in pods, cylindrical, slightly curved, with a woody shell; dark-brown externally; internally it has longitudinal shining bands, with shining septa, covered with a black pulp, which is extracted by first bruising the pods, then boiling them in water, and then evaporating the solution; or if the pods are fresh, taking the pulp out with a spatula: it has a slightly sickening odour, and sweet mucilaginous taste.

Q. What is the dose? — *A.* As a laxative, ʒj. — ʒij.; as a purgative, ℥j. — ℥ij. It is an ingredient in the confection of senna.

Castor Oil—Oleum Ricini. — *Q.* From what is this derived? — *A.* From the seeds of the Ricinus communis, a native of Africa, but cultivated in this country and Europe.

Q. What is the appearance of the seeds, &c.? — *A.* They are the size of a bean, oval, compressed, and obtuse at the extremities, very smooth and shining, ash coloured, and marbled with reddish-brown spots. Internally they are highly oleaginous, of a black colour and sweetish taste, followed by a slight acrimony.

Q. How is the oil extracted, and what are its sensible properties? — *A.* It is extracted in three ways: 1st, by decoction; 2d, by expression; 3d, by the aid of alcohol. The pure oil is a thick, viscid, colourless fluid, with little or no odour, mild and nauseous taste; as found in the shops it is slightly yellow.

Q. Is it soluble in alcohol? — *A.* Yes.

Q. What is the dose of oil? — *A.* For an adult, f℥j.; for a child, 3 or 4 months old, f℥j.

Q. How is it best administered? — *A.* In milk, hot water, hot coffee, with the tincture of gentian, and in emulsion.

Q. Are not olive oil, linseed oil, and melted butter cathartic? — *A.* Yes.

Rhubarb — Rheum. — *Q.* What is this medicine? — *A.* The roots of the different species of Rheum; herbaceous plants, growing in Central Asia, and cultivated in Europe.

Q. What are the different varieties. — *A.* The Russian, Chinese, and European. The Russian is the best.

Q. Describe the different varieties. — *A.* In the Russian, the pieces are irregular and angular; the hole in them only reaches to the centre, less compact and heavy, and cut less easily than the Chinese. The colour internally and externally is more lively than in other varieties, and the powder is of a buff colour; the odour and taste is aromatic. It stains the saliva yellow, and has a gritty feel under the teeth. The Chinese rhubarb is in cylindrical pieces; the hole passes all the way through them; the colour externally is dirty yellow; it is heavier and more compact than the Russian, and when broken presents variegated surfaces; it has an aromatic and bitter astringent taste, and stains the saliva yellow; the powder is browner than the Russian. The Chinese rhubarb is the variety most used. In the European rhubarb the pieces are longer than thick, sometimes flat or irregularly cylindrical; the texture is more ligneous and the powder more brown than the other varieties. Its odour is nauseous, taste astringent, and it is scarcely gritty under the teeth.

Q. What are the chemical constituents of rhubarb? — *A.* Rhubarberin, tannin, gum, starch, and oxalate of lime.

Q. To what does it impart its virtues? — *A.* To boiling water and to alcohol.

Q. What are the doses of it? — *A.* As a laxative, grs. v.—x. as a purgative, grs. xx.—xxx.

Q. What are the officinal preparations? — *A.* The infusion, made with ℥j. to Oss. of boiling water, dose, f℥ij.—℥ij.; tincture, dose, f℥j.—f℥j.; the tr. rhei et aloe; tr. rhei et gentian; tr. rhei et senna, or Warner's gout cordial, doses, f℥j.—f℥j.; syrup of rhei, dose, f℥j.—f℥ij.; the syr. rhei arom., dose, f℥j.—f℥ij.

Q. What effect has roasting on rhubarb? — *A.* It increases its astringent and decreases its purgative effects.

Senna. — *Q.* What is this medicine? — *A.* The leaves of

several species of cassia, viz., C. acutifolia, C. ovata, C. elongata; small shrubs growing in Africa and Arabia.

Q. What are the commercial varieties? — *A.* The Alexandria, Tripoli, and India.

Q. What are the sensible properties of senna? — *A.* The odour is faint and sickly; the taste is slightly sweet and nauseous, and bitter; the colour is green. The colour of the powder is also green.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. What is the active principle? — *A.* Cathartin.

Q. In what form is it given, and what are the doses? — *A.* In powder, ʒj.; infusion, made with ℥j. of senna, ʒj. of sem. card., to Oj. of water; dose, f℥iv., every four or five hours, or f℥ij. more frequently repeated.

Q. What is the dose of the tr. senna et jalap, or Elixir salutis? — *A.* Fʒij.—f℥ss.

Q. What is the composition and dose of the confection of senna? — *A.* The confection is composed of senna, coriander seed, liquorice root, figs, pulp of prunes, pulp of tamarinds, pulp of Cassia fistula, refined sugar, and water, dose ʒj.—℥ss.

Q. What is the name of American senna? — *A.* Cassia marilandica; it possesses the qualities of senna, but in a less degree, and the dose should be ½ greater than that of senna.

Extract of Butternuts — Extractum Juglandis. — *Q.* Whence is this obtained? — *A.* From the inner bark of the root of the Juglans cinirca.

Q. How is the extract prepared, and what are its sensible properties? — *A.* By boiling the bark down, and evaporating the decoction to a proper consistence. It has a black colour, astringent, bitter taste, and sweet odour.

Q. What is the dose? — *A.* Grs. xx.—xxx., as a purgative; grs. x.—xij., as a laxative.

Aloes — Aloe. — *Q.* What is this medicine? — *A.* The inspissated juice of the leaves of the Aloe spicata; A. socotrina, and A. vulgaris.

Q. Where are these produced? — *A.* The A. spicata at the Cape of Good Hope; the A. socotrina at the Island of Socotora, and the A. vulgaris in the West Indies.

Q. How is the aloe prepared for use? — *A.* The purest mode is by inspissating the juice placed in bladders or shallow vessels; the common kind is prepared by making a decoction and evaporating it.

Q. What are the commercial varieties, and which is the best?

—*A.* The commercial varieties are the Cape, Socotrine, and Hepatic. The Cape is the best.

Q. Which plants yield these varieties? —*A.* The cape is derived from the Aloe spicata. We are ignorant of the source of the socotrine, and also of the hepatic.

Q. What are the characteristics and sensible properties of the cape and socotrine aloes? —*A.* The cape aloes is in masses of different sizes, of a shining surface, translucent at the edges; has a resinous fracture, a strong disagreeable odour, and is of a dark olive colour; the powder is greenish-yellow. The socotrine aloes is in pieces of a yellowish, or reddish-brown colour, becoming darker by exposure; the surface is glassy, fracture smooth and conchoidal, with sharp and semitransparent edges, the powder is bright, golden yellow. It has a peculiar, not unpleasant odour, and a bitter disagreeable aromatic taste.

Q. What are the chemical constituents of aloes? —*A.* A peculiar principle, soluble in water and alcohol; and a flea-coloured powder, soluble in alcohol, but scarcely soluble in boiling water.

Q. To what does aloes impart its virtues? —*A.* To cold and hot water, and to alcohol.

Q. What is the dose of aloes? —*A.* As a laxative, grs. ij.—vj.; as a purgative, grs. x.—xv.

Q. What are its officinal preparations? —*A.* Pills of aloes and assafœtida, dose grs. x.—xx.; pills of aloes and myrrh, dose, grs. x.—xx.; compound rhubarb pills, dose grs. x.—xx.; powder of aloes and canella, dose, grs. x—xx.; tr. aloes, dose, ʃʒss.—ʃʒjss.; tr. aloes et myrrh, dose, ʃʒj—ʒij., &c.

Jalap—Jalapa. — *Q.* What medicine is this? —*A.* The root of the Ipomea jalapa, a vine, native of Mexico.

Q. What is the appearance of the root? —*A.* It is brought to market in transverse and vertical slices, and more frequently in pear-shaped tubers of various sizes; the dried tubers are compact, firm, heavy, and wrinkled, and of a dark colour externally; when broken they have a resinous fracture, and a grayish colour, diversified with a concentric arrangement of different matters, which are partly black and white; the dark coloured portion is the more efficient. The powder is yellowish-gray.

Q. What are its sensible properties, and to what does it yield its virtues? —*A.* The odour is sweet and nauseous; the taste is sweetish, acrid; the colour reddish. It imparts its virtues partially to water and alcohol, and entirely to diluted alcohol.

Q. What is its chemical nature? —*A.* A resin and gummy extract.

Q. Which is the more efficient, the resinous or the gummy portion? — *A.* The resinous.

Q. What is the dose of powdered jalap?—*A.* Grs. xv.—xxx.; and in combination, jalap, grs. x., and potas. bitart. ʒj.—ʒij.; or calomel and jalap, āā. gr. x. The dose of the resin is, grs. viii.—x.

Q. How is the extract prepared? — *A.* By taking the powdered jalap, alcohol and water, macerating the jalap in alcohol, pouring off the tincture, adding water to the residue and boiling down, and straining the decoction and mixture separately; distil the former and evaporate the latter; mix them together and again evaporate.

Q. What is the dose? — *A.* Grs. x.—xx.

Scammony—Scammonium. — *Q.* From what is this medicine made? — *A.* The inspissated juice of the root of the Convolvulus scammonia, which grows in Syria and Asia Minor.

Q. How is this prepared for use? — *A.* The earth is cleared from the root, the top cut off; the juice which exudes is collected in shells, and allowed to concrete.

Q. What are the commercial varieties, and describe them, &c.? — *A.* The Aleppo and Smyrna. The Aleppo is the best, and comes in saucer-shaped masses, which are heavy, and of a porous structure, or sometimes compact; has a faintly shining fracture; externally it is olive-gray, internally lighter, and becomes darker by exposure. It has the odour of old cheese from ewe's milk; the taste is bitter and slightly acrid; the powder is light coloured. The Smyrna comes in flat cakes; darker, more compact, heavier, and harder than the preceding; it has a dull, earthy fracture, and a bitter acrid taste, and is not as good as the Aleppo.

Q. What are its relations to water and alcohol? — *A.* It is dissolved by water and alcohol, and entirely by diluted alcohol.

Q. What is it chemically? — *A.* A gum resin.

Q. How is it used and in what preparation? — *A.* Generally in combination, and particularly in the comp. ex. colocy.; dose, grs. v.—x.

Black Hellebore—Helleborus.—*Q.* What part of the plant Helleborus niger is used? — *A.* The fibrils of the root. The plant grows in the south-east of Europe.

Q. What are their properties? — *A.* They are about the size of a straw, from four inches to a foot in length; smooth and brittle; and externally black or deep brown; internally yellowish-white. They have little smell, a bitter, nauseous, acrid taste, and lose their virtues by keeping and exposure; the powder is yellowish-brown.

Q. To what do they impart their virtues?— *A.* To water and alcohol; long boiling impairs their virtues.

Q. What other name has it? — *A.* Melampodium.

Q. How and in what quantity is this given? — *A.* In powder, grs. x.—xx.; in decoction, made ʒij. to Oj. of water, dose, fʒj.; tincture, fʒj.; extract, grs. xij.—xv.

Colocynth—Colocynthis. — *Q.* What is this medicine?— *A.* The fruit of the Cucumis colocynthis, a plant resembling the garden cucumber, growing in Turkey, Africa, and Asia.

Q. What is the appearance and sensible properties of the fruit? — *A.* It is globular, the size of a small orange, yellow and smooth when ripe, and containing a white, spongy, medullary matter, enclosing numerous seeds; the fruit is picked in the autumn, and dried quickly; it is kept in the shops in white balls, light and spongy, and abounding in seeds; the pulp is the only part used in medicine. It has a feeble odour, and a nauseous and intensely bitter taste.

Q. What is its active principle, and to what does it impart its virtues? — *A.* The active principle is Colocynthin. It imparts its virtues to water and alcohol.

Q. What is its dose? — *A.* Grs. v. — x.

Q. What is the composition and dose of the compound extract? — *A.* It is composed of pulp of colocynth, pulv. aloe, pulv. scammony, pulv. cardamom., Castile soap, and alcohol. The dose is grs. x.—xv.

Gamboge—Gambogia. — *Q.* What is this medicine? — *A.* The inspissated juice, supposed to be derived from the Stalagmitis cambogioides, or the Garcinia cambogia, natives of Asia.

Q. What is the appearance and sensible properties of the pieces? — *A.* They are in cylinders, sometimes hollow and flat, and agglutinated together. The surface is striated, of a dull orange colour, and breaks with a shining, smooth, conchoidal fracture, and translucent at the edges. The powder is bright yellow. It has no smell, very little taste at first, but afterwards acrimony is perceptible.

Q. What is it? — *A.* A gum resin.

Q. What are its relations to water and alcohol? — *A.* It is dissolved partly by water and partly by alcohol.

Q. What is the dose? — *A.* Grs. iij.—vj., in pill or emulsion.

Q. What is the composition of the compound cathartic pill? — *A.* Comp. ext. of colocynth, ext. jalap, calomel, and pulv. gamboge; dose, 3 pills.

Elaterium. — *Q.* From what is this derived? — *A.* From

the Momordica elaterium, or squirting cucumber; a vine similar to the common cucumber growing in Great Britain, but a native of Europe.

Q. What is the character of the fruit, and how is the elaterium obtained? — *A.* The fruit is oval, an inch and a half long and an inch thick; of a greenish or grayish colour, covered with prickles. The elaterium is the substance spontaneously deposited by the juice of the fruit, when separated and allowed to stand.

Q. Which is the best? — *A.* Clutterbucks.

Q. What are the characteristics of elaterium? — *A.* It is in thin, flat cakes or fragments; of a greenish-gray colour; bitter, acrid taste; light and pulverulent, inflammable, with little smell.

Q. What is the active principle? — *A.* Elaterin.

Q. What is the dose? — *A.* One-eighth of a grain of the best and one-half a grain of the common kind, every half hour till it operates; and of elaterin, from one-sixteenth to one-twelfth of a grain.

Croton Oil — Oleum Tiglii. — *Q.* Of what is this a product? — *A.* Of the seeds of the Croton tiglium; a small shrub, native of the East Indies.

Q. Describe the seeds. — *A.* They are larger than a grain of coffee; oblong, and rounded at the extremities; the shell is covered with a yellowish-brown epidermis, beneath which it is black and smooth; the kernel is yellowish-brown and abounds in oil.

Q. How is the oil obtained from the seeds, and how do we find it in the shops? — *A.* The oil is obtained by roasting and pressing the seeds; and, as found in the shops, is of an orange or yellowish colour; the odour is faint, and it has a peculiar acrid taste.

Q. What are its chemical constituents, and in what is it soluble? — *A.* It is partly soluble in alcohol, insoluble in water, and it contains an acrid and oleaginous principle.

Q. What is the dose? — *A.* Gtts. i.—ij., in pill of crumb-bread.

Q. What are its effects when externally applied? — *A.* It pustulates.

MINERAL CATHARTICS.

Sulphur. — (See *Chemistry.*)

Q. How is it prepared for medical uses? — *A.* By resublimation and washing.

Q. What names have been given to it when prepared? — *A.* Flowers of sulphur, sublimed sulphur, and washed sulphur.

Q. What are its sensible properties? — *A.* It is of a yellow colour, slight taste, and peculiar smell.

Q. In what is it soluble? — *A.* In the volatile and fixed oils, and insoluble in water and alcohol.

Q. What is the dose of it? — *A.* ʒi.—ʒij., as a laxative; or in smaller quantities, as an alterative.

Q. How is it used externally? — *A.* In the form of an ointment, made with sulphur, ℔i., adeps, ℔iv.; also in vapour.

Precipitated Sulphur — Sulphur Præcipitatum — Lac Sulphuris, or Milk of Sulphur. — *Q.* How is this prepared? — *A.* By boiling sulphur and lime together in water, filtering the solution, and adding sufficient muriatic acid to precipitate the sulphur, and washing it.

Q. What is the dose? — *A.* The same as sulphur.

Carbonate of Magnesia — Magnesiæ Carbonas. — *Q.* How is this obtained? — *A.* By decomposing sulphate of magnesia with carbonate of soda or potassa.

Q. How is it found in the shops, and what are its properties? — *A.* It is found in prisms and cubes; it is light, without smell, with little taste, of a white colour, and smooth to the touch.

Q. In what is it soluble? — *A.* It is slightly soluble in water, more so in cold than in hot, and entirely soluble in carbonic acid water.

Q. With what is it adulterated? — *A.* With lime; which may be detected by diluting the carbonate in solution with sulphuric acid, and then adding oxalate of ammonia, when oxalate of lime is precipitated.

Q. What is it chemically? — *A.* A subcarbonate.

Q. What is the dose? — *A.* From ʒi.—ʒij.

Magnesia. — *Q.* What names are sometimes given to this? — *A.* Calcined magnesia and Magnesia usta.

Q. How is this prepared? — *A.* By calcining the carbonate and then adding muriatic acid, by way of test, until no effervescence takes place.

Q. What are its sensible properties? — *A.* It is in a white powder, with a peculiar taste, without smell, and almost insoluble in water.

Q. What is this chemically? — *A.* A metallic oxide; of magnesia, one equivalent, and oxygen, one equivalent.

Q. What is peculiar in Henry's magnesia? — *A.* It is much heavier than the ordinary variety, smoother, and mixes with water more readily.

Q. What is the dose of magnesia? — *A.* For an adult, ʒi.; for a child two years old, from grs. x.—xx.

Q. How is it best administered? — *A.* By throwing the magnesia in water or milk, and stirring it.

Sulphate of Soda — Sodæ Sulphas. — *Q.* What is the common name for this? — *A.* Glauber's salt.

Q. Whence is it derived? — *A.* It sometimes is found native, and is also the salt remaining after muriatic acid is obtained. (See *Chemistry*).

Q. What is the appearance, sensible properties, &c., of the crystals? — *A.* They are in four and six-sided prisms, striated; they effloresce on exposure; they have a nauseous, saline taste; when heated, the crystals undergo watery fusion.

Q. What is its solubility? — *A.* It has different degrees of solubility according to the temperature; the temperature, at which it is most soluble is 91° Fahrenheit.

Q. What is the dose? — *A.* Of the crystallized salt, ʒj.—ʒij.; of the effloresced, one-half the quantity.

Q. How is it administered? — *A.* In combination with lemon-juice or tartaric acid.

Sulphate of Magnesia — Magnesiæ Sulphas. — *Q.* By what name is this usually known? — *A.* Epsom salts.

Q. What are its sources and modes of preparation, &c.? — *A.* It is one of the constituents of sea-water, also found in various springs; and formed by the action of sulphuric acid upon magnesite or other magnesian rocks.

Q. How is it found in the shops? — *A.* In needle-shaped crystals.

Q. Does it effloresce on exposure? — *A.* Yes, slowly.

Q. Is it soluble in water? — *A.* Yes, in equal weights of cold water, and in three-fourths its weight of boiling water.

Q. What is its taste? — *A.* Saline and bitter.

Q. What is its dose? — *A.* ʒi.

Sulphate of Potassa — Potassæ Sulphas. — *Q.* What was this formerly called? — *A.* Vitriolated tartar.

Q. How is it obtained? — *A.* As the residue left in retort after obtaining nitric acid. (See *Chemistry.*)

Q. Describe the crystals. — *A.* They are small, six-sided prisms, with a rough base, and very hard.

Q. For what are they used? — *A.* In the preparation of Dover's powder.

Q. In what are they soluble, and what effect has heat upon them? — *A.* They are soluble in nine parts of cold and four of warm water, and they decrepitate by the action of heat.

Q. What is the taste? — *A.* Nauseous and bitter.

Q. What is the dose? — *A.* ℥ss.—℥vj.

Bitartrate of Potassa — Potassæ Bitartras. — *Q.* What are the common names for this? — *A.* Cremor tartar, and crystals of tartar.

Q. What is the source of it, and how is it prepared? — *A.* It is obtained from the juice of the grape; the crude tartar sticks to the inside of wine-casks, from which it is taken, purified by dissolving and redissolving, and crystallizing. It is imported in crystals.

Q. What is their appearance, and how are they kept in the shops? — *A.* The crystals are white, in crusts and masses, agglutinated together; they are kept in the shops in a white powder.

Q. What is their taste, solubility, &c.? — *A.* The taste is sour; they are soluble in sixty parts of warm water, and insoluble in alcohol; time and exposure decomposes the solution.

Q. How is it administered, and what is the dose? — *A.* By dissolving it in warm water, allowing it to cool, then sweeten it; dose, f℥ss. — f℥i.

Tartrate of Potassa — Potassæ Tartras. — *Q.* What was this formerly called? — *A.* Soluble tartar.

Q. How is it prepared? — *A.* By taking carbonate of potassa, bitartrate of potassa, and boiling water; dissolving the carbonate of potassa in the water, and adding the bitartrate until effervescence ceases.

Q. Has it any water of crystallization? — *A.* No.

Q. What is its form, colour, &c.? — *A.* It is in white crystals, slightly deliquescent, with irregular summits; the taste is cooling and bitterish, and swells up, becomes blackened, and decomposed by heat.

Q. What effect have the acids and acidulous salts upon it? — *A.* They decompose it.

Q. What is the dose? — *A.* ℥ss.—℥i.

Tartrate of Potassa and Soda — Soda et Potassæ Tartras. — *Q.* What is the common name for this? — *A.* Rochelle salts.

Q. How is it prepared? — *A.* By dissolving carbonate of soda in boiling water, and adding, gradually, the bitartrate of potassa, and filtering, and crystallizing, &c.

Q. What is this chemically? — *A.* A double salt of the tartrate of potassa and soda.

Q. What is its appearance, properties, &c.? — *A.* The crystals are sometimes very large, right prisms, but, as ordinarily

found, are half prisms with unequal sides; they effloresce on exposure; their taste is saline and bitter; heat decomposes them. They are soluble in two and a half times their weight of cold, and much less of boiling water.

Q. What is the dose? — *A.* ʒi.—ʒiss.

Q. What is the composition of Seidlitz powders? — *A.* Sodæ et potas. tart., ʒij., sodæ bicarb., ℈ij., in a white paper; and acid tartaric, grs. xxxv., in a blue paper; each is to be dissolved separately in water, and taken in a state of effervescence when mixed together.

Phosphate of Soda — Sodæ Phosphas. — *Q.* How is this prepared? — *A.* By calcining bones, adding sulphuric acid and carbonate of soda, and macerating, washing, and crystallizing, &c.

Q. How is it kept in the shops, and what is its taste and solubility, &c.? — *A.* It is kept in large, white, efflorescent crystals; they have a pure saline taste, and are soluble in four times their weight of cold and twice their weight of boiling water.

Q. What is the dose? — *A.* ʒi.—ʒij.

Calomel. — *Q.* What is the officinal name for this? — *A.* Mild chloride of mercury, hydrargyri, chloridum mite. For preparation, &c., see *Chemistry*.

Q. What impurity sometimes exists in this, and how may it be freed from it? — *A.* The bichloride or corrosive sublimate, which may be freed from it by washing it with boiling water, and adding aqua ammonia until no precipitate forms.

Q. What are its properties? — *A.* It is a white, tasteless, inodorous, insoluble substance, unalterable in the air, but blackened by exposure to light; when in mass it is generally in crystalline cakes, the interior of which are horny and elastic in texture; sp. gr. 7·2.

Q. What are its incompatibles? — *A.* The alkalies and alkaline earths, the alkaline carbonates, soaps, hydro-sulphates, and, according to some, iron, lead, and copper.

Q. What is the peculiarity of Howard's calomel? — *A.* It is prepared by causing the calomel in vapour to come in contact with steam in the subliming vessel, whereby it is converted into an impalpable powder, and perfectly washed from corrosive sublimate.

Q. What is the character of calomel as a mercurial? — *A.* It is the best.

Q. What is the dose as a purgative? — *A.* Grs. v.—xx.; and if it does not operate freely, follow by castor oil or salts.

Q. With what is it often used in combination? — *A.* With

jalap, rhubarb, scammony, &c. The dose of calomel and jalap, āā. grs. x.

Q. What is the dose of calomel for a child? — *A.* Grs. iv.

Q. What is the dose of calomel as an alterative? — *A.* Gr. ss. to ij. every 2 or 3 hours.

ENEMATA.

Q. What are enemata? — *A.* Medicines in a fluid state injected into the rectum to facilitate the action of other medicines, or to operate upon the bowels when the stomach is too irritated to allow of their being introduced into the system through it.

Q. What is the composition of the common enemata? — *A.* Salt, molasses, lard, or olive oil, fʒss., and warm water, Oj.; and we may add ol. ricini, fʒij. The oil of turpentine, assafœtida, &c., have been used as ingredients in injections.

DIURETICS.

Q. What are diuretics? — *A.* Medicines which increase the secretion of urine.

Foxglove — Digitalis. (*Vide supra.*) — *Q.* Is not this a powerful diuretic? — *A.* Yes.

Q. What is the dose and preparation. (See *Nervous Sedatives.*)

Squill—Scilla. — *Q.* What part of this is officinal? — *A.* The bulb of the Scilla maritima, an herbaceous plant, native of the countries bordering upon the Mediterranean Sea.

Q. What are the varieties and characters of the bulbs, &c.? — *A.* There are two varieties, the white and red; the bulb is pear-shaped, of various sizes, consisting of scales, attenuated at the edges, closely applied to each other, and invested with a membranous coat. In the white variety the whole bulb is white. In the red variety the epidermis is red.

Q. How are they prepared for market, and how is it found in the shops, &c.? — *A.* They are prepared for market by slicing them transversely, and drying; the outer and central portions are removed. As found in the shops they are in irregular, oblong pieces, more or less contorted, and of a dull yellowish-white colour, with a reddish tint, brittle and pulverizable when perfectly dry. They have a feeble odour, and an acrid, nauseous taste.

Q. To what do they impart their virtues, and what is their

active principle? — *A.* They impart their virtues to water and alcohol. The active principle is scillitin.

Q. What are the effects of over-doses? — *A.* Hypercatharsis, strangury, bloody urine, inflammation of stomach and bowels, &c.

Q. What is the dose? — *A.* Grs. i.—iij., two or three times a day, gradually increased.

COLCHICUM ROOT, COLCHICI RADIX—COLCHICUM SEED, COLCHICI SEMEN. — *Q.* What is this medicine? — *A.* The root and seeds of the Colchicum autumnale, or meadow saffron.

Q. Describe this plant bulb, &c. — *A.* It is a perennial, bulbous plant, a native of the temperate parts of Europe, but is cultivated in this country; the bulb, which resembles the tulip in shape, has a brown, membranous coat; internally, solid and fleshy; and should be collected in July and August.

Q. How is it prepared for market, and what are its properties? — *A.* The bulb is cut into thin, transverse slices as soon as dug up, and these are spread out and dried by a moderate heat; the slices are flat and white on both sides, the odour of the fresh is disagreeable, and the taste hot and acrid.

Q. To what does the root impart its virtues, and in what do the virtues consist? — *A.* It imparts its virtues to water and alcohol, and vinegar; the active principle is colchicum or colchicia. Time injures its preparations.

Q. When should the seeds be collected, and what are their peculiarities? — *A.* They should be collected in July and August; they are small, spherical, and brown, and their virtues exist in the outer coating.

Q. What is the dose of colchicum? — *A.* Of the root or seeds in substance, grs. ij.—v., but they are not often given in this way; more frequently in the wine of colchicum root, vinum colchici radicis.

Q. How is this made? — *A.* In the proportion of one pound of the bulb to one pint of wine.

Q. What is the dose? — *A.* In acute cases, gtts. x.—xx., every 3 or 4 hours; in chronic cases, gtts. x.—xx., 3 times a day.

WINE OF COLCHICUM SEEDS—VINUM COLCHICI SEMINIS.— *Q.* In what proportion is this made, and what is the dose? — *A.* It is made, with ℥j. to Oj. of wine. The dose is from ss.—f℥ij.

WHITE HELLEBORE, VERATRUM ALBUM—AMERICAN HELLEBORE, VERATRUM VIRIDE. — *Q.* What parts of these are used in medicine? — *A.* The roots of the Veratrum album, and

Veratrum viride, herbaceous plants; the former a native of Europe, the latter a native of this country.

Q. Describe the roots and their sensible properties. — *A.* They are fleshy, fusiform, yellowish-white externally, and pale yellowish-gray internally; they have a disagreeable odour, which is lost by drying; the taste is first sweetish, then bitterish, acrid, burning, and durable.

Q. What is the active principle? — *A.* Veratria.

Q. Are not these roots dangerous medicines? — *A.* Yes.

Q. What is the dose of the powder? — *A.* Grs. ij.—viij.

Veratria. — *Q.* Whence is this obtained, and what are its sensible properties? — *A.* It is obtained from the cavadilla, the seeds of a Mexican plant. It is a white, pulverulent, uncrystallizable substance, inodorous, very acrid, and fusible by heat.

Q. In what is it soluble? — *A.* It is scarcely soluble in cold water, soluble in one thousand parts of boiling water, soluble in alcohol.

Q. In what way is it generally used? — *A.* In ointment, made with grs. xl., to adeps, ℥j.

Indian Hemp—Apocynum Cannabinum. — *Q.* What part of this plant is used? — *A.* The root.

Q. Where does this plant grow, and what are the characters of the root? — *A.* The plant grows in this country; the root is horizontal, one-third of an inch thick, of a yellowish-brown colour when fresh, but dark chestnut when old; it has a strong odour, and a nauseous, acrid, and permanently bitter taste; the fresh root when bruised emits a milky juice.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. In what form is it used, and what is the dose? — *A.* In decoction, by boiling ℥ss. in three half-pints of water to a pint; and the dose is from f℥j.—f℥ij., two or three times a day.

Dandelion—Taraxacum. — *Q.* What is this medicine? — *A.* The root of the Leontodon taraxacum, an herbaceous plant, growing in all parts of the world.

Q. Describe the root and its sensible properties, &c. — *A.* The root is several inches in length, thin, round, and tapering, of a brown colour externally, without smell, and has a sweetish, mucilaginous, bitter taste, and imparts its virtues to water and alcohol; time injures it.

Q. How is the decoction made, and what is the dose? — *A.* By boiling ℥j. of the dried, or ℥ij. of the fresh root, in Oj. of

water, down to a half pint; the dose is f℥ij., two or three times a day.

Q. When should the extract be prepared, and what is the dose? — *A.* The extract should be made in August, the dose grs. xx.--xxx.

Juniper Berries--Juniperus. — *Q.* Of what are these the first? — *A.* The Juniperus communis, an evergreen shrub, native of Europe, but naturalized in this country.

Q. What is the appearance and sensible qualities of the berries? — *A.* They are globular, more or less striated, the size of a pea; they are covered with a glaucous bloom; beneath which they are shining and blackish purple, and contain a brownish-yellow pulp, and three angular seeds. They have an agreeable aromatic odour, and a sweet, warm, bitterish, terebinthinate taste.

Q. What is their active principle, and to what do they impart their virtues? — *A.* Their active principle is the volatile oil of Juniper berries; they impart their virtues to water and alcohol.

Q. How is the oil prepared, and what is its colour? — *A.* The oil is prepared by distillation, and is at first green and afterwards yellow.

Q. How is the infusion made, and its dose? — *A.* ℥j. of the bruised berries are put to Oj. of water, and the dose is a pint daily.

Q. What is the dose of the oil? — *A.* Gtts. v.—xv.

Wild Carrot — Carota. — *Q.* What part of this is used? — *A.* The seeds of the Daucus carota, an indigenous herb.

Q. What is the character and sensible properties of the seeds? — *A.* They are very light, of a brownish colour, oval-shaped, flat on one side, and convex on the other; they have an aromatic odour, and a warm, pungent, bitterish taste.

Q. What is the active ingredient? — *A.* A peculiar volatile oil.

Q. How is it used, and what is the dose? — *A.* In infusion, made with ℥ss. of the seeds to Oj. of water, and the whole taken daily.

Q. Has not the garden carrot been used externally for a poultice when scraped? — *A.* Yes.

Q. Is not the root of the common parsley a very good diuretic? — *A.* Yes.

Turpentine — Terebinthina. — *Q.* What is this? — *A.* The juice of different species of the genera Pinus, Abies, and Larix.

Q. Of what does it consist? — *A.* Of a resin and peculiar volatile oil, called oil of turpentine.

Q. What are the varieties of turpentine used in the United States? — *A.* The common white turpentine, and the Canada turpentine.

Q. From what tree is the white turpentine derived? — *A.* From the Pinus palustris of the south.

Q. When is it collected, how is it brought to market, and what are its properties as found in the shops? — *A.* It is collected in the winter, brought to market in casks, and, as found in the shops, has a peculiar aromatic odour, warm, pungent, bitterish taste, and is of a white colour tinged with yellow, slightly translucent, and of a consistence varying with the temperature at different seasons of the year.

Q. What are the names for the Canada turpentine? — *A.* Terebinthinæ canadensis, Canada balsam, and balsam of fir.

Q. Of what is this the product? — *A.* The Abies, balsamifera, growing in the Northern States and Canada.

Q. Where is the turpentine found? — *A.* In the vesicles upon the trunk and branches, which, upon being broken, exude the turpentine.

Q. Describe it, and its sensible properties, &c. — *A.* When fresh it is colourless, or slightly yellowish and transparent, of the consistence of honey, tenacious, of a strong agreeable odour, and a bitter, somewhat acrid taste; it becomes more yellow and thicker by exposure, and then assumes a solid consistence.

Q. What are the effects of heat upon the turpentines? — *A.* They are rendered more liquid by heat, and take fire at a high temperature.

Q. What are their relations to water and alcohol? — *A.* Water extracts only a small quantity of the volatile oil; they are soluble in alcohol and ether, and readily unite with the fixed oils.

Q. What is their chemical composition? — *A.* A resin and volatile oil; their virtues reside in the volatile oil.

Q. What is the dose of turpentine? — *A.* Grs. x.—℥j., in pill or emulsion; or it is used externally as a liniment.

Tar—Pix Liquida. — *Q.* From what is this obtained? — *A.* From the Pinus palustris, or other species of Pinus of the Southern States.

Q. What are its properties? — *A.* It has a peculiar empyreumatic odour, bitter, resinous, acid taste, an almost black colour, and tenacious consistence.

Q. What is it chemically? — *A.* Resin, united with acetic acid and empyreumatic oil, coloured by charcoal.

Q. What are its relations to water? — *A.* It yields a small proportion of its constituents to water.

Q. What is the dose of tar and tar-water? — *A.* Of tar, ʒi. —ʒss.; of tar water, a pint or two in the day.

Q. How else has tar been used? — *A.* In vapour and ointment.

Q. What is the residue after the evaporization of the volatile oil of tar? — *A.* Pitch.

Creasote — Creasotum. — *Q.* Whence is this obtained? — *A.* From tar or crude pyroligneous acid. (See *Dispensatory.*)

Q. What are its properties? — *A.* When pure, it is a colourless, oleaginous liquid, greasy to the touch, volatilized by heat, and having a caustic, burning taste, and a penetrating, disagreeable odour, like smoked meat; sp. gr. 1·037.

Q. What are its relations to water and alcohol, &c.? — *A.* It forms two combinations with water; the one, of one part of creasote to eighty parts of water; and the other, of one part of water to ten of creasote; and unites, in all proportions, with alcohol, ether, and naphtha.

Q. What are some of its peculiar properties? — *A.* It prevents putrefaction and coagulates albumen.

Q. How is it used externally and internally? — *A.* Externally, in watery solution and in ointment; and internally, in the dose of gtts. i.—ij.; in emulsion, &c.

Resin — Resina. — *Q.* What is this? — *A.* The residue after the distillation of the oil from turpentine.

Q. What are the varieties? — *A.* Yellow and white; the yellow is the simple resin, the white is resin shaken in water while in a state of fusion.

Q. What are the properties of resin? — *A.* It is a smooth, brittle solid, of a yellowish colour, and semitransparent; when pure, it is inodorous, and insipid, fusible by heat, decomposed by a high temperature, and takes fire in the open air.

Q. What is its solubility? — *A.* It is soluble in water, soluble in ether and the essential oils, and in alcohol.

Q. For what is resin used? — *A.* As an ingredient in ointments and plasters.

Q. Of what particular ointment is it the basis? — *A.* Of the resin cerate (Ceratum resinæ), or basilicon ointment.

Q. What is the dose of the oil of turpentine as a diuretic? — *A.* Gtts. x.—xx., two or three times a day.

Copaiba. — *Q.* What is this commonly called? — *A.* Balsam of copaiva.

Q. Whence is it derived? — *A.* From the different species of the copaifera, growing in Brazil and Guiana.

Q. How is it procured from the tree, what is its appearance when first obtained, and how is it kept in the shops? — *A.* The juice is procured by making incisions into the stems and branches of the tree. As first obtained it is clear and colourless, and thin, but it soon acquires a thicker consistence and a yellowish tinge; and, as found in the shops, it is clear and transparent, of the consistence of olive-oil, of a pale yellow colour, a peculiar, not unpleasant odour, and a bitterish, hot, and nauseous taste.

Q. What are its relations to water and alcohol? — *A.* It is insoluble in water, but entirely soluble in absolute alcohol.

Q. What are its chief ingredients? — *A.* A volatile oil and resin; the former is probably the active principle.

Q. How is the oil obtained, and what are its properties? — *A.* It is obtained by distillation with water; at first it is colourless, but afterwards it has a fine green hue; it has the odour and taste of copaiba; when exposed, it becomes darker and thicker, and of greater density.

Q. What effect has a mixture with magnesia upon it? — *A.* It becomes hard, and easily formed into pills, which should consist of one-sixteenth of magnesia.

Q. What is its dose? — *A.* Gtts. x.—xxx., three times a day, in pill, capsule, or emulsion; and of the volatile oil, gtts. v.—xv.

Spanish Flies — Cantharis. (See *Epispastics.*)

Q. What is the dose as a diuretic? — *A.* Gr. i., two or three times a day; or of the tincture, gtts. x., frequently repeated.

Carbonates of Potassa. — *Q.* Which of these are used? — *A.* The carbonate and bicarbonate.

Q. How is the carbonate procured? — *A.* From the impure carbonate, by solution, recrystallization, &c.; it is a deliquescent salt.

Q. What are the impurities? — *A.* Foreign salts and earthy matters.

Q. How is the purer variety or salt of tartar prepared? — *A.* By rubbing potas. bitart. and potas. nitras. separately in powder, throwing them in a brass kettle heated to redness, and then preparing it as you would do the carbonate.

Q. How is it found in the shops, and what are its properties? — *A.* It is in a coarse, white, granular powder, with a nauseous, alkaline taste, and an alkaline reaction; it is soluble in water, but insoluble in alcohol.

Q. What is its dose? — *A.* Grs. x.—xxx., three or four times a day.

Q. How is the bicarbonate prepared? — *A.* By saturating a solution of the carbonate with carbonic acid gas; then filtering and evaporating the filtered liquor that crystals may form, taking care that the heat does not exceed 120° Fahrenheit; then dry the crystals.

Q. What are its properties? — *A.* It is in the form of white, inodorous crystals, permanent in the air, with a slight alkaline taste, dissolving in four times its weight of cold water, and in five-sixths of boiling water; it is sparingly soluble in alcohol: when too great heat is used, either in the form of boiling water or otherwise, it is decomposed.

Q. What is its dose? — *A.* ʒss.—ʒi.

Acetate of Potassa — Potassæ Acetas. — *Q.* What was this formerly called? — *A.* Sal diureticus.

Q. How is it prepared? — *A.* By saturating a solution of the carbonate of potassa with acetic acid; heating the mixture, and clearing the liquid with animal charcoal; and then evaporating it to dryness, until a pellicle is formed, which must be removed; and as soon as another pellicle is formed, it should be removed; and these pellicles placed in a well-stopped bottle.

Q. What are its properties? — *A.* It is a white, deliquescent salt, with a pungent, saline taste; soluble in half its weight of water, and twice its weight of alcohol.

Q. What is its dose? — *A.* ℈i.—ʒi., every two or three hours.

Bitartrate of Potassa. (*Vide supra.*)

Q. What is its dose as a diuretic? — *A.* ʒi.—ʒij., given daily in divided doses.

Nitrate of Potassa. (*Vide supra.*)

Q. What is its dose as a diuretic? — *A.* Grs. x.—xx., frequently repeated.

Spirit of Nitric Ether — Spiritus Ætheris Nitrici. — *Q.* What is the common name for this? — *A.* Sweet spirits of nitre.

Q. How is it prepared? — *A.* By taking nitrate of potassa, sulphuric acid, alcohol, and diluted alcohol and carbonate of potassa; mix the nitrate of potassa and the acid in a glass retort, pour in the alcohol gradually, and digest the mixture with a gentle heat, then raise the heat and distil. To the distilled liquor add the diluted alcohol and carbonate of potassa, and again distil.

Q. What are its properties? — *A.* It is a colourless liquid, of a grateful etherial odour; when fresh, it has a sweet, and when old, a sour taste; it is very volatile and inflammable.

Q. In what is it soluble, &c. ? — *A.* It is soluble in water and alcohol ; it has the same specific gravity as alcohol ; and is often diluted with alcohol.

Q. What is its dose ? — *A.* ℥ss.—ʒi., frequently repeated.

DIAPHORETICS.

Q. What are diaphoretics ? — *A.* Medicines which produce perspiration.

Q. Are not sudorifics and diaphoretics synonymous terms ? — *A.* Yes.

Q. What are the different classes of diaphoretics ? — *A.* The nauseating, refrigerant, and alterative.

Nauseating Diaphoretics.

Ipecacuanha. — *Q.* How is this used as a diaphoretic ? — *A.* Generally in combination with opium.

Q. How is the union of these two made more perfect ? — *A.* By combining them with the sulphate of potassa.

Q. What is the officinal preparation of this kind ? — *A.* The powder of ipecacuanha and opium, commonly called Dover's powder.

Q. What are the proportions of the ingredients in this powder ? — *A.* Pulv. opii, grs. ij. ; pulv. ipecac., gr i. ; potas. sulph., grs. viij.

Q. What is the dose of this powder ? — *A.* Grs. x., every four or six hours.

Tartrate of Antimony and Potassa. (*Vide supra.*)

Q. What is the dose of this as a diaphoretic ? — *A.* Grs. $\frac{1}{2}$—$\frac{1}{4}$ every hour or two.

Refrigerant Diaphoretics.

Citrate of Potassa. — *Q.* What is this ? — *A.* A soluble, deliquescent salt.

Q. In what two forms is it employed ? — *A.* In the form of neutral mixture, and the effervescing draught.

Q. How is the neutral mixture prepared ? — *A.* By saturating the carbonate or bicarbonate of potash with lemon-juice until effervescence ceases.

Q. What is the proportion of ingredients when the carbonate of potash is used ? — *A.* Lemon-juice, ℥iv., and add as much of the carbonate as will saturate it, and then filter, &c.

Q. What is the proportion when citric acid is used ? — *A.* Acidum citrici, ʒij., water, ℥iv.

Q. What is the dose of neutral mixture? — *A.* F℥ss., every hour or two.

Q. What is the composition of the effervescing draught? — *A.* Potassa carb. ℥iii.; aqua, f℥iv.; then add a table-spoonful of the solution to the same quantity of lemon or lime-juice, previously mixed with a tablespoonful of water, and give the mixture in the state of effervescence every hour or two.

Q. What is the taste of these solutions? — *A.* Pleasantly alkaline.

Q. What are sometimes added to these mixtures? — *A.* Tart. ant. et potas.; tr. opii.; spts. aeth. nit., &c.

Acetate of Ammonia. — *Q.* How is this salt employed? — *A.* In solution.

Q. What are the officinal and common names for it? — *A.* Officinally, liquor ammoniæ acetatis. The common name is spirits of Mindereris.

Q. How is it prepared? — *A.* By saturating distilled vinegar or dilute acetic acid with carbonate of ammonia.

Q. What is its colour and taste? — *A.* It is clear, with a pleasant aromatic taste.

Q. What is its dose? — *A.* F℥jss.—f℥j., repeated every two or three hours.

Nitrate of Potassa is also used as a diaphoretic. (*Vide supra.*)

Spiritus Ætheris Nitrici. (*Vide supra.*) — *Q.* What is its dose as a diaphoretic?— *A.* F℥ss.—f℥j., every two or three hours.

Alterative Diaphoretics.

Guaiacum Wood — Guaiaci Lignum — Guaiac — Guaiaci Resinæ. — *Q.* What is the name of the tree which produces these? — *A.* The Guaiacum officinale, a large tree growing in the West Indies and South America.

Q. How is guaiacum wood imported and kept in the shops, and what are its properties? — *A.* It is imported in billets, but kept in the shops in raspings or shavings. The external colour of the billets is yellow, the internal black, and when heated has a peculiar odour; and is bitter to the taste when long chewed.

Q. To what does it impart its virtues? — *A.* Slightly to water, and in a larger proportion to alcohol.

Q. What is the guaiac? — *A.* The concrete juice of the tree, obtained either by spontaneous exudation, or by making incisions in the trunk, or by acting upon the billets with fire, or by boiling the raspings, &c.

Q. How is it found in the shops, and what are its proper-

ties? — *A.* It is in reddish-brown lumps, when first prepared, but becomes of an olive colour, or greenish brown by exposure; it has a translucent, brittle, and shining fracture. The powder is at first grayish, but becomes green by exposure, and in hot weather cakes together. The taste is pungent, and the odour very feeble.

Q. What is it chemically? — *A.* A gum resin.

Q. What are its relations to water and alcohol? — *A.* Water acts slightly upon it; alcohol dissolves all, excepts its impurities.

Q. What is the dose of it in powder? — *A.* Grs. x.—xxx.

Q. What are the names of the officinal tinctures, and their doses? — *A.* The tinctura guaiaci, and the tinctura guaiaci ammoniata. The doses of each of these is fʒj., three or four times a day.

Q. In what decoction is this wood an ingredient? — *A.* In the compound decoction of sarsaparilla.

Mezereon — Mezereum. — *Q.* What is this? — *A.* The bark of different species of the Daphne, as the Daphne mezereum, &c.

Q. Describe the plant, &c. — *A.* It is a small, hardy shrub, with highly fragrant and pale rose-coloured flowers; it is a native of Europe.

Q. Describe the bark and its properties. — *A.* It is in long strips; externally it has a grayish epidermis, beneath which is a soft, greenish tissue; the inner bark is tough, pliable, fibrous and striated with a whitish colour; the recent bark has a nauseous smell, but the dry is inodorous; the taste is acrid.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. What are its principles? — *A.* A peculiar one, called daphnin, and an acrid resin, in which its virtues are thought to reside.

Q. How is it used, and what is the dose? — *A.* It is used in decoction, in the proportion of mezereon, ʒij., and liquorice root, ʒss.; boil this in Oiij. of water to Oij.; the dose is a teacupful four times a day.

Q. Is not this an ingredient in the comp. decoct. of sarsaparilla? — *A.* Yes.

Q. What is the effect of mezereon bark, when externally applied? — *A.* It produces inflammation.

Sassafras. — *Q.* What part of this is used? — *A.* The bark of the root of the Laurus sassafras, and the pith of the small twigs.

Q. What are the properties of the bark and the piths, as kept in the shops? — *A.* The bark is in irregular fragments, sometimes covered with a brown epidermis, and very brittle; its colour is like that of cinnamon; the odour is fragrant, and the taste sweet and aromatic. The pith is in white, slender, cylindrical pieces, light and spongy.

Q. To what does the bark impart its virtues, and what is its active constituent? — *A.* The active principle of the bark is a volatile oil, and the bark imparts its virtues to water and alcohol.

Q. How is the volatile oil procured, and what is its specific gravity? — *A.* The oil is procured by distillation; its sp. gr. 1·094.

Q. In what preparation is the bark used? — *A.* In the comp. decoc. of sarsaparilla.

Q. What is the dose of the oil? — *A.* Gtts. v.—x.

Q. For what is the pith used, and what are its proportions in its preparations? — *A.* It is used to impart its mucilage to water, as a collyrium, in the proportion of grs. x. to f℥j.—f℥ij. of water.

Sarsaparilla. — *Q.* Of what is this the root? — *A.* Of several species of Smilax, as the Smilax officinalis and syphilitica, natives of Mexico, West Indies, and South America.

Q. What is the character of the root as imported? — *A.* It is in bundles; the root is about the size of a goose-quill, wrinkled, and flexible, the cortical portion is thick; the colour is variegated, sometimes black, internally it is white, with little odour, and when taken into the mouth there is little taste, but afterwards there is a burning in the fauces.

Q. To what does it impart its virtues? — *A.* To water and alcohol; long boiling impairs its virtues.

Q. In what does its virtues reside? — *A.* In a peculiar principle, called sarsaparillin.

Q. What is the dose of the powder? — *A.* ℥ss.—℥j., three or four times a day.

Q. What is the composition of the compound decoction? — *A.* Sarsaparilla, sassafras, guaiacum wood, liquorice root, and mezereon. The dose is f℥iv., three or four times a day.

Q. What is the composition and dose of the syrup? — *A.* Sarsaparilla, guaiacum, red roses, senna, liquorice root, oil of sassafras, oil of aniseed, oil of gaultheria, sugar, and diluted alcohol; the dose is f℥ss.

Q. What is the dose of the alcoholic extract? — *A.* Grs. x.—xx. (There is also a fluid extract.)

EXPECTORANTS.

Q. What are expectorants? — *A.* Substances which increase and facilitate the discharge of mucous or other secretions from the membrane lining the air-cells and bronchial tubes, &c.

Q. Are not emetics in small doses expectorants? — *A.* Yes. Squill. (*Vide supra.*)

Q. How is this used as an expectorant? — *A.* In the form of the vinegar, syrup, oxymel, and tincture.

Q. How is the syrup or oxymel prepared from the vinegar, and what are the doses of the various preparations? — *A.* The syrup is formed by adding sugar to the vinegar, and the oxymel is formed by adding honey to the vinegar. The dose of the vinegar is ʒss.—ʒj.; the dose of the syrup or oxymel is ʒj.—ʒij.; the dose of the tincture, gtts. xxx.—xl.

Garlic—Allium.—*Q.* What is this? — *A.* The Allium sativum, or garden garlic of Europe, but cultivated in this country.

Q. What is the part used, and what are its properties? — *A.* The bulb is the part used; it is somewhat of a flattened sphere, and has the stem attached to it; it is covered with a white, dry, membranous envelope surrounding the cloves which are around the stem, each clove having a distinct envelope besides. The cloves have a peculiar odour, and a bitter acrid taste.

Q. In what do their virtues reside? — *A.* In a volatile oil.

Q. To what do the cloves impart their virtues? — *A.* To water, vinegar, and alcohol.

Q. What is the common form for administration? — *A.* The juice.

Q. What is the dose of it for a child? — *A.* ℥ss.—ʒj.

Seneka—Senega. — *Q.* What part is officinal? — *A.* The root of the Polygala senega, an herbaceous, perennial plant, native in this country.

Q. What is the character and sensible properties of the root? — *A.* The root is ligneous, with a large head, and tapering to a point, contorted, and appears as if a thread were inserted in the one side; the colour is yellowish or grayish-brown; the powder is gray; the odour is peculiar and strong in the fresh, but faint in the dry; the taste is sweetish and mucilaginous; and after a while irritating to the fauces. The cortical portion contains the more active part.

Q. What is thought to be the active principle, and to what does it impart its virtues? — *A.* The active principle is Senegin, and it imparts its virtues to water and alcohol.

Q. In what forms is it given, and what are the doses? — *A.* In powder, dose, grs. x.—xx.; in decoction, made by boiling, ℥j. of the bruised root with ℥i. of liquorice root in Ojss. of water, to Oj.; and the dose is, f℥i.—f℥ij., 3 or 4 times a day.

Q. What is the composition of the Syrupus scillæ compositus, or Coxe's Hive Syrup? — *A.* Squill, senega, tart. ant. et potass., clarified honey, and distilled water.

Ammoniac—Ammoniacum. — *Q.* What is the medicine used? — *A.* The inspissated juice of the Dorema ammoniacum, an umbelliferous plant of Persia.

Q. How is it obtained? — *A.* From punctures made in the bark of the shrub, whence the juice exudes and concretes.

Q. In what forms does it come to us, and what are their characters? — *A.* It comes in tears and masses; the tears which are the purest are in spherical pieces, from the size of a pin's head to that of a walnut; they have a yellow exterior, and interiorly they are white and shining; they are very brittle; the masses appear to be the tears of inferior quality agglutinated together; they are diversified in structure, and contain impurities.

Q. What are the sensible properties of ammoniac? — *A.* It has a peculiar smell, with a bitter, acrid, and sweet taste.

Q. What is it chemically? — *A.* Gum resin, with volatile oil.

Q. What are its relations to water and alcohol?—*A.* It is partly soluble in alcohol, and forms a milky emulsion with water.

Q. What is its dose? — *A.* Grs. x.—xxx., in pill or emulsion.

Q. What is an officinal preparation of it? — *A.* The pilulæ scillæ compositæ, composed of squill, ginger, hard soap, and ammoniac.

Assafœtida. (*Vide supra.*)

Q. What is its dose as an expectorant? — *A.* Grs. v.—xv., in pill or emulsion.

Balsam of Tolu —Tolutanum. — *Q.* What is this the product of? — *A.* The Myroxylon toluiferum; a tree growing in tropical America.

Q. How is the balsam procured, in what state is it imported, and how is it kept in the shops? — *A.* It is obtained from the juice exuded, it is collected in jars, and is imported in a semi-fluid state; as found in the shops, it is in various degrees of consistence, the colour is brown and translucent, the odour is fragrant and agreeable, the taste is warm, pungent, and penetrating.

Q. What are the effects of heat and exposure, and what are

its essential constituents? — *A.* It melts by heat, and inflames and diffuses its peculiar odour; by exposure it becomes hard and brittle; its constituents are resin, volatile oil, and benzoic acid.

Q. What are its relations to water and alcohol? — *A.* It is entirely dissolved by alcohol; water extracts its benzoic acid.

Q. How may the benzoic acid be separated from it? — *A.* By distilling it with water when the acid is sublimed.

Q. What are the properties of benzoic acid? — *A.* It is in soft, white, feathery crystals, of a silky lustre; when pure it is inodorous; it is inflammable; its taste is warm and acrid; it is a constituent characteristic of the balsams.

Q. In what preparation, and that only, is benzoic acid used? — *A.* Tr. opii, camph., or elixir paregoric.

Q. What is the dose of tolu? — *A.* Grs. x.—xxx., in emulsion.

Q. What is the dose of the tincture? — *A.* ℥i.—f ij.

Q. Does not the balsam of Peru possess qualities similar to tolu? — *A.* Yes.

EMMENAGOGUES.

Q. What are emmenagogues? — *A.* Medicines which favour the menstrual secretion.

Q. What medicines, which have been mentioned before, act in this way? — *A.* The preparations of iron, aloes, black hellebore, guaiac, &c.

Savine — Sabina. — *Q.* What is the medicine used? — *A.* The leaves of the Juniperus sabina, an evergreen shrub, native of Europe.

Q. What is the appearance of the plant? — *A.* Similar to the common red cedar of this country.

Q. What is the appearance and sensible properties of the leaves? — *A.* They are pinnate, of a green colour when fresh, ash-coloured when dry; they have a peculiar, strong, heavy, disagreeable odour, and a bitter and acrid taste.

Q. To what do they impart their virtues? — *A.* To water and alcohol.

Q. What is the active principle? — *A.* A volatile oil, called the oil of savine — Oleum sabinæ.

Q. What are the properties of the oil? — *A.* It is of a yellow, limpid, light colour, strong odour, and acrid taste.

Q. In what forms is savine given, and what are the doses? — *A.* In powder, dose, grs. v.—xx., two or three times a day; the oil, dose, gtts. ij.—v.

Spanish Flies. — *Q.* What is the dose of these as an emmenagogue? — *A.* The tincture is used generally; dose, gtts. x.—xxx., three times a day.

SIALAGOGUES.

Q. What are these? — *A.* Medicines which promote the secretion of saliva; as tobacco, or any substance or root when chewed.

ERRHINES.

Q. What are these? — *A.* Medicines which promote the secretion from the mucous membrane of the nostrils.

EPISPASTICS.

Q. What are epispastics? — *A.* Medicines which, when applied to the skin, produce a blister.

Spanish Flies — Cantharis. — *Q.* What are the names for the fly? — *A.* Cantharis vesicatoria, Meloe vesicatoria, and Lytta vesicatoria; natives of Spain and Italy.

Q. How are they procured, and what is their appearance? — *A.* They are obtained by shaking them from the trees and shrubs to which they adhere, and immersing them in vinegar and water; they are two-thirds of an inch in length, oblong, and of a golden-green colour.

Q. What is the colour, odour, and taste of the powder? — *A.* The powder is brownish-green, interspersed with shining particles, which are parts of the heads and wing cases of the fly; the odour is disagreeable, and the taste burning and urinous.

Q. To what do they impart their virtues? — *A.* To water and alcohol.

Q. When insects attack the powder what is the result? — *A.* Its virtues are injured.

Q. What is the active principle, and its appearance? — *A.* The active principle is cantharidin, a white, crystalline substance, of a shining, micaceous appearance, insoluble in water and cold alcohol, but soluble in ether and the oils.

Q. How is the cerate of Spanish flies, commonly called blistering ointment, prepared? — *A.* By taking powdered flies, yellow wax, resin, and olive oil; melting together, first the wax and resin, and then adding powdered flies, and stir the whole constantly until it cools.

Q. How is the ointment of Spanish flies prepared? — *A.* By

taking powdered flies and distilled water, and boiling down the water with the flies to one-half the original quantity; mixing cerate with the strained liquor, and evaporating to a proper consistence.

Q. How is the plaster of pitch and Spanish flies prepared? — *A.* By mixing together Burgundy pitch and fly cerate, by means of a water-bath, stirring constantly.

Q. How is the linimentum cantharidis prepared? — *A.* By taking powdered flies and oil of turpentine, digesting the flies in it for three hours, and then straining.

Potato Flies — Cantharis Vittata, or Lytta Vittata. — *Q.* Where are these native, and on what plants are they found? — *A.* They are native of this country, and are found upon the sweet-potato vines.

Q. What is their appearance? — *A.* They are less than an inch in length, with a head of a light red colour, and dark spots on the top; the wing cases are black, with a yellow, longitudinal stripe in the centre, with a yellow margin.

RUBEFACIENTS.

Q. What are these? — *A.* Medicines which, when externally applied, inflame the skin.

Mustard — Sinapis — *Q.* What is this medicine? — *A.* The seeds of the Sinapis alba and S. nigra, natives of Europe, but cultivated in this country.

Q. Describe the plants and the seeds. — *A.* The black mustard is a tall plant, with leaves of various characters; the flowers are small and yellow, the pods are smooth, and contain numerous seeds; the seeds are small and globular, of a brown colour externally, internally yellow; when whole they are inodorous, but when powdered they have a distinct smell; the taste is bitterish, hot, and pungent. The white mustard is a smaller plant than the black, the flowers are in racemes, the pods are spreading, rugged, and roundish, &c., the seeds are larger than the black, and of a yellowish colour, and of a less pungent taste than the black. They both are yellow in powder.

Q. What do they contain? — *A.* Mucilage, and a fixed oil.

Q. In what way is it used as a rubefacient? — *A.* By making a poultice with the powder in water, and spreading it on muslin or leather, &c.

Q. What two substances which we have described before are rubefacients? — *A.* Cayenne pepper, and oil of turpentine.

Burgundy Pitch — Pix Abietis. — *Q.* What tree produces

this? — *A.* The Abies communis, a large evergreen tree of the north of Europe, commonly called Norway spruce fir.

Q. How is it procured and prepared for use, and how is it found in the shops? — *A.* It is procured, &c., by laying bare the wood of the tree, and allowing the juice to concrete, and then taking and boiling it in water and afterwards straining it; as found in the shops it is in large, brittle, and opaque masses.

Q. What are its sensible properties, and the effects of heat upon it, &c.? — *A.* It is of a yellowish-brown colour, of a weak terebinthinate odour and taste, and becomes darker by exposure; it is fusible by heat.

Q. What is it chemically? — *A.* A gum resin.

Q. How is it used? — *A.* As a plaster.

Liquor Ammoniæ, or Solution of Ammonia. — *Q.* What is the ordinary name for this? — *A.* Water of ammonia, aqua ammoniæ.

Q. How is it prepared? — *A.* By passing the fumes arising from the combination of muriate of ammonia and lime into water.

Q. What is its odour? — *A.* Pungent and acrid.

Q. What are its relations to the oils? — *A.* It combines with them and forms soaps.

Q. What is volatile liniment? — *A.* A combination of one part of aqua ammoniæ with two or three parts of olive oil.

Q. What is Granville's lotion? — *A.* A combination of aqua ammoniæ, camphor, and rosemary.

ESCHAROTICS.

Q. What are these? — *A.* Substances which, when applied to any part of the body, destroys its life and produces a slough.

Q. What are some of these? — *A.* The actual cautery, or white-hot iron; the moxa, or small combustible masses to be burnt upon the skin; which are made of spunk, or cotton rolled up and saturated with a solution of nitre or bichromate of potassa, &c.

Potassa. — *Q.* What is this? — *A.* The common caustic.

Q. How is it prepared? — *A.* By evaporating a solution of potassa over the fire until ebullition ceases, and the potassa melts, and then pouring it into moulds.

Q. What is its appearance? — *A.* It is in cylindrical pieces, of various sizes; it has a dingy gray or green colour; it is very deliquescent, and should be kept in green glass bottles, with accurately fitted stoppers.

Q. What are its impurities? — *A.* The sulphate of potassa, chloride and peroxide of potassium, peroxide of iron, lime, &c.

NITRATE OF SILVER. — *Q.* What is the common name for this? — *A.* Lunar caustic. (See *Chemistry;* and ARGENTUM, under *Tonics.*)

Q. How is it applied? — *A.* Either in the solid stick, or in solution.

ARSENIOUS ACID — ACIDUM ARSENIOSUM. (See *Chemistry.*)

Q. How is this found in the shops, and for what may it be mistaken? — *A.* In a white opaque powder, without odour, and with a bitter, austere taste, and it may be mistaken for magnesia.

Q. Is not this a dangerous caustic? — *A.* Yes.

Q. Is it soluble in water? — *A.* Yes.

SULPHATE OF COPPER. (See *Chemistry, et supra.*) — *Q.* What is the proportion of it in its caustic solution? — *A.* ℈j.—f℥j. of water.

CORROSIVE CHLORIDE OF MERCURY — HYDRARGYRI CHLORIDUM CORROSIVUM. (See *Chemistry.*) — *Q.* What is this? — *A.* The bichloride of mercury or corrosive sublimate.

Q. How is this used? — *A.* In solution.

Q. In what state is it obtained by sublimation? — *A.* In a white, transparent, ponderous mass, with an acrid, styptic, durable taste. It is powdered for use.

Q. Is it soluble in water and alcohol? — *A.* Yes.

Q. What are its incompatibles? — *A.* Many of the metals, the alkalies, and their carbonates, soap, and lime water, tartar emetic, nitrate of silver, &c.

Q. Does it easily salivate? — *A.* No.

Q. When given in over-doses, what are its effects and the antidote?—*A.* It is a corrosive poison. The antidote is albumen and demulcents.

Q. What is its dose? — *A.* Gr. $\frac{1}{8}$ — $\frac{1}{4}$, three or four times a day, in pill or solution.

Q. Is the dried alum, or Alumen exsiccatum, very efficient as a caustic? — *A.* No.

Q. How is it prepared? — *A.* By driving off the water of crystallization, by heat, from common alum.

Q. Which of the mineral acids are used as caustics — *A.* The sulphuric and nitric.

DEMULCENTS.

Q. What are these? — *A.* Unirritating substances, which form with water a viscid solution.

Q. What are their constituents? — *A.* Gum sugar and starch.

Gum Arabic—Acacia. — *Q.* Of what is this the product? — *A.* Of different species of Acacia, thorny trees, growing in Africa and Arabia.

Q. How is it procured, and what are the varieties used in medicine? — *A.* It exudes spontaneously from the bark of the trunk and branches; and hardens by exposure; it reaches us from Smyrna, Trieste, Marseilles, &c.; and the varieties used in medicine are the Turkey and Senegal.

Q. Describe these varieties. — *A.* Turkey gum consists of small, irregular fragments, slightly tinged with yellow, and is the best. The senegal gum is in roundish, unbroken pieces, of a yellowish or reddish-brown colour, larger than the turkey gum, and less brittle and pulverizable.

Q. What are the sensible properties of gum? — *A.* It has various tinges of colour; it is inodorous, of a feeble, sweetish taste, and when pure dissolves entirely in the mouth. Its powder is white.

Q. In what is it soluble? — *A.* In water.

Q. What are the effects of exposure upon the solution? — *A.* It thickens it, and it ferments.

Q. For what is it chiefly used? — *A.* As a vehicle for other medicines, to make pills, and as a diluent drink.

Tragacanth—Tragacantha. — *Q.* Of what is this the product? — *A.* Of several species of Astragalus, small, thorny shrubs of Greece, and Asia Minor.

Q. How is it collected, and what are its properties, &c.? — *A.* It exudes spontaneously during the summer from the stems and branches of the shrubs, and hardens, assuming various shapes; of a whitish colour, translucent, and resembling hone; it has very little smell or taste.

Q. How is it pulverized? — *A.* By exposing it to great cold, or to great heat, and pounding it in a heated mortar.

Q. Does it dissolve in water? — *A.* No; but it forms a very adhesive paste with it.

Q. What is its composition? — *A.* Gum and bassorin.

Slippery Elm Bark — Ulmus. — *Q.* What is this? — *A.* The inner bark of the Ulmus fulva or slippery elm, an indigenous tree.

Q. How is the bark prepared? — *A.* The bark is stripped from off the tree, and the epidermis separated from it, and the bark is then dried.

Q. Describe it. — *A.* It is in long, nearly flat pieces, of a

fibrous texture, of a tawny colour, of a sweetish, not unpleasant taste, and odour; it is very mucilaginous, and imparts its mucilage to water.

Q. How is the infusion prepared? — *A.* In the proportion of ℥j. to Oj. of water.

Q. For what is the powder used? — *A.* To make poultices.

Flaxseed—Linum. — *Q.* Of what is this the product? — *A.* The Linum usitatissimum, or common flax.

Q. What are the active principles? — *A.* A fixed oil, and mucilage.

Q. How is the oil prepared? — *A.* By expression.

Q. What is the appearance of the oil? — *A.* It is of a yellowish-brown colour, of a disagreeable odour and nauseous taste.

Q. How do you extract the mucilage? — *A.* By hot water.

Q. How is the infusion made? — *A.* With the seeds, ℥j. to Oj. of water.

Q. For what are the powdered seeds used? — *A.* To form poultices.

Liquorice Root — Glycyrrhiza—Liquorice—Extractum Glycyrrhizæ. — *Q.* Of what is this the root? — *A.* Of the Glycyrrhiza glabra, a plant, native of the south of Europe, and it comes from Messina and Palermo in Sicily.

Q. Describe the root, &c. — *A.* It is in long pieces, varying in thickness, fibrous, and externally grayish-brown and wrinkled; internally, yellowish and without smell, of a sweet, mucilaginous taste, with now and then a slight acrimony. The powder is grayish-yellow.

Q. To what does it impart its virtues? — *A.* To water.

Q. What is its peculiar principle? — *A.* Glycyrrhizin.

Q. In what form is the root used? — *A.* In decoction, ℥j. to Oj. of water; in powder to prepare pills, &c.

Q. How is the extract prepared, and what are its sensible qualities, &c.? — *A.* It is made by cutting up the root, boiling it in water until the liquid is saturated, straining the decoction and evaporating it. It is in cylindrical rolls, very black, brittle, and dry; breaks with a shining fracture; it has a sweet, slightly acrid or bitterish taste, and is soluble in water.

Q. What are its impurities? — *A.* Starch, sand, juice of prunes.

Q. What is the appearance of the refined liquorice? — *A.* It is in small, brilliantly black pieces, of the size of a quill.

Sago. — *Q.* Of what is this the product? — *A.* Of the Sagus rumphii, or sago palm of the East Indies.

Q. Whence is it obtained, and how is it prepared? — *A.* It is obtained from the pith of the trunk of the tree in the shape of a coarse powder, which is mixed with water, afterwards strained, allowed to subside; and the farina left in solution is worked up.

Q. What are the two varieties? — *A.* The pearl and common sago.

Q. What are the characters of the two varieties? — *A.* The pearl sago is in small grains, of the size of a pin's head, and white, inodorous, and with little taste. The common sago is in larger grains, of more unequal size, of a duller aspect, and mixed with a more or less dirty powder.

Q. What are its relations to water? — *A.* It is insoluble in cold water, and by long boiling, at first becomes soft, transparent, ultimately gelatinous; it is almost all starch.

Q. What are the proportions for the decoction? — *A.* ℥j. to Oj. of water.

Tapioca. — *Q.* Of what is this the product? — *A.* The Jatropha mannihot, a plant of tropical America, but cultivated in the West Indies, Brazil, &c.

Q. What are the two varieties? — *A.* The sweet and the bitter; the sweet is perfectly harmless in the recent state, while the bitter is poisonous.

Q. How is the tapioca prepared? — *A.* By washing, scraping, and grating the root of the plant to a pulp, which in the acrid variety is submitted to pressure and heat, so as to separate the deleterious juice, &c.

Q. Describe tapioca. — *A.* It is in the shape of hard, white, rough grains, with little taste, and partially soluble in cold water.

Arrow-Root—Maranta. — *Q.* What is this the product of? — *A.* The Maranta arundinacea and other species; plants of the West Indies, and cultivated in the United States.

Q. Whence is it obtained, and how is it prepared? — *A.* It is obtained from the root by first washing the root, then beating it into a pulp, which is thrown in water, and agitated to separate the starch from the fibrous portion, the fibres are removed by the hand, the starch remains in the water, the water is strained and the starch allowed to subside, and this is again washed and dried in the sun.

Q. What are the sensible properties, &c., of arrow-root as brought to market? — *A.* It is a light, white powder, or in

small pulverulent masses, without smell or taste. It is highly demulcent and nutritious, and forms an excellent article of diet.

Q. Is it liable to mustiness? — *A.* Yes.

Q. How is it used? — *A.* By boiling it in water or milk, in the proportion of ʒj. to Oj. of water or milk, and flavouring it with spices, sugar, &c.

Q. What is frequently substituted for arrow-root? — *A.* The starch of the potato.

Barley—Hordeum.—*Q.* How is barley prepared for medical purposes? — *A.* By depriving the grains of their hulls, and afterwards rounding and polishing them in a mill.

Q. What is its appearance as thus prepared, and what name does it assume? — *A.* It is in round or oval grains, the longitudinal furrow of the seeds still existing upon them, and of a pearly whiteness; hence called pearl barley.

Q. What are the constituents of pearl barley? — *A.* It abounds in starch, with some gluten, sugar, and gum, but is destitute of hordein.

Q. How is it used? — *A.* In decoction.

Q. How is barley water made? — *A.* By first boiling the barley with a little water for a short time, then throwing this water away, and then boiling the barley again in fresh water, and adding sugar, lemon-juice, liquorice-root, raisins, &c.

ANTACIDS.

Q. What are these? — *A.* Substances capable of neutralizing acids.

Q. Which of these have been mentioned under previous heads? — *A.* Carbonates of potassa, ammonia and its preparations, magnesia and its compounds, &c.

Carbonate of Soda—Sodæ Carbonas. — *Q.* From what is the medical carbonate formed? — *A.* From the impure carbonate.

Q. What is its appearance? — *A.* It is a white, efflorescent salt, crystallizing in large rhamboidal prisms, opaque without but semi-transparent within.

Q. What is its taste and insolubility? — *A.* It has an alkaline caustic taste, and is easily soluble in water.

Q. How is it best prepared for use? — *A.* By drying it.

Q. What is the dose of the dry or anhydrous salt? — *A.* Grs. x.—xxx.

Bicarbonate of Soda — Sodæ Bicarbonas. — *Q.* What was this formerly called? — *A.* The supercarbonate.

Q. How is it prepared? — *A.* By saturating a solution of the carbonate with carbonic acid gas, then crystallizing it.

Q. What is its taste and solubility? — *A.* It is slightly alkaline and very soluble.

Q. What is the dose? — *A.* ʒss.—ʒj.

Lime — Calx. — *Q.* How is this employed? — *A.* In solution, as lime water.

Q. How is this prepared? — *A.* By taking half a pound of lime and twelve pints of water, shaking them well together and allowing the lime to subside, and keeping it in well-stopped bottles.

Q. What effect has exposure upon it? — *A.* It takes carbon from the air, and becomes milky, or a carbonate of lime is formed.

Q. How is the carbonate of lime used? — *A.* In the form of chalk.

Q. How is this prepared for use? — *A.* By washing a solution of common chalk with water, then allowing the chalk to subside, and then pouring off the water.

Q. What is the dose of this? — *A.* Grs. x.—xx.—xxx.

ANTHELMINTICS.

Q. What are these? — *A.* Medicines capable of destroying worms in the alimentary canal.

Pink Root—Spigelia.—*Q.* What is this? — *A.* The root of the Spigelia marilandica, a perennial plant of the Southern States.

Q. What are the characteristics of the root? — *A.* It consists of numerous, slender-branched, crooked, wrinkled fibres, from 3 to 6 inches in length, attached to a knotty head. It is of a yellowish-brown colour externally, of a faint smell, and a sweetish, slightly bitter taste. Its powder is fawn-coloured.

Q. To what does it yield its virtues? — *A.* To water and alcohol.

Q. In what form is it used, and what are the doses? — *A.* It is used in powder; for a child, grs. x.—xx., night and morning; in infusion, made with ʒss. to Oj. of water; dose, fʒss.—fʒj., 2 or 3 times a day.

Worm Seed—Chenopodium.—*Q.* What is this medicine? — *A.* The seeds of the Chenopodium anthelminticum, or Jerusalem oak, an indigenous plant.

Q. In what do the properties of the plant exist? — *A.* In the volatile oil.

Q. What is the appearance of the seeds? — *A.* They are about the size of the head of a pin, irregularly spherical, very light, and of a dull greenish-yellow colour, and when deprived of their capsule are shining and of a dark colour.

Q. How is it administered, and what is the dose? — *A.* In the seeds powdered, dose, ℈j.—℈ij.

Q. Is the volatile oil officinal? — *A.* Yes.

Q. How it is procured? — *A.* It is procured by distillation, and is of a light yellow colour when recently distilled, but becomes brown by age.

Q. What is its dose? — *A.* Gtts. iv.—viij. night and morning.

Cowage—Mucuna.—*Q.* What is this the product of? — *A.* The Mucuna pruriens, a climbing plant of the West Indies.

Q. What is the appearance of the fruit? — *A.* It is a pod, semilunar in shape, covered with brown hairs, which are easily separated from it; the brown hair is the part used.

Q. How is it administered? — *A.* With molasses and syrups.

Q. What is the dose of it? — *A.* For an adult, ℥ss.; for a child 3 or 4 years old, ℥j.

Q. What other articles are anthelmintic? — *A.* The bark of the pomegranate root, oil of turpentine, tin, and calomel.

MEDICINES UNCLASSIFIED.

Ergot—Ergota. — *Q.* What other names has this? — *A.* Spurred rye, or Secale cornutum.

Q. Of what is this the product, and how is it supposed to be formed? — *A.* It is the product of the common rye, occurring in marshy districts, and supposed to be caused by a diseased state of the grain; of the primary cause of this diseased state authors differ. (See *Dispensatory.*)

Q. Describe the ergot. — *A.* The grains are from six lines to an inch in length, from half a line to a line in thickness, curved and marked with a longitudinal groove; they are of a light brown colour externally, yellowish-white within, and of an unpleasant smell and acrid taste.

Q. To what does it impart its virtues? — *A.* To water and alcohol.

Q. In what form is it administered, and what are the doses?

—*A.* In powder, dose, grs. x.—xx.; in wine, dose, f℥j.—℥iij.; in infusion, made by adding ℥j. to f℥iv. of water, dose, f℥j.

Nux Vomica.—*Q.* What is the tree from which this is derived, and what is the part used? — *A.* The tree is the Strychnos nux vomica of the West Indies; the seeds is the part used.

Q. Describe the seeds. — *A.* They are flat and circular, somewhat curved, three-quarters of an inch in diameter; they are covered with fine, silky, ash-coloured hairs, attached to a thin membrane investing the kernel, which is hard and horny-whitish, and of difficult pulverization; they have no odour, but a very bitter, acrid taste.

Q. What are the active principles, and to what do they impart their virtues? — *A.* The active principles are strychnia and brucia; the more important is strychnia: they impart their virtues to water and alcohol.

Q. Describe strychnia. — *A.* When rapidly crystallized it is in the form of a white, granular powder, without odour, but of a very bitter, acrid, slightly metallic taste; it is neither volatilizable or fusible, and is only melted at the point of decomposition. It is slightly soluble in water, but more so in alcohol,

Q. From what is strychnia obtained for use? — *A.* From the bean of St. Ignatius.

Q. What are the poisonous effects of nux vomica or strychnia? — *A.* Great anxiety of countenance, difficult and confined respiration, universal tremors, and violent convulsions.

Q. What is the dose of nux vomica and strychnia? — *A.* Of the powder of nux vomica, grs. v.; of alcoholic ext. gr. ss.—ij.; strychnia, gr. $\frac{1}{12}$th to $\frac{1}{6}$th.

Q. How is strychnia used externally? — *A.* By sprinkling it upon blistered surfaces.

Arsenic. (See *Chemistry.*)—*Q.* Is arsenic probably inert in the metallic state? — *A.* Yes.

Q. Is not the preparations of arsenic in large doses poisonous? — *A.* Yes.

Q. How would you treat the poisonous effects of arsenic? — *A.* By first evacuating the stomach, then administering the hydrated sesquioxide of iron, in large doses, followed by demulcents.

Q. How is this only antidote for arsenic prepared? — *A.* By treating a boiling solution of crystallized sulphate of iron with nitric acid, as long as orange-coloured fumes are given off; then diluting and filtering the liquor, and then precipitating by

an excess of ammonia; wash the precipitate, keep it under water, and give it in any amount.

Q. What two preparations of arsenic are recognised in medicine? — *A.* The arsenious acid, and the solution of the arsenite of potassa, or Fowler's solution. (See *Chemistry.*)

Q. What is the dose of these two? — *A.* Of arsenious acid, gr. one-twelfth, in pill; of Fowler's solution, gtts. x., two or three times a day.

Preparations of Mercury — Mercurial Ointment — Unguentum Hydrargyri. — *Q.* How is this made? — *A.* By taking purified mercury, lard, and suet; rub the mercury with the suet and a small portion of lard till the globules disappear, then add the remainder of the lard, and mix the whole thoroughly.

Q. What is its appearance? — *A.* Bluish when fresh; but it becomes darker when kept.

Mercurial Pills — Pilulæ Hydrargyri. — *Q.* What is the ordinary name for these? — *A.* Blue pills.

Q. How are they prepared, and what is the dose? — *A.* They are made by rubbing together purified mercury, confection of roses, and powdered liquorice, until all the globules of mercury disappear.

Q. What is the officinal pill? — *A.* Grs. iij.

Q. What is the dose of it? — *A.* One pill three times a day, or one night and morning.

Mercury with Chalk — Hydrargyrum cum Creta. — *Q.* How is this prepared? — *A.* By taking purified mercury and calc. carb. (prep.), and rubbing them together until all the globules of mercury disappear.

Q. What is the dose? — *A.* Grs. v.—xx., twice a day.

Red Oxide of Mercury—Hydrargyri ox. Rubrum, or Red Precipitate. — *Q.* How is this prepared? — *A.* By boiling, in a glass vessel, with nitric acid and distilled water, purified mercury until it is dissolved; a white mass will remain after the water is evaporated; rub this in a powder, and throw it into a shallow vessel, and apply heat, and gradually increase the heat until red vapours cease to rise.

Q. What is its appearance? — *A.* Of a brilliant red colour, shining and scaly, with a shade of orange.

Q. Is it soluble in water? — *A.* Yes, slightly.

Q. What is the name of the officinal ointment? — *A.* Unguentum hydrargyri oxidi rubri.

Q. How is the nitrate of mercury used? — *A.* In the form

of an ointment, called citrine ointment (unguentum hydrargyri nitratis).

Q. What is the colour of the ointment? — *A.* When recently prepared it is of a beautiful yellow colour, but it becomes greenish by time. (For the other and numerous preparations of mercury, see the *United States Dispensatory.*)

Iodine — Iodinum. — (For its preparation and chemical relations, see *Chemistry.*)

Q. What are its characteristics? — *A.* It is of a soft, friable, opaque solid, in crystalline scales; of a bluish-black colour, and metallic lustre; it has a strong, peculiar odour, and an acrid taste; it is slightly soluble in water, and much more soluble in alcohol and ether.

Q. What is the dose of it? — *A.* From $\frac{1}{4}$ to $\frac{1}{2}$ a grain, three times a day.

Q. What is the proportion of iodine in the tincture, and what is the dose? — *A.* The iodine is in the proportion of ℥ss., to alcohol, Oss.; the dose is from gtts. x.—xv.

Iodide of Potassium—Potassii Iodidum.—*Q.* How is this prepared? — *A.* By applying heat to a solution of potassa; and adding, by degrees, sufficient iodine to saturate the potassa and give to it a brown colour, and then passing through it hydrosulphuric acid gas till it loses its brown colour, and retains the odour of the acid; then filter through paper, and after throwing hot water on the residue filter again, boil the filtered liquor for a short time, clear the liquor from any impurities, and boil to dryness.

Q. Describe it. — *A.* It is a deliquescent salt, of an opaque, white colour, with an acrid and slightly bitter taste; it is soluble in two-thirds of its weight of cold water and is converted into the hydriodate; it dissolves freely in alcohol.

Q. What is its dose? — *A.* Grs. v.—x., 2 or 3 times a day.

Q. What is the advantage of the solution? — *A.* It affords an easy method for dissolving iodine.

Compound Solution of Iodine—Liquor Iodini Compositus. —*Q.* With what is this identical? — *A.* Lugol's solution.

Q. What is the dose of it? — *A.* Gtts. vi., three times a day.

Q. How is iodine externally used? — *A.* In baths or ointment.

Q. What is the composition of the ointment? — *A.* ℈j. of iodine to ℥j. of lard. (For the other preparations of iodine, see *Dispensatory.*)

PART VI.

OBSTETRICS, ETC.

PECULIARITIES OF THE FEMALE.

Q. What are some of the peculiarities of the female? — *A.* The skeleton is lighter and more delicate than that of the male; the pelvis is wider and the thorax narrower than in the male; the integuments of the body are softer than in the male; and on the face there is no beard: the mammæ are much more developed than in the male, &c.

Q. Describe the mammæ. — *A.* They are the two glandular bodies, situated upon the upper anterior portion of the chest, upon the large pectoral muscle, covered by the skin; and become enlarged at puberty.

Q. Of how many parts do they consist? — *A.* Each mamma consists of a nipple, or red-coloured projection from the middle of the breast, and is capable of erection; their structure is common integument, twenty to twenty-five lactiferous tubes, which terminate on the surface of the nipple by open mouths; these tubes are situated in a firm, glandular mass. The areola of the nipple is a circular disk, of a red colour at the base of the nipple, and it contains numerous follicles. The glandular substance of the mammæ is imbedded in fat, and consists of numerous separate glandular portions, from which the lactiferous tubes arise, which enter the nipple.

Q. What is the office of the mammæ? — *A.* To secrete the milk to nourish the offspring.

Q. What is the peculiarity in the female pelvis? — *A.* The arch of the pubis is more arched than in the male, and the cavity of the pelvis is more capacious; and it contains, in addition to the bladder, rectum, and muscles, the uterus, ovaries, fallopian tubes, &c.

Anatomy of the Pelvis.

(For the general configuration and composition of the bony pelvis, we refer to Anatomy, &c., page 18, &c.)

Q. How is the pelvis divided by obstetricians? — *A.* Into the upper and lower portions, by the linea ileo pectinea, a ridge extending from the crest of the pubis, between the ilium, and ischium, &c., to the junction of the ilium with the sacrum.

Q. What is the appearance of the upper portion, or false

pelvis? — *A.* It is defective in front, elevated at the sides, and has posteriorly the promontory of the sacrum and lumbar vertebræ in part.

Q. What are the measurements of the upper pelvis? — *A.* From one anterior superior spinous process to the other across the pelvis, nine inches; from the middle of the crest of one ilium to the same point in the opposite one across, eleven inches; and from the top of the crest of the ilium to the linea ilio pectinea of the same side, three and a half inches.

Q. What is the appearance of the lower, or true pelvis? — *A.* That of an inverted cone, with two straits and a basin or cavity.

Q. Describe these straits and the cavity of the pelvis. — *A.* The superior strait is elliptical in shape, and formed by the top of the symphyses pubis, the linea ilio pectinea, and the promontory of the sacrum. The inferior strait is oval in shape, consisting of the rami of the pubis and ischia on the sides, the subpubic ligament in front, and the sacro-ischiatic ligaments and coccyx behind; the cavity of the pelvis is that part of it contained between the superior and inferior straits.

Q. Give the axis and measurements of the superior strait. — *A.* The axis is an imaginary line drawn from the point of the coccyx at right angles to the strait, and which if continued would pass out at the umbilicus; the circumference of the strait is thirteen inches; the sacro-pubic diameter, four inches; the oblique diameters from points in the two linea ilio pectinea to the opposite sacro-iliac symphyses, each of them are five inches; the transverse or bis-iliac diameter, five and a quarter inches.

Q. Give the axis and measurements of the inferior strait? — *A.* The circumference of the strait is twelve inches; the anterior posterior diameter from pubic ligament to coccyx, from four and a half to five inches; the transverse or bis-ischiatic diameter, four inches; and the oblique diameters, each of them four inches. Its axis is an imaginary line drawn from the middle bone of the sacrum and out of the pelvis midway between the rami of the pubis and ischium of each side.

Q. What other measurements are there which should be noted? *A.* From the top of the symphysis pubis to the lower edge of the sub-pubic ligament, one and a half inches; from the top of the sacrum to the point of the coccyx anteriorly, five, five and a half, and six inches; from the linea ileo pectinea to the tuberosity of the ischium, for each side, three and a half inches; from the subpubic ligament to the top of the promontory of the sacrum, four and a half inches; from the subpubic ligament to the hollow of the sacrum, four and three-quarter inches.

Q. Where are the inclined planes of the pelvis? — *A.* There are two for each side of the pelvis. The anterior one is all that part of the pelvis in front of a line drawn from the spine of the ischium, obliquely up the point midway between the two extremities of the crest of the ilium, and embraces all the anterior portion of the pelvis to the symphysis pubis of the one side; and the posterior plane is directly back of the anterior, extending to the middle line of the sacrum; the anterior plane is the largest.

Q. What is the axis of the pelvis? — *A.* An imaginary curved line drawn through the middle of its cavity, and passing out with the axis of the superior strait superiorly, and with the axis of the inferior strait inferiorly.

SEXUAL ORGANS.

External Genital Organs.

Q. What are the external genital organs? — *A.* The mons veneris, the vulva, and perineum.

Q. What is the mons veneris? — *A.* The eminence upon the top of the pubis, composed of fat, fibrous filaments, and cellular tissue, and covered with skin, upon which are hairs, in the adult.

Q. What are the labia majora? — *A.* Cutaneous folds, which pass down from the lower part of the mons veneris, and separate farther and farther to about their middle, and then approach to be again united about an inch in front of the anus; they are covered, externally, by skin, and with hairs at puberty, and lined with a smooth, rose-coloured membrane, which abounds in sebaceous or mucous follicles.

Q. What is the fissure which these labia bound called? — *A.* The vulva.

Q. What are contained in this fissure or vulva from above downwards? — *A.* The lesser labia or nymphæ, the clitoris, the vestibule, the meatus urinarius, the vulvar orifice of the vagina, the hymen, the fossa-navicularis, and the fourchette.

Q. Describe the nymphæ. — *A.* They are two folds of the inner skin of the labia majora, situated internal to the labia majora; they are narrow above, broader below, and contract again at their lower part; they are erectile, cellular, and vascular in structure, covered with a rose-coloured epithelium.

Q. Describe the clitoris. — *A.* It is an oblong, firm, projecting body, immediately under the superior commissure of the labia, and is surrounded by a duplicature of the lining membrane

of the labia, at the beginning of the nymphæ, called præputium ; it consists of two corpora cavernosa, united together anteriorly, forming the gland ; and it is divided, posteriorly, into two crura, which are attached to the rami of the pubis.

Q. What is the use of the clitoris? — *A.* It is capable of erection, and is supposed to be the principal seat of sensation in coition.

Q. What is the vestibule? — *A.* That small, triangular, depressed space, corresponding to the upper part of the arch of the pubis, circumscribed by the clitoris, the inner face of the nymphæ, and the meatus urinarius.

Q. Where is the opening to the urethra? — *A.* Beneath the vestibule we find an orifice, which is the opening to the urethra, and separated from the vagina by a tubercle.

Q. Describe the female urethra. — *A.* It is large, about an inch long, and with a slight curve, and passes slightly behind the symphysis pubis.

Q. What bounds the orifice of the vagina? — *A.* The sphincter vaginæ muscle, arising from the union of the crura clitoridis ; it is inserted into the sphincter ani, and also into the sides of the vagina, which it partly surrounds.

Q. What is that membrane called which is generally found near the external orifice of the vagina of virgins, and partially closing it? — *A.* The hymen, a duplicature of the lining membrane of the vagina.

Q. What is the shape of the orifice in the hymen? — *A.* Sometimes triangular, at other times oval, &c.

Q. When is the hymen generally ruptured? — *A.* At the first sexual intercourse.

Q. What becomes of the lacerated hymen? — *A.* It cicatrizes, forming what are called myrtiform caruncles.

Q. What are those parts called at the superior and inferior portions of the vulva? — *A.* The superior and inferior commissures.

Q. Where is the perineum situated? — *A.* From the posterior commissure of the vulva to the point of the coccyx.

Q. Is not this very distensible? — *A.* Yes.

Q. Where is the fossa navicularis situated? — *A.* At the anterior inferior portion of the hymen.

Q. Where is the fourchette? — *A.* At the inferior boundary of the vulva.

Internal Genital Organs.

Q. What are the internal genital organs? — *A.* The uterus,

the vagina, the fallopian tubes, ovaries, and ligamentous attachments.

Q. What is the uterus? — *A.* A hollow, pear-shaped muscular organ, to lodge and nourish the ovum during pregnancy, and to expel it by the process of labour.

Q. Where is it situated? — *A.* In the pelvis, behind the bladder, in front of the rectum, beneath the small intestines, and continuous below with the vagina; in the unimpregnated state it is in the direction of the axis of the superior strait.

Q. How is the uterus divided? — *A.* Into fundus, body, and neck; the fundus is that portion above the origin of the fallopian tubes; the body is between the origin of these tubes and the neck of the uterus; and the neck is the lower portion of the organ.

Q. How many sides and angles has the uterus? — *A.* Three.

Q. What orifice is situated at the extremity of the inferior angle? — *A.* The orifice of the mouth of the uterus or os tincæ.

Q. What is the state of the mouth of the womb? — *A.* It is transverse, small at first, but becomes more open and rugged after a female has had a child. The inferior lip of this orifice is thicker, broader, and longer than the superior.

Q. How do you divide the internal surface of the womb? — *A.* Into the cavity of the body and the cavity of the neck of the womb.

Q. What is the state of the cavity of the body of the uterus? — *A.* It is of a triangular shape, with the sides slightly separated; the sides and bottom of this cavity are almost straight; sometimes convex in young girls, but are generally concave after a delivery; the inferior angle is the point where the two cavities of the womb communicate with each other, and is sometimes called the internal orifice of the uterus.

Q. What is the situation and appearance of the cavity of the neck of the uterus? — *A.* It is below the internal orifice of the uterus, and is barrel-shaped, and arborescent in appearance.

Q. Where are those small vesicles, sometimes called ovula Nabothi, found? —*A.* In the folds of the mucous membrane of the neck of the uterus.

Q. What is the lining membrane of the uterus? — *A.* Probably mucous membrane.

Q. What are the dimensions of the womb? — *A.* Unimpregnated, it is about $2\frac{1}{2}$ inches long; $1\frac{1}{2}$ wide at the supe-

rior angles; its neck is about an inch long, and its body is half an inch thick.

Q. What is the structure of the uterus, and what are the directions of its fibres? — *A.* It is muscular, with two sets of fibres, the circular and longitudinal.

Q. What membrane partially invests the uterus exteriorly? — *A.* The peritoneal.

Q. What and where are the fallopian tubes? — *A.* They are two small, hollow cylinders, four or five inches long, as large as the barrel of a quill; and extending from the superior angles of the uterus to near the iliac fossa of each side, where they terminate in a fimbriated extremity, and are inclosed within the upper edges of the broad ligaments.

Q. What is their structure? — *A.* Similar to that of the uterus.

Q. Where are the ovaries situated? — *A.* In the upper part of the broad ligaments behind and a little below the fallopian tubes, and near the superior angles of the uterus to which they are attached by the *ligament of the ovaries.*

Q. Describe the ovaries. — *A.* They are oblong bodies, flattened antero-posteriorly, and are about the size and shape of a large almond; their surface is generally smooth in those who have never been fecundated, but in those who have had children it is filled with irregularities.

Q. What is found in the parenchyma of the ovaries about the age of puberty? — *A.* The Graafian vesicles, or vesicles which contain germs.

Q. What is the office of the ovaries? — *A.* They are the seats of conception.

Q. What is meant by a corpus luteum? — *A.* The yellow body which remains after the ovule has escaped from the ovary.

Q. What are the broad ligaments of the uterus? — *A.* Expansions of the peritoneum from the sides of the uterus to the lateral and posterior portions of the pelvis.

Q. What and where are the other ligaments of the uterus? — *A.* The anterior or round ligaments, arising from the upper part of the body of the uterus, pass out at the abdominal rings, and are lost in the mons veneris and the utero-sacral ligaments, which pass from the back of the uterus to the sides of the sacrum.

Q. Where is the vagina situated? — *A.* In the axis of the inferior strait, and it forms an angle of about 65° with the great diameter of the womb.

Q. What is its length? — *A.* From four to six inches.

Q. What is the anatomical structure of the vagina? — *A.* It is muscular and cellular, with a lining of mucous membrane, in an arborescent arrangement.

Q. How does the vagina pass from the uterus, and how does it terminate anteriorly? — *A.* It passes off immediately from the anterior surface of the womb, but posteriorly it passes up some distance before passing down, and forms by this arrangement a cul-de-sac; at the anterior extremity it terminates in an opening in the vulva of about an inch or an inch and a half antero-posteriorly.

Q. What are the arteries, veins, and nerves of the uterus, &c.— *A.* The uterus is supplied by the uterine arteries, and the ovaria by the spermatic arteries. The veins of the uterus and fallopian tubes, and ovaria, correspond in name and distribution with the arteries.

Q. What are the nerves of the uterus, &c.? — *A.* Branches from the lumbar, sacral, and sympathetic.

Menstruation and its Irregularities, Etc.

Q. What are the menses? — *A.* A peculiar discharge from the sexual parts, resembling blood in colour, which takes place at the age of puberty in girls, and occur every twenty-eight days during their menstrual life.

Q. What are the changes which take place in the female at the age of puberty? — *A.* The uterine organs become enlarged and developed, the voice changes, the moral sensibility is more acute, the breasts enlarge, and, finally, the menses flow, and the female now becomes susceptible of being fecundated.

Q. At what age do these changes usually take place? — *A.* At the fourteenth or fifteenth year in temperate climates, and much earlier in warm climates, and later in cold climates.

Q. How often do the menses flow in the healthy female? — *A.* Every twenty-eight days.

Q. Where does this fluid come from? — *A.* From the cavity of the body and neck of the uterus.

Q. What are some of the common names for the menses? — *A.* Courses, reds, monthlies, and being unwell or indisposed.

Q. Do luxuries, and high living, and nervous temperament, favour menstruation? — *A.* Yes.

Q. When the menses are about coming on, what are the signs of their approach? — *A.* There is a sense of fulness in the loins and neighbouring parts, a feeling of languor, swelling of the breasts, headache, and sometimes hysterical symptoms.

Q. How long does the discharge last when once established,

and what is the quantity discharged? — *A.* From five to seven days, and the quantity discharged from four to six ounces.

Q. Is not this function easily disturbed? — *A.* Yes.

Q. How many years does this function last, and when does it cease? — *A.* From thirty-five to forty years, and generally ceases from the forty-fifth to the fiftieth year.

Q. Do we know of any other cause for the production of menstruation besides the existence of the ovaries? — *A.* No.

Q. Do not females sometimes conceive without menstruating? — *A.* Yes.

Q. When do they more easily conceive? — *A.* Immediately after the menses have flown.

Q. Are the menses noxious? — *A.* No.

Q. What are the signs of a change of life in the female, or the cessation of the menses? — *A.* The female loses her rotundity of form, the capillary circulation is diminished, and the female begins to assume the appearance of old age, &c.

Q. When the female does not menstruate regularly during her menstrual life, and her system is full and plethoric, what should be done? — *A.* Resort to the lancet, saline cathartics, &c.

Q. If, on the contrary, her system is feeble, and her health impaired, what is the treatment? — *A.* Administer tonics, and enjoin exercise, with a healthy, nutritious diet, &c.

Q. What is meant by a retention of the menses? — *A.* The non-appearance of them, notwithstanding the age of the patient.

Q. What is meant by a suppression of the menses? — *A.* Their cessation of appearance, during the menstrual life of the female, after having once made their appearance.

Q. What is the technical name for either of these? — *A.* Amenorrhœa.

Q. What are sometimes the causes of a non-appearance of the menses at the proper time? — *A.* Disease, or a want of proper development in the female system.

Q. Do females always suffer from the absence of the appearance of the menses at the proper time? — *A.* No.

Q. What is meant by the term chlorosis, or green sickness? — *A.* A general anemic condition of the system, with a functional derangement of most of the organs of the body.

Q. What is the character of the menstrual discharge, if it does take place in this state of the system? — *A.* Generally serous.

Q. What is necessary to be done in a case of chlorosis? — *A.* Invigorate the system by exercise, preparations of iron, healthy diet, &c.

Q. Are not the menses sometimes retained by mechanical means? — *A.* Yes.

Q. What are the forms of the suppression of the menses? — *A.* The acute, or the discharge being suppressed during their actual flow; and the chronic, where the cause acts antecedently to prevent their appearance at the proper time.

Q. What kind of a discharge sometimes takes place as a substitute for the real menses? — *A.* A white discharge, or leucorrhœa.

Q. Do the mammæ ever become sympathetically affected when the uterus is affected? — *A.* Yes.

Q. Are emmenagogues beneficial in chronic amenorrhœa? — *A.* Yes.

Q. What is meant by the term Dysmenorrhœa? — *A.* Painful menstruation.

Q. What is the probable cause of this? — *A.* Either from a slowness in the secretion of the menstrual fluid, or from a difficulty in passing the fluid when secreted.

Q. What are the symptoms of dysmenorrhœa? — *A.* Coldness of the extremities, nervous chills, headache, and pain in the lower portion of the abdomen, of a paroxysmal character, at the menstrual periods.

Q. What is generally the nature of the discharge in dysmenorrhœa? — *A.* Membranous, and in coagula.

Q. Do females with dysmenorrhœa conceive easily? — *A.* No.

Q. What should be done in cases of dysmenorrhœa? — *A.* During the paroxysms, resort to topical depletion, warm, stimulating enemata per vaginam, and the warm hip-bath and anodynes internally; and, in the intervals between the paroxysms, endeavour to remove the causes of the disease by means of alteratives, &c.

Q. How would you relieve dysmenorrhœa from mechanical obstruction? — *A.* By dilating the neck of the womb by bougies, &c.; or if the hymen is entire, make an opening into it.

Q. What is meant by Menorrhagia? — *A.* An increased or excessive secretion of the menses.

Q. What are some of the exciting causes of this? — *A.* Either great nervous or vascular excitement, or great internal congestions or displacements of the womb, &c.

Q. With what may menorrhagia be confounded? — *A.* With a real uterine hemorrhage, arising either from polypus, ulcers, or abortion, &c.

Q. How can you be sure of your diagnosis in these cases? — *A.* By an examination per vaginam.

Q. What effect has menorrhagia upon the system? — *A.* It debilitates it.

Q. What medicines should be administered in cases of menorrhagia? — *A.* Astringents and tonics.

THE FŒTAL SKELETON.

Q. What is the condition of the skeleton of the fœtus? — *A.* Imperfectly ossified.

Q. What is the length of a fœtus? — *A.* From eighteen to twenty inches.

Q. What are the various important measurements of the fœtus? — *A.* From acromion to acromion, four inches, which may be compressed to three. The dorso-thoracic, three and a half or four inches, which may be reduced to two. From trochanter to trochanter, two and a half to three inches. From the sacrum to anterior part of thighs when flexed forward, three inches. Antero-posterior diameter of pelvis, one and a half to two inches.

Q. How is the fœtal cranium divided? — *A.* Into the compressible and incompressible portions.

Q. What are the various surfaces and extremities called? — *A.* Occipital and mental extremities, and a superior and inferior and two lateral surfaces, and an anterior and posterior surface.

Q. What are the principal sutures on the fœtal cranium? — *A.* The lambdoid, running between the parietal and occipital bones; the sagittal, between the two parietal bones; the coronal, between the parietal and frontal bones; the frontal, between the two edges of the frontal bones (before they are united into one), extending to the root of the nose.

Q. Where is the anterior fontanel or bregma situated, and what is its shape? — *A.* At the anterior angle of the parietal bones, and at the upper posterior angle of the frontal bone. It is kite-shaped.

Q. Where is the posterior fontanel? — *A.* At the junction of the tip of the lambdoidal suture with the posterior extremity of the sagittal suture.

Q. Are these sutures and fontanels of importance in obstetrics? — *A.* Yes; to form a correct diagnosis of the position of the child's head when in the cavity of the pelvis.

Q. Are there any other fontanels? — *A.* Yes; at the posterior, inferior edges of the parietal bones.

Q. Where is the vertex situated? — *A.* It is the point in the centre of the space bounded by the occipital protuberances, the parietal protuberances, and the middle point of the sagittal suture.

Q. What are the various measurements of the fœtal cranium?

— *A.* The bi-parietal diameter, three to three and a half inches; the occipito-bregmatic, or perpendicular diameter, three to three and a half; the occipito-frontal, four; the transverse, three to three and a half; the trachelo-bregmatic, three and a half; bi-temporal, two and a half inches; the occipito-mental, five inches; occipito-frontal, four inches.

Q. What are the measurements of the facial extremity of the fœtal ellipse? — *A.* From the top of the forehead to the end of the chin, or fronto-mental, three inches; and the bi-malar, two and a half inches.

Q. What are the various degrees of elongation and compressibility to which some of these diameters mentioned before may be subject? — *A.* The occipito-mental may be elongated to six or seven inches, and the bi-parietal may be compressed to three inches.

GENERATION, ETC.

Q. What is meant by generation? — *A.* The function of animated beings necessary to the reproduction of their species.

Q. What is the form of generation applicable to the human race? — *A.* The gemniparous, or the formation by germs.

Q. Where are the germs of the male and female situated? — *A.* That of females in the ovaries, and that of the male in the semen or fluid secreted by the testicles.

Q. What is necessary in order that conception should take place? — *A.* The union of these germs.

Q. What are the principal theories of conception? — *A.* That of epigenesis, or the junction of the two germs in the uterus, and that each forms part of the new being; or that of evolution, where the mother furnishes the entire germ, and it is stimulated to action by the male germ.

Q. Which theory is now most generally adopted? — *A.* That of ovular evolution.

Q. Where are the two germs supposed to meet? — *A.* In the ovary.

Q. Is copulation absolutely necessary in all mammiferous animals to produce conception? — *A.* Yes.

Q. What is meant by viviparous generation? — *A.* When the ovum, after being detached from the ovary, is brought to maturity in the cavity of the uterus.

Q. What change takes place in the ovary after fecundation? — *A.* A vesicle containing an ovule enlarges, absorption of its

covering takes place; it is grasped by the fimbriated extremity of the fallopian tube, and carried to the uterus.

PREGNANCY, ETC.

Q. What are the two forms of pregnancy? — *A.* Uterine and extra-uterine.

Q. What is meant by uterine pregnancy? — *A.* Where the ovum is developed in the cavity of the uterus.

Q. What is meant by extra-uterine pregnancy? — *A.* The development of the fecundated ovule out of the cavity of the uterus, either in the ovary, fallopian tube, or body of the uterus, &c.

Q. What are the varieties of true pregnancy? — *A.* Simple pregnancy, where there is a single ovum; double and triple, where there are two or three ova; and complicated pregnancy, where we have a polypus, a great quantity of water, &c., present.

Q. What is the measurement of the neck of a uterus in the unimpregnated adult female? — *A.* About an inch long, and half an inch thick.

Q. What variations take place in the neck of the uterus after impregnation? — *A.* During the first two months it becomes thicker and longer, and it continues to become longer until the fourth month; during the fourth and fifth months it shortens from one-third to one-fifth; at the sixth month, two-thirds; at the seventh and eighth months it is almost entirely developed or passed away.

Q. What is the state of the os uteri after impregnation? — *A.* It becomes plugged up by mucus.

Q. What are the various changes which take place in the uterus itself?—*A.* It at first becomes more pyriform; the posterior surface then developes more rapidly than the anterior; and at the fifth month, the uterus is almost spherical in form; at the third month, the fundus is a little above the margin of the superior strait; at the fourth month, a large part of it is out of the cavity of the pelvis; at the fifth month, the fundus is half way between the pubis and umbilicus; at the sixth month, on a level with the umbilicus; at the seventh month, an inch or two above the umbilicus; and at the eighth month, it has reached the epigastric region; at the ninth month, the fundus is lower than at the eighth month, on account of the anterior development of the uterus, and its falling more forward than before.

Q. Where are the intestines forced by the development of the uterus? — *A.* Up and back.

Q. What is the size of the uterus at the full term of utero-gestation? — *A.* Twelve inches, from the fundus to the orifice of the uterus; eight inches transversely, and nine inches antero-posteriorly.

Q. Where is the orifice of the uterus generally situated at the full period of utero-gestation? — *A.* Opposite the fundus in its long diameter.

Q. What change takes place in the substance of the uterus during its development? — *A.* It becomes softer, and the muscular fibres and vessels are more perfectly developed.

Q. What are meant by the venous sinuses of the uterus? — *A.* Simply the veins much enlarged, with their orifices open upon the internal surface of the uterus.

Q. How is the sensibility and irritability of the uterus during pregnancy? — *A.* Increased.

Q. What is the state of the vagina during pregnancy? — *A.* During the first months it becomes shorter, and then afterwards longer and larger.

Q. How are the fallopian tubes and ovaries situated at the end of pregnancy? — *A.* They hang along the sides of the uterus.

Q. What effect has uterine development upon the bladder and urethra? — *A.* It carries the bladder upwards and forwards, and the urethra nearly perpendicular.

Q. What effect has uterine development upon other parts of the system? — *A.* It impedes respiration, produces constipation, distends the skin, leaving behind appearances of cicatrices.

Q. Why is there a great tendency to œdema, varicose veins, anasarca, &c., during pregnancy? — *A.* Because of pressure upon the vena cava and absorbents.

Q. What is the state of the lining membrane of the uterus? — *A.* It becomes more developed, villous, and vascular.

Q. What membrane is secreted by the lining membrane of the uterus? — *A.* The decidua or caduca.

Q. What is its character? — *A.* Gelatinous, villous, vascular, and reddish in colour.

Q. How long does this exist within the uterus? — *A.* During pregnancy.

Q. When is it cast from the uterus? — *A.* At the time of parturition, with the placenta.

Q. Is this membrane organised? — *A.* Yes.

Q. Is this membrane complete, or has it openings in it? — *A.* It is complete.

Q. What is the use of the decidua? — *A.* It is the source of communication between the uterus and ovum.

Q. What are the investments of the ovum? — *A.* It has two membranes, the chorion externally and the amnion internally.

Q. What is contained in the inner membrane? — *A.* A fluid, in which the embryo floats.

Q. How large is the ovum when it passes from the ovary to the uterus? — *A.* About the size of a small pea.

Q. How is the ovum situated upon its arrival at the end of the fallopian tube? — *A.* After passing down, it pushes the decidua from the end of the tube, becomes enveloped in it, and two membranes are apparently formed; the one over the ovum being called decidua reflexa, and the other decidua vera next to the uterus.

Q. Is there any fluid existing between these two reflections? — *A.* Yes; but they gradually come in contact.

Q. Is the shaggy surface of the chorion in contact with the uterus? — *A.* No; it is in contact with the decidua.

Q. Whence does the ovum receive its support? — *A.* It receives its blood from the uterus through the decidua and shaggy surface of the chorion.

Q. What are the characters of the chorion? — *A.* It is a serous membrane; its external surface is shaggy, and the internal surface smooth.

Q. Is the chorion increased in thickness and strength as it is developed? — *A.* Yes.

Q. Is it believed that the chorion is the basis of the placenta? — *A.* Yes.

Q. What is the appearance of the amnion? — *A.* It is a delicate sac within the chorion, smooth, transparent, and slightly adherent to the chorion; it contains the liquor amnii.

Q. What is the character of the liquor amnii? — *A.* It is a saltish, unctuous fluid, thicker than water, and of a brownish colour.

Q. How much is there generally at the birth of a child? — *A.* It varies from a pint to a quart or gallon.

Q. What is the apparent use of this fluid? — *A.* To allow free motion to the child, and to prevent its being injured by jars, &c.

Q. Where is the vesicula alba situated? — *A.* Between the chorion and amnion.

Q. What is its use? — *A.* To supply the embryo with nutriment during the first months of uterine life.

Q. Where is it supposed to enter the body of the embryo? — *A.* At the appendicula vermiformis.

Q. Has it any bloodvessels? — *A.* Yes; the vitello-mesenteric, or omphalo-mesenteric.

Q. How is the embryo connected to the placenta? — *A.* By the umbilical cord.

Q. Of what is the umbilical cord composed? — *A.* Of two arteries, a vein, absorbents, a covering of amnion and albuminous matter.

Q. Where do these vessels arise, and where do they empty? — *A.* The arteries arise from the primitive iliacs, and the vein passes under the liver, and finally enters the vena cava. They terminate either upon the placenta, or where the placenta will be.

Q. What is the size of the placenta? — *A.* Six to eight inches in diameter; its circumference eighteen to twenty-four inches; and its thickness is various.

Q. What is the character of the placenta? — *A.* It is a congeries of vessels, with the fœtal surface lined with the amnion, and the outer surface filled with lobules or sulci, and covered, as thought by some, with the decidua.

Q. What is the theory of formation for the placenta? — *A.* That the shaggy surface of the chorion enlarges at the point where the ovule is in contact with it, and that at that point the placenta is formed out of the shaggy surface of the chorion and the decidua.

Q. Into what portions has the placenta been divided? — *A.* Into the fœtal and maternal portions.

Q. What is the vascular connection between the uterus and placenta? — *A.* By means of a system of capillary veins and arteries.

Q. What are the kinds of circulation in the placenta? — *A.* That by the utero-placental vessels to sustain the placenta, and that for the sustenance and nutrition of the fœtus from the placenta, or placento-fœtal.

Q. What becomes of the fœtal blood after it has circulated through the umbilical arteries? — *A.* It is returned by the umbilical vein.

Q. Do the uterine veins open directly upon the placenta? — *A.* No; but upon the decidua by patulous orifices.

Q. Upon which does the placenta depend for nutrition, the mother or child? — *A.* The mother.

Q. Is the placenta easily detached from the uterus? — *A.* Yes.

Q. What is the usual length of the umbilical cord? — *A.* From eighteen to twenty inches.

Q. What is the difficulty attending a too long cord? — *A.* It is liable to become knotted, and to prolapse during labour.

Q. What is the difficulty when the cord is too short? — *A.*

It may retard delivery, or the placenta may be detached too soon, or the uterus may be inverted.

Q. Are there any valves to the veins of the cord? — *A.* No.

Q. How are the membranes situated in case of twins? — *A.* Each embryo has its own membranes and placenta.

Q. What opinion is most prevalent in regard to superfœtation? —*A.* That it would be impossible to take place while the uterus is occupied by a decidua, or perhaps an ovum, but that before that time it can occur.

Q. What is the probable cause of a female giving birth to twins of different sizes, and apparently different ages? — *A.* That it was probably a twin pregnancy; but that the one fœtus had ceased to be developed.

Q. Where is the placenta mostly situated? — *A.* To one of the sides of the uterus.

Q. How long do we call the new being an embryo? — *A.* During the three first months; after this time it is called fœtus.

Q. How soon can an embryo be seen within its investments? — *A.* About the tenth day by means of the microscope; it is then a small speck.

FŒTUS, ETC.

Q. What are the changes which the fœtus undergoes? — *A.* It soon presents two bodies or vesicles, attached to each other; the foundation for the head and body of the future fœtus; these gradually separate, and the different parts are developed.

Q. How are the different additions made to the fœtus? — *A.* By pullulation; first, we have the features, then the roots of the upper extremities, then the coccyx, then the lower extremities, &c.

Q. How far is the fœtus developed at the end of the third month? — *A.* The integuments are distinct, the head is rather large, but the eyelids and mouth are closed; the osseous system begins to be developed, &c.; it is now about three inches long.

Q. When does the muscular system appear to be developed? — *A.* At the end of the fourth month.

Q. What is meant by the viability of the fœtus? — *A.* That the fœtus is able to exercise an extra-uterine life.

Q. When does this occur? — *A.* At the end of the sixth or beginning of the seventh month.

Q. What is the situation of the fœtus in the cavity of the uterus at the full period of gestation? — *A.* In the form of an ellipse, with the limbs crossed and flexed in front of the abdomen.

Q. Which is the long diameter of the fœtus, and how much is it?—*A.* From vertex to coccyx; and it is about twelve inches.

Q. What is the weight of the fœtus at full term generally? — *A.* From seven to eight pounds.

Q. What is the size and weight of each child in twin pregnancy? — *A.* They are smaller, and of less weight than at a single pregnancy.

Q. Where is the umbilical cord situated at full term? — *A.* Midway between the pubis and lower portion of the sternum.

Q. What is the condition of the fœtal brain? — *A.* It is soft and flabby.

Q. What are the relative sizes of the different visceral organs of the fœtus? — *A.* The liver is quite large and the lungs small, and very slightly porous or crepitous; the rest of the viscera are small.

Q. What gland have we in the fœtus which is absent in the adult? — *A.* The thymous gland, situated in the top of the superior mediastinum; it has two lobes.

Q. What is peculiar to the fœtal heart?— *A.* It is like a single heart; the two auricles acting as a single auricle, and both the ventricles acting as a single ventricle.

Q. What is peculiar to the septum between the auricles? — *A.* It is incomplete, having an orifice called the foramen ovale.

Q. Do we not have something like a valve at this foramen? — *A.* Yes, upon the left side of the foramen ovale.

Q. Describe the fœtal circulation. — *A.* The blood enters the fœtus through the umbilicus by the umbilical vein; this vein passes underneath the edge of the liver and empties into the left branch of the sinus venæ portarum, whence part of the blood is distributed to the lobes of the liver; the other part is conducted by the ductus venosus into the left hepatic vein, which empties itself into the ascending vena cava, which empties itself into the right auricle of the heart; a part of which blood passes through the foramen ovale into the left auricle, the other part into the right ventricle. From the right ventricle the blood is forced—a small quantity through the pulmonary artery, while a much larger portion passes by the ductus arteriosus into the aorta. The blood from the left ventricle is forced through the aorta simultaneously by the contraction of the right ventricle. The blood from the ductus arteriosus and the aorta being mixed, passes on through the aorta to the iliacs, where two branches are given off, which mount up along the sides of the bladder, and pass out at the umbilicus to the placenta.

Q. Where is the situation of the ductus arteriosus? — *A.* It

arises from the pulmonary artery just as it is given off from the heart, and passes to the aorta just below its arch.

Q. What peculiar changes take place in the system upon the birth of the child? — *A.* Respiration takes place; the blood passes through the pulmonary artery to the lungs, and the ductus arteriosus gradually becomes obliterated; the valve between the two auricles becomes the closed, and the usual circulation of the adult system takes place; and the other vessels of uterine life become obliterated.

Q. Does the fœtus make its own blood? — *A.* Yes.

Q. What is the colour of the fœtal blood? — *A.* It is between the colour of arterial and venous blood; with a softer coagulum and with smaller globules.

Q. What are some of the proofs that the maternal blood is not circulated in the fœtus? — *A.* Because injections cannot pass from the vessels of the mother to the fœtus, and *vice versâ*; and that hemorrhage from the umbilical cord, when cut at birth, is not continuous, but exists only for a short time, &c. The fœtus may die from rupture of the cord, but the mother does not suffer, &c.

Q. May not a fœtus suffer from a continual drain of blood from the mother? — *A.* Yes.

Q. How is the ratio of pulsations in the fœtal heart in comparison with that of the mother? — *A.* They are two to one as frequent as in the mother.

Q. What is the object of the placenta? — *A.* To cause the requisite changes in the blood for the nutrition and development of the fœtus.

Q. How does pressure upon the cord produce death in the fœtus? — *A.* By interrupting the process of hematosis, and by suspending the circulation.

Q. Is it probable that the liquor amnii affords nutriment to the child? — *A.* No.

Q. Is it probable that the fœtus has sensation while in the uterus? — *A.* Yes, to a slight degree.

Extra-Uterine Pregnancy.

Q. What are the varieties of this? — *A.* Ovarian pregnancy, where the embryo is in the ovary; abdominal pregnancy, where the embryo is developed in the fallopian tube; and interstitial pregnancy, where the embryo is developed in the walls of the uterus.

Q. Can we give any positive reasons for these irregularities in pregnancy? — *A.* No.

Q. For how long a time may the ovum continue to be deve-

loped in these cases? — *A.* For two or three months, and be surrounded by a peculiar cyst or sac.

Q. Does decomposition readily occur in these cases? — *A.* No.

Q. What is the condition of the cavity of the uterus in these cases? — *A.* It is always lined by the decidua.

Q. In some extraordinary cases have not women carried a fœtus in this extra-uterine state for many years? — *A.* Yes.

Q. May not women become pregnant in the usual way while carrying a child in this extra-uterine state? — *A.* Yes.

Q. What can be done in these cases of extra-uterine pregnancy? — *A.* Very little but palliate symptoms.

Q. Has gastrotomy been advised in some of these cases? — *A.* Yes.

Of the Signs of Pregnancy.

Q. How do you divide the signs of pregnancy? — *A.* Into rational and physical.

Q. What is the first rational sign? — *A.* The suppression of the menses.

Q. Is this a positive sign? — *A.* No.

Q. Are the menses always interrupted by pregnancy? — *A.* Not always during the first months.

Q. Do women ever menstruate during pregnancy, and do they not sometimes menstruate only during pregnancy? — *A.* Yes; they may do both.

Q. Do not the mammary glands become sympathetically affected in pregnancy? — *A.* Yes.

Q. At what time does the mammæ begin to secrete milk? — *A.* Towards the end of pregnancy, or during the latter part of the eighth month.

Q. May not milk be found sometimes in the breasts of females not pregnant or nursing? — *A.* Yes.

Q. Do not the breasts sometimes become tumid and painful from other causes than pregnancy? — *A.* Yes.

Q. What changes occur in the nipples, and in the areola of the mammæ? — *A.* The nipples become enlarged, tumid, and dark-coloured; the areola becomes larger and darker, and the follicles around the nipple are enlarged.

Q. May not all these changes arise from uterine irritation, &c.? — *A.* Yes.

Q. What are the changes in the uterus in the early weeks of pregnancy? — *A.* It enlarges and is developed; and from the third to the fourth month a small tumour may be felt in the abdomen.

Q. Where is the top of the uterus at the fourth month? — *A.* Just above the superior strait, &c. (See, for further development of the uterus, page 574.)

Q. Do we always have pouting of the navel at pregnancy? — *A.* No.

Q. Is not the carriage of the female changed by pregnancy? — *A.* Yes; it becomes more vacillating, and the limbs are stretched further apart.

Q. What sign has lately been discovered which has been thought to be of great value? — *A.* That of Kiesteine in the urine.

Q. What is meant by physical examination in pregnancy? — *A.* By an examination with the hand upon the external surface of the abdomen; that *per vaginam;* and by auscultation, &c.

Q. When the hand is placed cold upon the parietes of the abdomen, may we not sometimes feel the fœtus move? — *A.* Yes.

Q. How should the female be placed to allow this examination? — *A.* Upon the back with the body flexed, and the whole system in a relaxed state.

Q. What is meant by the touch? — *A.* An examination *per vaginam.*

Q. What arrangements are necessary when this examination is to be made? — *A.* The proposition should be made to a third person; the room should be darkened, and the female suitably clad and situated, and the examiner should take his seat so that his right hand may be towards the hips of the patient (if on the left side and horizontal), but if on her back he should sit with his face towards her.

Q. If the patient is standing, how should she and the examiner be situated? — *A.* She should stand against something firm, and slightly recline upon the shoulders of the examiner; the examiner should be seated upon a low seat, or bend upon his knee in front of the patient, and pass his index finger to the posterior commissure of the vulva.

Q. Is not the touch an excellent mode of diagnosticating pregnancy? — *A.* Yes.

Q. How soon may we rely upon this to aid us in diagnosticating pregnancy? — *A.* After the fourth month.

Q. Can we ascertain that the body is really a fœtus? — *A.* No; but we can ascertain the fact of something floating in a fluid in the uterus.

Q. What name has been given to this? — *A.* *Ballottement,* or uterine palpitation or percussion.

Q. How is this performed? — *A.* By placing the index finger of the one hand upon the mouth of the uterus, and the other hand upon the body outside, and then making a slight percussion, and then waiting for the rebound.

Q. Does the woman usually experience a tremulous sensation in the womb at the end of the fourth month? — *A.* Yes.

Q. When does the uterus arise out of the cavity of the pelvis? — *A.* Between the fourth and fifth months.

Q. May not all these signs of pregnancy fail? — *A.* Yes.

Q. What can we ascertain by auscultation? — *A.* The action of the fœtal heart, and the vitality or non-vitality of the fœtus.

Q. How many sounds can we discriminate by auscultation? — *A.* Two; one, that of the fœtal heart, and the other of the placental circulation.

Q. What is the difference in these sounds? — *A.* The first has a quick, double beat, and the other is synchronous with the maternal heart.

Q. What is there peculiar in the placental sound? — *A.* It is cooing (but this is doubted).

Q. Must we rely entirely upon the sounds in determining whether there is life or not? — *A.* No; for the placenta may be placed far back in the uterus; or the child may be situated with its back at a distance from the abdominal parietes, so that we cannot hear them.

Q. Where are the sounds usually heard? — *A.* At the lower and lateral portion of the uterine tumour.

DISEASES OF PREGNANCY.

Q. Into how many classes may we divide the diseases of pregnancy? — *A.* Into two; local and general.

Q. What are some of the local signs? — *A.* A difficulty or a frequency in passing urine, from the pressure of the uterus upon the bladder; a frequent disposition to defecate, or a constipated state of the bowels; or great irritation in the rectum, from pressure of the uterus. We have, also, pain in the right side, dyspeptic symptoms, from pressure upon the stomach; hernia, from pressure on the bowels or bladder, &c.

Q. What is the effect of pressure upon the large bloodvessels? — *A.* It produces œdema of the lower extremities, congestion of the inferior vessels, hemorrhoids, &c.

Q. What effect has pressure upon the nerves of the lower extremities? — *A.* It produces cramp, spasm, and neuralgia.

Q. What influence is sometimes exerted over the vagina? —

A. It becomes turgid and full, very hot, and often we have a leucorrhœal discharge, aphthæ, and pruritis vulvæ.

Q. Is not the skin put upon a great stretch, and rendered painful? — *A.* Yes.

Q. Does not the stomach often become nauseated, and vomiting occur? — *A.* Yes.

Q. When does this nausea generally occur? — *A.* Upon rising from bed in the morning, and hence is called morning sickness; but it may last all day.

Q. What effect is sometimes produced upon the stomach? — *A.* Its taste becomes depraved, and the patient has a longing for *outré* articles.

Q. When do these feelings arise, and how long do they last? — *A.* They arise, generally, as soon as menstruation has ceased, and during the first month, and continue for two or three months.

Q. Are we generally to fear anything from this sickness of stomach? — *A.* No.

Q. By what may these disagreeable feelings of the stomach be relieved? — *A.* By taking food, rest, fresh air, and slight cordials.

Q. Is not the liver sometimes implicated? — *A.* Yes; and we then may have maculæ or slight jaundice, high-coloured urine, &c.

Q. What effect is produced upon the salivary glands? — *A.* They become irritated, and we have a profuse discharge of saliva.

Q. What name has been given to that state of the mammary glands which sometimes exists beyond the ordinary excitement? — *A.* Mastodynia.

Q. What are some of the general symptoms of pregnancy? — *A.* Excitement of the brain, the cerebro-spinal system of nerves, and of the vascular system.

Q. What are some of the signs of cerebro-spinal irritation? — *A.* We may have great despondency, vitiated sensibility, hysteria, dyspnœa, palpitation, great irritability of the uterus, with nervous chills; or we may have fainting, &c.

Q. Are some females troubled with otalgia, odontalgia, cephalalgia, &c., during pregnancy? — *A.* Yes.

Q. What effect is exerted upon the vascular system? — *A.* It becomes greatly increased in blood, and we have general fulness and turgescence, and congestion, causing headache, &c.

Q. What evil consequences may arise from this state of the system? — *A.* We may have apoplexy, hemorrhage from the uterus, &c.

Q. How would you meet these symptoms? — *A.* By fresh air, regulated diet, slightly aperient medicines, and often by bleeding; administer slight cordials, &c.

Q. How would you relieve many of the other symptoms of pregnancy? — *A.* By correct hygienic treatment, and judicious medicinal applications.

Q. What should be the character of the diet of a pregnant female? — *A.* It should be light, and easy of digestion; and her drinks should be simple, and in moderate quantities.

Q. How can we remove plethora? — *A.* By gentle and easy exercise, with proper regard to food and drink; and sometimes it is necessary to resort to venesection.

Q. How would you counteract nervous irritation? — *A.* By slight febrifuges, cordials, and antispasmodics.

Q. In what way is it sometimes necessary to remove impacted feces from the rectum? — *A.* By mild injections, or by the finger or spoon-handle.

Q. How would you treat any inflammations or mechanical obstructions about the patient? — *A.* By the usual means, always bearing in mind the condition of the individual.

Q. Is puncturing ever necessary in œdema or general dropsy? — *A.* Yes; but it should be done with caution.

Q. What is necessary in morning sickness? — *A.* To eat before arising, and to use mostly solid diet; and if the sickness should recur, to lie down again.

Q. If vomiting should occur, how would you relieve it? — *A.* By antacids, and some aromatic infusion.

Q. What is necessary in mastodynia? — *A.* The application of warm applications, and sometimes leeches to the breasts, or the use of the soap plaster.

Q. In cases of severe toothache, should we not be cautious in the extraction of teeth? — *A.* Yes.

LABOUR, ETC.

Q. What is meant by labour? — *A.* The action both of the uterus itself, and the powers of the system generally, necessary to cause the birth of a child.

Q. How do we calculate the period for natural labour? — *A.* Ten days from the last menstrual period. Nine calendar months and ten days, or ten lunar months; or two hundred and eighty days from the last appearance of the menses.

Q. Do not some females go longer than this? — *A.* Yes.

Q. What are the two varieties of labour? — *A.* Natural and accidental.

Q. What are some of the causes of accidental labour? — *A.* Any untoward circumstances, which may effect either the mind or body of the mother.

Q. What is the prime agent in labour? — *A.* The uterus.

Q. Does not the action of the mind influence the progress of labour? — *A.* Yes, to a partial degree.

Q. When the brain and spinal marrow become unduly excited what may we fear? — *A.* Convulsions.

Q. What are the varieties of uterine contraction? — *A.* The tonic and spasmodic.

Q. What is a tonic contraction? — *A.* Where all the uterine fibres become unusually rigid.

Q. What are spasmodic contractions? — *A.* The alternate contractions, or those coming and going, or labour-pains.

Q. What is the usual frequency of the labour-pains? — *A.* At first they occur every half hour, but afterwards they become more frequent, as every ten or fifteen minutes.

Q. What is the effect of these contractions? — *A.* They at first dilate the orifice of the uterus, and afterwards force the child down.

Q. What happens to the membranes in these contractions? — *A.* They are separated from their attachments to the uterus.

Q. How is the bag of waters formed? — *A.* By the contractions of the uterus forcing the membranes through the mouth of the uterus, and the liquor amnii and the head of the child being also forced down.

Q. What is the state of the vagina under the pressure from the bag of waters? — *A.* It becomes enlarged and lubricated with mucus.

Q. What happens to the bag of waters under repeated uterine contractions? — *A.* They burst, and the liquor amnii is discharged.

Q. Does the bag of waters always form? — *A.* No; for the membranes may be prematurely ruptured, or the head of the child may be firmly forced against the uterine orifice.

Q. When the waters have passed away, upon what does the uterus then act? — *A.* Upon the fœtus.

Q. What accessory powers are now brought to bear? — *A.* The abdominal muscles; and these sometimes may excite the uterus to increased action.

Q. What are some of the signs that labour is about to commence? — *A.* The subsidence of the abdominal tumour; pres-

sure or uneasiness at the lower portion of the abdomen; a secretion, muco-albuminous like in character, also takes place, with a softening and general relaxing of the tissues of the vagina, &c.

Q. How do we divide the stages of labour? — *A.* Into the first stage, or that of dilatation of the os uteri; the second, or expulsion of the child; the third, or that of the expulsion of the placenta and membranes.

Q. Where are the first labour-pains usually felt? — *A.* In the back or hypogastric region.

Q. What is the moral and physical condition of the female at labour? — *A.* She is generally irritable, petulant, desponding; she is often chilly and nauseated; the pulse is small and feeble, and the vagina secretes a muco-sanguineous discharge.

Q. What is this muco-sanguineous discharge called in common language? — *A.* A show.

Q. May not a female have feigned pains? — *A.* Yes.

Q. In what manner does the orifice of the uterus dilate? — *A.* At first slowly, but afterwards more rapidly.

Q. How would you ascertain the degree of dilatation at each pain? — *A.* By the application of the fingers to the os uteri during a pain.

Q. What are the usual periods occupied for each stage? — *A.* The first stage is from six to twelve hours; the second, from three to five hours, and the last from one to two hours.

Q. Which are the most dangerous stages to the mother and child? — *A.* The second stage is more dangerous to the child, and the third stage to the mother.

Q. What is the description of the pains in the first and second stages of labour? — *A.* Those of the first stage are cutting and grinding; the second are more forcing or bearing down.

Q. What are the positions which the female should assume during the stages of labour? — *A.* That which is most easy for her during the first stage; and during the succeeding stages she should be placed in bed.

Q. What is the condition of the female, generally, during the second stage? — *A.* Her pulse becomes excited; her skin is covered by a cool perspiration; the cerebral organs may become congested; her mind is more calm; her limbs may become cramped.

Q. If the patient should feel like rising to evacuate her bowels during the second stage, should she be permitted to do it? — *A.* No; for the pressure of the child's head may produce this feeling.

Q. Is not the perineum sometimes greatly distended? — *A.* Yes.

Q. What is the condition of the patient after the child is born? — *A.* The uterine pains subside, and she is quite easy.

Q. How is the placenta expelled from the vagina? — *A.* By the voluntary efforts of the mother; or else through the assistance of the accoucheur by traction.

Q. Is there much hemorrhage attending the expulsion of the placenta? — *A.* No; it is generally about a pint.

Q. If the hemorrhage is profuse, in how short a time may the mother bleed to death? — *A.* Some say in five or six minutes.

Q. Whence does the hemorrhage come? — *A.* From the patulous orifices of the veins where the placenta has been attached.

Q. What is meant by a tedious labour? — *A.* One which occupies twenty-four or more hours.

Q. What are some of the causes of tedious labour? — *A.* Rigidity of the soft parts; small size of the pelvis; or deviated positions of the child; or irregular contractions of the uterus.

Q. What is meant by the term presentation? — *A.* When some portion of the fœtus is placed at the orifice of the uterus.

Q. What is meant by the position of the fœtus? — *A.* When some particular part of a presentation is situated at a particular portion of the pelvis.

Q. How are natural labours classified? — *A.* Into those where the vertex presents favourably, and those where the pelvis presents favourably.

CEPHALIC PRESENTATIONS.

Q. What are the two principal occipital presentations? — *A.* Where the occiput presents to the anterior half of the pelvis, or to the posterior half.

Q. What are the positions of the head recognised? — *A.* Six; three anterior, and three posterior.

Q. What are the various positions? — *A.* The first, where the nape of the child's neck is behind the left acetabulum and the bregma to the right sacro-iliac symphysis; the second, where the nape of the neck is behind the right acetabulum and the bregma to the left sacro-iliac symphysis; the third, where the nape of the neck is behind the symphysis pubis and the bregma to the sacrum; the fourth, where the nape of the neck is in front of the right sacro-iliac symphysis and the bregma to the left acetabulum; the fifth, where the nape of the neck is in front

of the left sacro-iliac symphysis, and the bregma behind the right acetabulum ; and the sixth, where the nape of the neck is in front of the sacrum and the bregma behind the symphysis pubis.

Q. When these positions exist, what is the mechanism of labour? — *A.* First, the forcing of the child down, and flexion of the head ; the head of the child then revolves, and is brought under the arch of the pubis ; it is still further forced along to the inferior strait, when the head begins to leave the breast and mount up. After the head is born it assumes a relative position to the body which it held in the uterus before the usual variations had taken place.

Q. What are the technical names for these various changes? — *A.* First, flexion, then rotation, then extension, and, finally, restitution.

Q. When does the perineum become greatly distended? — *A.* When the head is in the inferior strait of the pelvis.

Q. What are the changes which the shoulders undergo? — *A.* They rotate on the inclined planes ; and one of the shoulders passes under the symphysis pubis and the other upon the sacrum.

Q. What is the position of the axis of the body of the child as the shoulders escape? — *A.* The body curves laterally to accommodate it to the curvature of the axis of the pelvis.

Q. What are the parts of the child which offer the greatest resistance in cephalic presentations? — *A.* First the head, and then the shoulders.

Q. Which shoulder generally emerges first? — *A.* The pubal, or where there is great rigidity of the mother's soft parts, the sacral shoulder.

Q. Do the same diameters of the child's head present in the first and second positions? — *A.* Yes.

Q. What causes prevent as easy delivery in the second as in the first position? — *A.* The rectum sometimes being loaded with feces prevents easy rotation.

Q. Where is the occiput situated when restitution has taken place in the second position? — *A.* To the right side.

Q. What are the difficulties in the third position? — *A.* The long diameters of the child's head present to the short diameters of the pelvis, and we have no rotation.

Q. What is the mechanism of labour in the fourth position? — *A.* First, we have flexion ; the occiput rotates upon the right posterior inclined plane, and we have greater flexion, until the forehead is thrown behind the arch of the pubis, and extension is

delayed until the occiput has passed the whole arch of the sacrum, and the forehead has passed under the arch of the pubis.

Q. Are not the thorax and shoulders greatly flexed? — *A.* Yes.

Q. What must we guard against in this position? — *A.* Rupture of the perineum, and great pressure upon the neck of the bladder. (This latter may happen in all posterior occipital positions.)

Q. What motion does the head perform after it is delivered in these occipito-posterior positions? — *A.* Revolution backwards.

Q. What is the mechanism of the fifth position? — *A.* The same as in the fourth, bearing in mind the difference of the inclined planes, &c.

Q. Which is the most rare of all the positions? — *A.* The sixth.

Q. What is its mechanism? — *A.* The head of the child is forced directly down without rotation; and the same changes occur as in the third position, only remembering that the forehead is in the same position as the occiput was in the third position.

Q. Which two positions give a good study for the general principles of the mechanism of labour? — *A.* The first and fourth.

Q. Why may deviated positions of the child's head, or the fourth and fifth positions, be converted into the second and first? — *A.* Because of the greater breadth of the anterior inclined planes.

Q. What treatment should be directed in the latter stages of pregnancy? — *A.* A proper degree of exercise, vegetable diet, simple drinks, avoid constipation, and promote the secretion and excretion of urine.

Q. What kind of an apartment should the patient select for her apartment during confinement? — *A.* A spacious and well-ventilated one.

Q. What would you advise in regard to the bed? — *A.* That it be placed so as to be accessible from all sides; and with posts so high, as to enable the patient to place her feet against them with ease; and that it be well ventilated.

Q. Is there any danger attending the delivering her upon the bed, and transferring her to another? — *A.* Yes; from hemorrhage occurring to the woman.

Q. How would you prepare the bed for delivery? — *A.* Let the bed be made as smooth as possible; place, where the hips

are to rest after delivery, a folded blanket, oil cloth, &c., to protect the bed from the lochia. Then place upon the bed, at its lower portion, another piece of oil-cloth, flannel, &c., where the woman is to rest while being delivered, to prevent the discharges from running down or soaking the bed. Now place at the upper portion of the bed a sheet drawn up in folds, which may be drawn down when the woman is put up in bed, after she is delivered; throw another sheet over the foot of the bed, and hanging down over the edge of the bed where the accoucheur is to sit; then place the pillows diagonally near the right foot-post, attach a band to this post, that she may draw upon it when in labour.

Q. What is the best position for delivering? — *A.* Upon the left side, and the axis of the body inclined to nearly the same axis as that of the uterus.

Q. What is the preparation necessary for the patient to be put to bed? — *A.* Her body-clothing may be so placed as not to be soiled; her petticoats should be put aside; her chemise should be rolled up around her waist; the bandage to be used after delivery should be pinned close to the rolled-up chemise. A sheet should now be placed around her body; her bed-gown may be put on; and she may be now placed in the bed, and covered by the usual bed-clothes, &c.

Q. What should be at hand when the child is born? — *A.* A ligature for the umbilical cord, a pair of sharp scissors with blunt ends, and a blanket in which to envelope the child, some warm water to immerse the child, and stimulants to excite respiration, if necessary.

Q. What is necessary for the accoucheur?—*A.* Unctuous matter to anoint his hands, napkins, and a covering to his lap, &c.

Q. How would you favour relaxation of the os uteri and peritoneum when necessary? — *A.* By warm enemata, by bleeding, by nauseants, and warm, moist clothes, and lubricating the os tincæ with the unguentum belladonnæ.

Q. Should not the bowels and bladder be guarded and attended to when in labour? — *A.* Yes.

Q. What are the dangers of too speedy bearing down? — *A.* Too early rupture of the membranes, and fatal compression of the child.

Q. How would you distinguish true from false pains? — *A.* From the fact that the real pains are alternate; while in those arising from other causes they are either irregular or continual.

Q. How would you relieve false pains? — *A.* By any of the remedies proper under other circumstances.

Q. What is the condition of the os uteri in labour? — *A.* Slightly dilated or dilatable, and becoming rigid under a pain.

Q. When is it necessary to put a woman to bed? — *A.* When the os uteri is nearly or entirely dilated.

Q. How should the examination per vaginam be made? — *A.* The practitioner should be seated with his right arm to the woman's back. After lubricating the index finger, he should pass it gradually along the back of the woman's thighs to the posterior commissure of the vulva, and insinuate his finger between the labia and into the vagina, without, in the least, exposing her person; and this should be done during a pain, so as to form a true diagnosis, if possible, if labour has commenced or not, the degree of dilatation of the os uteri, and the presentation of the child.

Q. Can you easily diagnosticate the presentation of the child previous to the rupture of the membranes? — *A.* Yes.

Q. Can the position as easily be recognised through the membranes? — *A.* No.

Q. Does labour progress with equal rapidity after as before the rupture of the membranes? — *A.* It generally proceeds with greater rapidity after the rupture of the membranes, when the os uteri is dilated.

Q. How would you rupture the membranes if necessary? — *A.* By pressing the point of the finger into the fold of the membranes, or scraping the edge of the finger nails against the membranes; or by hooking the membrane with the fore-finger nail; or by puncturing with the point of a scissors or sharp instrument carried along the index finger.

Q. When would you rupture the membranes? — *A.* During a pain.

Q. How would you avoid being soiled by the liquor amnii? — *A.* By having the arms covered with napkins, and a napkin close at hand to press against the vulva when you burst the membranes; the latter also renders the woman more comfortable.

Q. Should the accoucheur interfere during the second stage of labour if every thing is proceeding naturally? — *A.* No.

Q. How would you increase flexion of the head if necessary? — *A.* By applying the finger against the side of the forehead, and pushing it up.

Q. At what stage of labour should the patient bear down? — *A.* During the second stage, when the os uteri is well dilated.

Q. Should the female bear down when the pain has gone off? — *A.* No.

Q. How would you favour rotation of the head? —*A.* Either by pressing with the index finger upon the parietal protuberance, from behind forward; or by pressing with the index finger from below backwards (making the change of hands to adapt them to the various positions).

Q. How would you support the perineum to prevent rupture? — *A.* By applying the palm of the hand over the perineum, with the wrist to the child's head; or by pressing with the points of the fingers against the perineum, covered with a napkin.

Q. Must you ever retard the progress of the child's head? — *A.* Yes; when the perineum is not well dilated.

Q. When is the time at which the perineum is most in danger? — *A.* When the parietal protuberances are passing the vulva.

Q. What must be done when the child's head is born? — *A.* See that the cord is not twisted around the child's neck, and support the head when down on the palm of the hand.

Q. Do you ever assist rotation of the shoulders? — *A.* Yes; by pressing the one to the pubis, and the other to the sacrum.

Q. May we ever make traction on the head? — *A.* Yes; when the perineum is resisting; and then drawing either forward or backward, as it may be necessary for either shoulder.

Q. Is it proper to favour the quick delivery of the body of the child? — *A.* No; it should be held back a little to allow the uterus to contract upon it.

Q. What disposition should be made of the body of the child when it is born? — *A.* It should be so placed as to protect its face from the discharges of the mother.

Q. What must be our chief care as soon as the child is born? — *A.* That the uterus is well contracted.

Q. How is this best done? — *A.* By placing the hand upon the abdomen of the mother, and by grasping the uterus, and forcing it, if necessary, to contract by friction, cold applications, &c.

Q. Must we attempt to convert a third, into a first or second position of the vertex? — *A.* Yes.

Q. How would you assist flexion in this case? — *A.* By passing the finger of the right hand upon the occiput and pulling it down; or by pressing with two fingers on each side of the frontal bone, and pressing it back and up.

Q. Is it ever necessary to pass the whole hand into the cavity of the pelvis, and carry up the hand, and then make the change? — *A.* Yes.

Q. Do transverse positions ever occur? — *A.* Yes; but rarely.

Q. Where lies the greatest difficulty in occipito-posterior positions? — *A.* The want of perfect flexion of the head.

Q. How would you favour flexion? — *A.* By pressing the finger against the forehead, or by hooking the occiput forward through the rectum, if you cannot do it through the vagina.

Q. Have we not great reason to fear rupture of the perineum in these cases? — *A.* Yes.

Q. How can the fourth position be converted into the second? — *A.* By pressing against the pubic side of the face, or by drawing upon the sacral side of the occiput by the fingers.

Q. How would you change a fifth position into a first? — *A.* By pressing against the face or temple, or by drawing upon the sacral side of the occiput.

Q. Into what positions should you convert the sixth? — *A.* Either into the fourth or fifth.

Q. Where should we find the fundus of the uterus after delivery? — *A.* In the umbilical or hypogastric region, or just above the brim of the pelvis.

Q. Is the placenta, in a majority of instances, spontaneously delivered? — *A.* Yes.

Q. Must we not sometimes stimulate the uterus to contract upon the placenta? — *A.* Yes, by friction.

Q. What is the danger of making undue traction upon the cord? — *A.* Inversion of the uterus, hemorrhage, &c.

Q. When it is necessary to act upon the cord or placenta, in which way should you make traction? — *A.* In the direction of the axis of the pelvis.

Q. What manœuvre is sometimes necessary to effect this? — *A.* To make a pully of the index finger of the left hand, and draw the cord under it with the right hand.

Q. When the placenta is down in the cavity of the pelvis, is it ever necessary to hook the finger into the placenta and draw it out? — *A.* Yes.

Q. How would you secure the membranes? — *A.* By twisting the membranes like a rope, as the placenta passes out of the vulva.

Q. What is necessary in inertia of the uterus? — *A.* First, to make friction over the abdomen, or grasp the uterus in the hand through the abdominal parietes; or use ergot; or to pass the hand into the cavity of the uterus; or by squeezing a lemon in the cavity of the uterus.

Q. Does not the external and internal os uteri frequently

contract without the uterus itself contracting; and what is the danger in these cases? — *A.* Yes; and then we may have concealed hemorrhage.

Q. Should you ever leave your patient without the placenta being delivered? — *A.* No.

Q. Is it ever necessary to pass the whole hand into the cavity of the uterus and grab the placenta, and then let the uterus act upon the hand, and expel the hand and placenta together? — *A.* Yes.

Q. What instruments are sometimes necessary to deliver the placenta? — *A.* Dewees's hook, Bond's placental forceps, and Hodge's forceps.

Q. How would you overcome constriction of the os uteri? — *A.* By the gradual insertion of the fingers, and of the whole hand; sometimes venesection must be resorted to, or by anointing the os uteri with the ointment of belladonna.

Q. May we not have constriction of other portions of the uterus? — *A.* Yes, especially of the middle portion of the uterus, producing hour-glass contraction of the uterus.

Q. Is there not much pain attending hour-glass contraction of the uterus? — *A.* Yes.

Q. How would you overcome hour-glass contraction of the uterus? — *A.* Induce the fundus of the uterus to contract by frictions upon the uterus through the parietes of the abdomen, and pass the hand conically through the constricted portion of the uterus, and gradually dilate it.

Q. What must be done if this does not succeed? — *A.* Bleed the patient, and use the warm bath and opiates.

Q. Is adhesion of the placenta to the side of the uterus a common occurrence? — *A.* No.

Q. What must be done when there is adhesion? — *A.* Pass the hand into the uterus, expand the hand, and gnaw off the placenta with the pulps of the fingers against the side of the uterus.

Q. What may happen when the placenta, or part of it is retained? — *A.* Irritation, pain, and inflammation of the uterus, and putrefaction of the placenta, &c.

Q. What is the treatment in these cases? — *A.* To wash out the cavity of the uterus by mild detergent washes, thrown into the uterus by proper syringes.

Q. What is meant by clearing the woman? — *A.* The complete removal of the placenta, membranes, and other discharges from the vagina and vulva of the female.

Q. When should the umbilical cord be cut? — *A.* Not until

the respiration in the child is fully established, and we have free circulation of its blood, and the artery of the cord has ceased to pulsate.

Q. How many ligatures would you apply to the cord? — *A.* Generally but one.

Q. Where should the ligature be situated? — *A.* About two inches from the abdomen.

Q. How should you give the child to the nurse, and how should she receive it? — *A.* You may take the child about the thorax between the thumb and forefinger, and support the limbs with the other hand, and then give it to the nurse in a warm flannel blanket, and wrap it warmly.

ASTHENIA AND ASPHYXIA IN THE INFANT, ETC.

Q. What do you mean by asthenia in the new-born infant? — *A.* A state of debility, with shrivelled features, difficult respiration, enfeebled circulation, with groaning, &c.

Q. What is necessary in such a state? — *A.* To stimulate the respiratory muscles gently by mild frictions, washing it in alcoholic fluids, gently inflating the lungs, wrapping it in flannel or cotton wadding, and handling it carefully.

Q. What is meant by asphyxia? — *A.* A state of apparent death.

Q. How many varieties are there? — *A.* Two; the simple, and congestive.

Q. What are the causes of this state? — *A.* Pressure upon the child in the passage of the pelvis, or upon the cord or placenta; knots in the cord; membranes over the face of the child; suffocation from the fluids or from the bed-clothes; or from the larynx and trachea being filled with mucus.

Q. What are the evidences of the two varieties of asphyxia? — *A.* Palor; want of respiration in the first variety and in the second; the face is swollen and turgid with blood; absence of the respiration and circulation, and coldness of the surface, &c.

Q. What is the treatment of asphyxia? — *A.* Remove all mechanical impediment to respiration; let the cord remain uncut; keep the body warm by warm bathing; use gently stimulating frictions; also stimulating injections. Now use the warm bath, and then dash cold water upon the thorax; imitate the process of respiration by the hand; breathe into the lungs; and in cases of congestion, allow blood to flow from the cord, to the amount of half an ounce or an ounce.

Q. Is the tracheal tube of much use? — *A.* No.

Q. Must we not keep up this treatment for some time? — *A.* Yes, for an hour or more.

Q. What is the character of the tumours sometimes upon the scalp of infants? — *A.* They are bloody and ecchymosed.

Q. How are they formed? — *A.* From the blood being pressed into a portion of the scalp, and there being coagulated.

Q. With what are these tumours often confounded? — *A.* With fracture.

Q. What is necessary in cases of tumour of the scalp? — *A.* Very little need be done, though a lead water poultice may be used, and if it should suppurate, open the tumour freely and poultice it.

Q. What is necessary to remove the sebaceous matter from the body of the child after it is born? — *A.* Anoint the body with animal oil, and wash it with unirritating soap and water.

Q. How would you dress the cord? — *A.* By cutting a small hole in a piece of linen, six inches square, passing the cord through it, and then doubling the linen around the cord so as to prevent the drying cord from irritating the integuments of the child, and then binding it with a flannel roller to the body of the child.

Q. When does the cord usually dry up and fall off? — *A.* In five or seven days.

Q. What should be the food of the child after it is born? — *A.* The mother's milk, or a little sugar and water.

MANAGEMENT OF THE WOMAN AFTER DELIVERY, ETC.

Q. After the woman is delivered and placed in bed, what should be done? — *A.* A soft napkin should be placed loosely against the vulva, and the bandage properly adjusted.

Q. What is the benefit of the bandage? — *A.* To prevent fainting from a sense of exhaustion, to promote contraction of the abdominal muscles, and to keep the uterus from again dilating with blood, &c.

Q. What should be the diet of the woman after delivery? — *A.* Gruel and barley water, and her drinks should be cool and simple.

Q. When should the bowels be opened by a cathartic if not open before? — *A.* On the third day after delivery.

Q. What is the character of after-pains? — *A.* They are spasmodic and alternate, similating labour-pains.

Q. To what are they attributed? — *A.* To coagula within

the cavity of the uterus, or upon an irritable condition of the uterus, bladder, and bowels.

Q. What is the treatment in the two cases? — *A.* In the first instance we must force the uterus to contract firmly and expel the coagula; or if they depend upon a peculiar nervous state we must administer anodynes; and should the bowels and bladder be affected, warm injections are highly beneficial; and drawing off the water from the bladder.

Q. Is not venesection often necessary? — *A.* Sometimes it is.

PELVIC PRESENTATIONS, ETC.

Q. Why are pelvic presentations dangerous to the child? — *A.* From the fact that the head may be arrested in the pelvic cavity, after the body is born.

Q. Why are they dangerous to the mother? — *A.* Because of the delay in the first and second stages of labour, and the great fatigue induced by the labour.

Q. How would you diagnosticate pelvic presentations? — *A.* From the smaller size of the os uteri and bag of waters; from a sulcus between the limbs, or from the presence of the genital organs; from a fold in the groin; and sometimes from the presence of meconium upon the finger after making an examination per vaginam.

Q. How do you divide pelvic presentations? — *A.* Into those of the breech, feet, and knees.

Q. Which are the more unfavourable? — *A.* Those of the knees and feet.

Q. What are the different positions of the pelvis? — *A.* The same as those of the cephalic extremity, substituting the breech for the head.

Q. Is not the mechanism of labour similar in breech presentations to those of the head? — *A.* Yes.

Q. What direction does the body take upon the hips being delivered? — *A.* It bends laterally to accommodate itself to the cavity of the pelvis.

Q. When the shoulders rotate, does the head follow them? — *A.* No; but the neck is twisted the fourth or sixth of a circle.

Q. Does not restitution of the shoulders take place when they are delivered? — *A.* Yes.

Q. How should the head present for ease and safety after the body is born? — *A.* Into the occipito-mental diameter, to the axis of the pelvis.

Q. What is the danger if the physician draws upon the body of the child? — *A.* That the chin may leave the breast, and we may then have a long diameter of the child's head presenting to a short diameter of the pelvis.

Q. How should the body of the child be carried to favour its proper engagement in the inferior strait? — *A.* In the anterior varieties of pelvic presentations the body should be carried up towards the front of the body of the mother; and in the posterior varieties, the body of the child should be carried back.

Q. Are there any differences in the mechanism of the presentations of the feet and breech? — *A.* None of importance.

Q. Is there not greater danger to the child in feet than in breech presentations? — *A.* Yes; from compression of the body and thorax, &c.

Q. Why are the shoulders less easily delivered in these cases than in breech presentations? — *A.* Because the os uteri will allow the feet and breech to pass through it when but partially dilated, while the shoulders require a greater degree of dilatation; and also when the body is pressed down, the arms mount up alongside of the head.

Q. What are the points of the legs in knee presentations corresponding with the occiput and anterior fontanel in cephalic presentations? — *A.* The anterior part of the legs correspond with the nape of the neck, and the anterior parts of the thighs with the anterior fontanel.

Q. What directions should be given to your patient in all cases of pelvic presentations? — *A.* That she must not bear down in the least during the first stage of labour; and if necessary, the practitioner should support the bag of waters, and administer anodyne enemata, and insist upon the recumbent position.

Q. Should the practitioner be at all officious in making traction, or in favouring rotation, &c.? — *A.* No; let nature take its course.

Q. What attention should be given to the cord? — *A.* When the body is delivered as far as the umbilicus, we must draw down a loop of the cord to prevent traction upon it, and compression; and should there be much compression, endeavour to place the cord in a more unoccupied part in the pelvis.

Q. When the body of the child emerges, how should it be supported? — *A.* Longitudinally upon the arm, and then carried so as to let the head curve upon the cavity of the pelvis and inferior strait.

Q. Can you not, by introducing a finger in the mouth or

alongside of the nose, make the head more easily emerge from the cavity of the pelvis? — *A.* Yes.

Q. Can we not by proper manipulation so operate upon the breech in the third or sixth position, as to cause proper rotation of the shoulders? — *A.* Yes.

Q. When must we make this rotation? — *A.* When it is in the cavity of the pelvis.

Q. What may be done in addition in cases of the sixth position? — *A.* First convert it into the fourth or fifth position; and when the shoulders are delivered, change it into a first or second position.

Q. What is an important rule in footling cases? — *A.* Keep back the feet until the first stage of labour is completed.

INSTRUMENTAL DELIVERY, ETC.

Q. What are some of the cases where the accoucheur must resort to medical and surgical aid? — *A.* In rigidity of the os uteri or of the external organs, hemorrhage, convulsions, inertia of the uterus, mal-positions of the fœtus, deformities of the pelvis, too great size of the head of the child, and the existence of tumours of the pelvis.

Q. What are the classifications of obstetrical instruments? — *A.* Those which do not injure the mother or child; those which destroy the child for the safety of the mother's life; and those which risk the life of the mother to save that of the child.

Q. In what cases should we use the hand alone? — *A.* Where the position is bad, to produce version; in hemorrhage, &c.

Q. What is meant by version of the head? — *A.* The bringing of the head to the axis of the pelvis, when some other part of the child has been presenting.

Q. What is meant by version by the feet? — *A.* When the hand is introduced into the cavity of the uterus, the feet of the child seized and brought down.

Q. Which is to be preferred, version by the head or feet? — *A.* Version by the head whenever it is practicable.

Q. What are the dangers of version? — *A.* Pain, hemorrhage, and rupture of the uterus to the mother, and too great twisting of the spine of the child.

Q. Which is the more frequently resorted to in this country? — *A.* Version by the feet.

Q. What must be the condition of the os uteri before attempting version? — *A.* It must be dilated, or easily dilatable.

Q. When should you make version? — *A.* Before the head has passed the os uteri, and as soon as the first stage of labour is completed.

Q. What should be the position of the patient for version? — *A.* Upon the back, with her hips over the edge of the bed and her feet supported.

Q. How should the accoucheur stand? — *A.* In front of the patient, and at his ease.

Q. What hand must be used in version by the head? — *A.* That which corresponds with the side to which the occiput presents.

Q. In what way must you introduce your hand within the soft parts? — *A.* First lubricate the hand and soft parts, and then pass it within, during a pain, in a conical form — the thumb being bedded between the fingers.

Q. When the hand is introduced, what should be its position? — *A.* Semi-pronate.

Q. After the hand is introduced, what then should be the position? — *A.* Supined.

Q. When are you to make the rest of the manœuvre? — *A.* in the absence of a pain.

Q. How would you seize the head to produce version by it? — *A.* First push up the head, slide your hand under it or along side of it; then embrace the head, then carry the chin to the iliac fossa opposite to the occiput, and let the occiput descend.

Q. How would you support or regulate the fundus of the uterus? — *A.* With the other hand.

Q. When would you resort to version by the head? — *A.* When the head is within the reach of the hand.

Q. In version by the feet, which hand would you use? — *A.* That one the palm of which is towards the front of the body of the child.

Q. How are you to proceed in version by the feet? — *A.* Introduce your hand during the absence of a pain; disengage the head, pass your hand over the side of the child, following the course of the limbs; embrace the feet, and keep the heels in the hollow of the hand until they are brought into the iliac fossa or cavity of the pelvis; insinuate the index finger between the feet, and withdraw the feet outside of the vulva.

Q. When you can find but one foot, what must be done? — *A.* Draw it carefully in the axis of the pelvis, and as much as possible towards the side where the other foot should be.

Q. How would you secure the one foot while you search for

the other? — *A.* By passing a fillet around the ankle, and letting the fillet hang outside of the vulva.

Q. Is it always necessary to find the second foot? — *A.* No.

Q. Where should you always attempt to bring the back of the child's foot? — *A.* At the anterior part of the pelvis.

Q. What position of the feet should you favour when you use the right hand for turning? — *A.* The first.

Q. What when you use the left hand? — *A.* The second.

Q. Is it not necessary, after turning, to favour rotation of the hips, shoulders, and head? — *A.* Yes.

Q. If the arms should have a tendency to mount up alongside of the head, how would you manage? — *A.* Resist the descent of the body of the child, and let the uterus force down the arms; or else pass up your finger and bring down the arms, favouring flexion of the arms at the elbow.

Q. When the shoulders are delivered and the head does not advance readily, how would you favour it? — *A.* Push back the body of the child, pass up two fingers, and press them upon the malar bones or upon the chin, and bring the chin down to the breast.

Q. When the head is arrested in the inferior strait, what instrument should you make use of? — *A.* The forceps.

Q. Is it not wise to have your forceps at command in cases of pelvic presentations? — *A.* Yes.

Q. In what cases is it sometimes necessary to bring down the feet? — *A.* In cases of inertia of the uterus.

Q. How would you manœuvre to bring down the feet? — *A.* Push up the breech, and then hunt after the feet.

Q. Which hand would you use? — *A.* That in which the palm looks to the abdomen of the child.

Q. If the breech becomes arrested in the cavity of the pelvis, how would you manipulate? — *A.* Attempt to bring down the breech by passing up the hand, and fix the thumb in one groin and a finger in the other; or else pass up a fillet around the hip; or else make use of the simple blunt hook, or Dr. Ludlow's guarded blunt hook.

Q. In using the blunt hook, should you injure the mother? — *A.* No.

Q. Into which groin should you pass the blunt hook? — *A.* In the sacral, if possible; but we most frequently pass it into the pubal.

Q. How would you guide the blunt hook to its proper position? — *A.* By the points of the fingers.

Q. In what other cases is the blunt hook applicable? — *A.*

To bring down the arms of the child, or to hook upon the lower part of the orbit of the eye, or in the mouth, to produce flexion of the head.

Q. By what instrument can you correct deviated positions of the head? — *A.* By the vectis or lever, a curved instrument, adapted to fit the different parts of the child's head.

Q. In what capacity is the vectis used? — *A.* As a lever and tractor.

Q. In what positions of the head is it especially useful? — *A.* In transverse positions.

Q. Is not the forceps a very efficient and valuable instrument? — *A.* Yes.

Q. How are the forceps made? — *A.* From steel; with two blades to fit the child's head, and so constructed as to be introduced separately, and then locked.

Q. What mode of locking is considered the best? — *A.* The German, or where we have a conical screw-pivot and conical notch.

Q. What are the two varieties of the forceps? — *A.* The short, or English, and the long, or French.

Q. Which forceps are generally preferred? — *A.* The long.

Q. Where may you act with the long forceps? — *A.* In any part of the pelvis.

Q. To what part of the child would you use the forceps? — *A.* Always to the head.

Q. To what part of the head would you apply them? — *A.* To the sides, except in transverse positions, when rotation cannot be effected.

Q. In what diameter of the head should the forceps to be applied parallel? — *A.* To the occipito-mental.

Q. Should the mother be subjected to any pain in the use of the forceps themselves? — *A.* No.

Q. Is the child's head liable to injury from the forceps? — *A.* Not as a general rule, but it may be to a slight degree in very difficult cases.

Q. When are forceps indicated? — *A.* When we have great resistance from the soft parts; when the system of the mother is much enfeebled; when we have convulsions, &c.

Q. Should not the first stage of labour be complete before you attempt to use the forceps? — *A.* Yes.

Q. Must you not be sure in your diagnosis before you attempt to use the forceps? — *A.* Yes.

Q. How would you place your patient for the use of the for-

ceps? — *A.* On her back, and her breech drawn to the edge of the bed, with her limbs separated, and feet well supported.

Q. Should not the bowels and bladder of the woman be well evacuated before using the forceps? — *A.* Yes.

Q. What are the peculiarities of the two blades of the forceps? — *A.* The one has the pivot in it, and is called the male or left hand blade; and the other has the notch, and is called the female or right hand blade.

Q. Which blade should be introduced first? — *A.* The left hand or male blade.

Q. What are the steps in the use of the forceps? — *A.* First apprise the patient and her friends of your intention; then place your patient in the proper position, warm the instrument, and lubricate it and the vulva and the right hand of the accoucheur. The accoucheur then takes the left hand or male blade in his left hand like a writing pen, stands between the limbs of the patient, guards the blade with the fingers of his right hand. The handle of the forceps should be carried nearly perpendicular to the body of the patient; its point is to be glided along the palm of the hand, and the fingers gradually becoming parallel with the patient's body, until the blade is placed by the side of the child's head in the occipito-mental diameter. The handle is now to be supported by the hand of an assistant; the other blade is now to be introduced and fixed as the former blade, and the two locked.

Q. Should not the points of the instrument always be kept against the sides of the child's head? — *A.* Yes; we then avoid injuring the soft parts of the mother.

Q. Must the blades lock readily? — *A.* Yes.

Q. Is there not danger sometimes of passing the forceps outside of the os uteri? — *A.* Yes.

Q. Should you make slight compression and traction when the blades are fixed? — *A.* Yes.

Q. When may you apply a fillet to the handles of the forceps? — *A.* To compress the head when the pelvis is too small, or the head of the child too large.

Q. In what capacity are the forceps used? — *A.* As levers and tractors.

Q. Must we not support the perineum of the female when delivering by the forceps? — *A.* Yes.

Q. How should you move the handles of the blades of the forceps? — *A.* From side to side of the head, and always from handle to handle.

Q. How would you apply the male blade when the head is

oblique in the cavity of the pelvis? — *A.* At first, elevate the handle, pass in the blade, sweep it under the top of the head, depress the handle rapidly to bring the blade to the side of the head, and that the point may look to one groin of the mother.

Q. How would you act with the female blade? — *A.* Pass it into the cavity of the pelvis, under the top of the child's head; then, by using the fingers, depress the handle of the blades to sweep it over the parietal protuberance, and then let the blade lock with the pivot to the left groin of the mother, if the case is one of the first position.

Q. If the shoulders are arrested, how would you act? — *A.* By making traction upon the head, or by passing up the blunt-hook, and then making proper traction.

Q. If the head is arrested in the superior strait, would you turn or use the forceps? — *A.* If acquainted with the use of the forceps, use them; if not, turn.

Q. Is there not much difficulty in applying the forceps at the superior strait? — *A.* Yes.

Q. How would you protect the mother from injury in using the forceps in the superior strait? — *A.* By passing up the hand to the head of the child sufficiently high as a guide and guard.

Q. What is the difficulty in applying the forceps in the second position of the vertex? — *A.* The male blade occupies so much space at the anterior commissure of the vulva, that the female blade is introduced with difficulty.

Q. How can you overcome this? — *A.* First introduce the male blade to its proper situation, then retract it a little till it is opposite the left ischium; let an assistant support it; now introduce the female blade; now pass up the male blade to its original position; and if you have done all properly, the blades will lock.

Q. Must we ever introduce the blade in front of the perineum, and the other under the arch of the pubis? — *A.* No.

Q. In cases of pelvic presentation and retained head, how are you to manage the body of the child? — *A.* Where the occiput is anterior, the body is to be carried over the abdomen of the mother; while in posterior positions of the occiput, the body is to be carried to the sacrum of the mother.

Q. Is it not difficult to deliver the head from the superior strait when the body is delivered? — *A.* Yes.

Q. How would you manage in such a case? — *A.* First get the head in a proper position, and then apply the forceps, or make use of instruments adapted to it; and sometimes take out he brain.

Q. What is the smallest diameter through which a living child can pass? — *A.* Three inches.

Q. What must be done in cases less than three inches? — *A.* Resort to the perforator, the crotchet, or gastro-hysterotomy.

Q. When the brain is broken up, what is the condition of the bones of the cranium? — *A.* They easily collapse.

Q. What are the diameters of the base of the skull when the vault of the cranium is removed? — *A.* The face is from one to one and a half inches; two inches with the lower jaw; transverse diameter, two inches and a half.

Q. What is meant by craniotomy and cephalotomy? — *A.* Breaking up the bones of the child's head.

Q. What instruments are used for this? — *A.* A perforator, and Smellie's scissors.

Q. Must not the uterus be supported in this operation? — *A.* Yes, firmly.

Q. When you operate, how are you to proceed? — *A.* The scissors or perforator is to be well guarded, by the points of the fingers, to the head, and the point of the instrument fixed in a fontanelle or suture; push the scissors to the guard of the blades, then open the handles and cut from within out, and then turn it again and proceed as before; then pass the scissors inside of the skull and cut up the brain; and then, if necessary, apply the forceps and compress the skull.

Q. When you use the crotchet, how would you apply it? — *A.* It is to be passed inside of the cranium, and fixed upon some point within the cranium, and traction made.

Q. What are some of the other instruments for diminishing the child's head? — *A.* The craniotomist; the bone forceps of Dr. Meigs, &c.

Q. Is ergot or turning ever to be resorted to in cases of deformity? — *A.* No.

Q. What instrument is used to diminish the bones of the cranium? — *A.* The osteotomist of Dr. Davis, &c.

Q. How large must the opening be to bring down the base of the cranium? — *A.* From one and a quarter to one and a half inches antero-posteriorly, and from two and a half to three transversely.

Q. Is cephalotomy dangerous to the mother? — *A.* No; not if done in time and with care.

Q. If the body will not pass, what must be done? — *A.* It must be broken up.

Q. When is it right to recommend the Cæsarean section?

— *A.* When the child is alive and the mother is in a good state.

Q. What are the objections to the Cæsarean section? — *A.* It involves the life of the mother, and does not always preserve the life of the child.

Q. Is the crushing forceps of Baudelocque, or its modification by Dr. Hodge, ever used to diminish the size of the child's head? — *A.* Yes.

Q. In what cases is artificial premature delivery resorted to? — *A.* In those cases where, if pregnancy is allowed to proceed to its full term, instruments would be necessary.

Q. At what month would you induce artificial delivery? — *A.* At the eighth, or a little earlier.

Q. How would you induce artificial delivery? — *A.* By stimulating the uterus to contraction, or by puncturing the membranes.

Q. When the antero-posterior diameter is two and three-quarter inches, what must we resort to? — *A.* Either premature artificial delivery, delivery by the crotchet, or by the Cæsarean section.

Q. In cases of sixth position, when the head will not rotate by any means in your power, what instrument must be used? — *A.* The forceps, carried high up, or a fillet, with a piece of whalebone, carried over the occiput, to draw the occiput down.

Q. Does the anterior fontanelle ever present in practice? — *A.* Yes; from flexion not being perfect.

Q. If the occiput should be arrested at the linea ilio-pectinea, what is the consequence? — *A.* A locked head and impracticable labour.

Q. How would you avoid this difficulty? — *A.* Resist the descent of the forehead by pressing against it with the finger, or else hook down the occiput with a lever, in the absence of a pain.

Q. Can you ever effect flexion and rotation at the same time, in cases where the head is in the cavity of the pelvis, or in the inferior strait? — *A.* Yes; by passing the lever under the sacral side of the occiput; or pass one or two fingers in the anus, and press against the head through the rectum and vagina.

Q. In cases of deviated third position, what is necessary to be done? — *A.* Push up the head, rotate the head, increase flexion, and let the occiput descend.

FACE PRESENTATIONS, ETC.

Q. In face presentations, what parts present to the straits of the pelvis? — *A.* The fronto-mental and bi-temporal to the plane of the straits, and the root of the nose to the centre of the pelvis.

Q. What is the principal difficulty in face presentations? — *A.* The occipito-bregmatic diameter is added to the antero-posterior diameter of the thorax when the head descends in the pelvis.

Q. In what face presentations does this occur? — *A.* When the forehead is anterior and the occiput is thrown back upon the spine of the child.

Q. Can the child be born alive in such cases? — *A.* No.

Q. When the chin presents to the anterior part of the pelvis, can the child be born alive? — *A.* Yes.

Q. What diameters present to the pelvis in face presentations? — *A.* The fronto-mental and bi-malar, or the trachelo-bregmatic and bi-parietal.

Q. When the chin presents to the sacrum of the mother, can the face enter the superior strait? — *A.* Yes.

Q. What are the varieties of face presentations? — *A.* The same as the occipital.

Q. Which are the most frequent face presentations? — *A.* The right mento-iliac and left mento-iliac.

Q. Is not labour easy if the chin comes under the arch of the pubis? — *A.* Yes.

Q. Describe the mechanism in these cases. — *A.* First great extension takes place, then rotation of the chin upon the anterior plane to the arch of the pubis, and then flexion until the head clears the perineum.

Q. When you find the child descending, face foremost, in the superior strait, what must be done? — *A.* Either make version by the head or feet.

Q. How many positions of the anterior fontanelle are recognised? — *A.* Six; the same as of the occiput.

Q. Can you not sometimes alter these before the membranes are ruptured? — *A.* Yes.

Q. What change would you attempt to make in them? — *A.* To an occipital position, by producing flexion and rotation.

Q. Is not the lever useful in these cases? — *A.* Yes; for by it you may favour rotation and flexion.

Q. When the top of the head is coming under the arch of the pubis, and you cannot rotate it, what is necessary? — *A.* Apply the forceps.

Q. How would you apply them? — *A.* By depressing the handles, and applying the ends of the blades high above the pubis.

Q. If you cannot use the forceps, what instruments are indicated? — *A.* The perforator and crotchet; and then, if possible, the forceps.

Q. What deviations may be converted into face presentations? — *A.* Where the forehead presents and cannot be rectified to an occipital presentation.

Q. When the occiput is anterior, what is the danger of this? — *A.* Producing an impracticable labour.

Q. Should you ever allow the forehead presentations to remain? — *A.* No.

Q. What must be done in these cases? — *A.* Convert the fronto-anterior position into the chin presentation, and bring down the occiput, when the position is with the chin anterior.

Q. When the chin is anterior in positions of the face, how would you apply the forceps? — *A.* Apply the blades of the forceps as in occipito-anterior positions; and when the chin clears the anterior commissure of the vulva, draw a little forward with the front of the thorax against the under part of the arch; then carry the handles rapidly over towards the abdomen of the mother.

Q. Do we frequently meet with positions of the side of the child's head? — *A.* No.

Q. When these positions do occur, how can you recognise them? — *A.* By the presence of the ear, a mastoid or a zygomatic process, &c.

Q. How do you correct these positions? — *A.* By pushing up the head and bringing it down in an occipital position.

Q. Do other parts of the body ever present? — *A.* Sometimes.

Q. In deviated positions of the body of the child, should you wait for spontaneous version? — *A.* No.

Q. How many presentations of the shoulders are there? — *A.* Two; one of the right and the other of the left.

Q. How do you diagnosticate shoulder presentations? — *A.* By the presence of a tumour on one side of the neck, and of the clavicle, the scapula, and the arm and hand, &c.

Q. What are the positions of the shoulders? — *A.* Dorso-pubic and dorso-sacral of the right and left shoulders.

Q. What is meant by spontaneous version? — *A.* That movement by which the body of the child is turned to a favourable from an unfavourable position of its own accord, or by the action of the uterus.

Q. Does this often occur in shoulder presentations? — *A.* No.

Q. In shoulder presentations should you wait for spontaneous version? — *A.* No.

Q. When the lower part of the body presents, what must be done? — *A.* Pass in the hand and bring down the breech or feet.

Q. When the upper part of the body presents, what must be done? — *A.* Pass in the hand and make version by the feet.

Q. Must the soft parts be well relaxed and dilated? — *A.* Yes.

Q. Should the membranes be preserved till the parts are well dilated? — *A.* Yes.

Q. Which hand must be used? — *A.* The same as in cases of version by the knees or feet.

Q. In cases where the dorsum of the child is to the pubis of the mother, which hand is to be introduced? — *A.* The one which can be readily applied to the iliac fossa in which the breech is situated.

Q. When the dorsum of the child is towards the sacrum, what is the rule of action? — *A.* In dorso-sacral positions of the right shoulder, and the breech in the left iliac fossa, the right hand must be passed up in front of the child in a prone condition, &c.

Q. Must we attempt to produce version when the uterus contracts? — *A.* No.

Q. When the body has been under great pressure in the cavity of the uterus in the pelvis, must you act immediately or allay the contractions? — *A.* You must allay the contractions.

Q. If the child is dead, must you resort to version? — *A.* No; you must deliver by the crotchet, &c.

COMPLICATIONS OF LABOUR, ETC.

Q. When an arm or hand descends with the head, what must be done? — *A.* Support the hand at the superior strait while the head descends.

Q. Must you ever make traction by the hand? — *A.* No.

Q. Is not the descent of the umbilical cord a complication of labour? — *A.* Yes.

Q. How does it complicate labour? — *A.* By its being pressed upon, and impeding the circulation of the child.

Q. When the cord has prolapsed, what must be done? — *A.*

Carry it above the superior strait and support it there, and allow the head to descend.

Q. In cases of intra-uterine hydrocephalus, what must be done to the child's head? — *A.* Open it, and allow the water to escape, and then complete the delivery by the forceps or blunt hook.

Q. How would you bring down the base of the cranium if it has been necessary to destroy the vault? — *A.* With the facial extremity foremost.

Q. In twin pregnancy are the signs very marked? — *A.* No.

Q. What sign can most be relied upon? — *A.* That by auscultation, when two hearts can be heard pulsating.

Q. In the third stage of twin pregnancy do we experience any greater danger than in simple cases? — *A.* Yes from the over-distension of the uterus and its liability to an atonic state, and the danger of hemorrhage.

Q. In cases of twins, if the head of one child and the feet of the other engages simultaneously, what must be done? — *A.* Push up the feet of the one, and let the head of the other descend, or else deliver by the forceps; or else resort to craniotomy, &c.

Q. Suppose that the head of one child locks with the head of the other, what is necessary? — *A.* To detruncate the child which has descended first, and then push up the head, and then deliver the second child, and then the head of the first.

Q. How many obliquities of the uterus are there? — *A.* Three; one anterior and two lateral.

Q. Do not these obliquities usually correct themselves? — *A.* Yes.

Q. If they do not, how would you act? — *A.* Favour the change of them by the proper position of the female. In lateral obliquities, by placing her upon the side opposite to the one where the fundus of the uterus lies; or in anterior obliquity, by placing a bandage around the abdomen of the female, and compressing the fundus of the uterus against the spine, and, if necessary, hooking the mouth of the womb with the finger down to its proper position, and holding it there.

Q. In cases where the os uteri cannot be reached by the finger, should we ever resort to harsh measures? — *A.* No.

Q. What is meant by the retroversion of the uterus? — *A.* When the fundus is thrown in the hollow of the sacrum and the os tincæ carried behind the pubis.

Q. When does retroversion usually occur? — *A.* During the first three months of pregnancy.

Q. What are the effects of retroversion? — *A.* Retention of urine and feces; more or less paralysis of the lower extremities, &c.

Q. What are the causes of retroversion? — *A.* Violent straining or jars, the weight of impacted feces in the colon, &c.

Q. What are the symptoms of retroversion? — *A.* Great bearing down, difficulty in evacuating the bowels or bladder, and difficulty in walking, &c.

Q. What is the best sign of retroversion? — *A.* That elicited by the touch.

Q. What are the indications of treatment? — *A.* Restoration of the organ, if possible; but if the uterus is too far developed, we must palliate symptoms and produce abortion.

Q. What is meant by antiversion of the uterus? — *A.* When the fundus of the uterus is thrown too far forward upon the parietes of the abdomen and the os tincæ high up in the hollow of the sacrum.

Q. What other causes have we to interfere with the function of parturition? — *A.* Too great rigidity of the os uteri and soft parts; too great plethora; high nervous excitement, &c.

Q. How would you counteract these? — *A.* By the usual remedies; by bleeding, anodynes, warm injections, &c.

Q. Do not irregular contractions retard labour? — *A.* Yes.

Q. When there are spasmodic contractions of the internal os uteri, how would you obviate them? — *A.* By venesection, anodyne injections, &c.

Q. What is meant by rupture of the uterus? — *A.* A lesion of the substance of the uterus.

Q. What are the symptoms of rupture of the uterus? — *A.* Sudden suspension of the alternate contractions, great prostration of strength, rapid pulse, and evident sinking.

Q. What are the consequences of this accident? — *A.* In a few instances patients may recover, but in a large number death ensues.

Q. In case of rupture of the uterus, what must be done? — *A.* If the rupture takes place in the first stage of labour gastrotomy should be immediately resorted to, but if in the second stage, version by the feet or delivery by the forceps.

Q. When the child has escaped through the rent in the uterus into the cavity of the abdomen, what is the proper practice? — *A.* Place one hand upon the parietes of the abdomen over the situation of the child; pass the other within the pelvis, up through the rent of the uterus, into the abdominal cavity, and deliver by the feet.

Q. In what cases of ruptured uterus would you use the for-

ceps or crotchet? — *A.* When the head of the child is within the cavity of the pelvis, and the body high up.

Q. What are meant by puerperal convulsions? — *A.* Those which supervene upon a puerperal or pregnant state.

Q. What are the varieties of these convulsions? — *A.* Hysterical and apoplectic.

Q. Upon what do hysterical convulsions depend? — *A.* Upon irritability of the nervous system.

Q. What are the effects of these convulsions upon labour? — *A.* They suspend or retard it.

Q. What are the symptoms of apoplectic convulsions? — *A.* Intense pain in the head, sometimes on a particular spot; loss of vision; pulse full, slow, and laboured, frothing at the mouth, spasm of the muscles, &c.

Q. What effect has convulsions upon gestation? — *A.* They may cause the death of the fœtus, or produce abortion.

Q. Are the labour-pains generally suspended during convulsions? — *A.* Yes.

Q. To which should you direct your attention in this state of things, the uterus or the convulsions? — *A.* The convulsions.

Q. What is the treatment for the apoplectic variety? — *A.* Bleeding, generally and locally, cold to the head, purgatives, followed by revulsives and counter-irritants.

Q. Should we, in cases of convulsions, interfere with the process of gestation if it is not complete? — *A.* We may bring on premature labour if the convulsions resist all treatment.

Q. What is meant by inertia of the uterus? — *A.* A want of action, either tonic or expulsive.

Q. What are its causes? — *A.* It may depend upon uterine plethora or from actual debility.

Q. What is meant by concealed hemorrhage? — *A.* When the blood which is effused from the patulous orifices of the bloodvessels of the uterus, on its inner surface, is prevented from escaping externally, and it then gradually fills the cavity of the uterus; and in some instances death is caused by the immense amount of blood so lost.

Q. What are the varieties of inversion of the uterus? — *A.* Complete and incomplete.

Q. What must be done in inversion of the uterus? — *A.* At first endeavour to replace the organ, or else draw the inverted fundus down, and make the inversion more complete.

Q. Which kind of inversion is the more dangerous? — *A.* The incomplete, from the danger of strangulation.

Q. By what means can we stimulate the uterus to contraction? — *A.* At first by frictions, enemata, warm teas, &c.; secondly,

if the os uteri is dilated, rupture the membranes, pull gently upon the os uteri, or finally administer ergot.

Q. In what cases is ergot alone applicable? — *A.* When the os uteri is well dilated, the soft parts relaxed, the pelvis capacious, and the position of the child favourable.

Q. In cases of hemorrhage in the third stage of labour, what is the necessary treatment? — *A.* Excite the uterus to contract by frictions, by kneeding the abdomen, by cold applications externally, by compression, by irritating the lining membrane of the uterus, and by the administration of ergot.

Q. If the patient has been subject to atony or hemorrhage, when may you give ergot? — *A.* Just as the child is about passing out.

Q. How soon should you leave your patient after delivery? — *A.* Not until reaction has taken place.

Q. In cases of syncope during pregnancy, should we be alarmed? — *A.* No.

Q. What is meant by abortion, and when does it take place? — *A.* The discharge of the ovum from the mother, or its detachment from the uterus, though not discharged before the end of the sixth month.

Q. When is the expulsion of the ovum called premature delivery? — *A.* From the end of the sixth to the ninth month.

Q. What are the causes of abortion? — *A.* The extremes of health, great constitutional irritation, plethora of the uterus, irritability of it, &c.

Q. How may abortion more certainly be produced? — *A.* By rupturing the membranes.

Q. What are the symptoms of abortion? — *A.* Great weight and pain in the pubic and sacral regions; a muco-sanguineous secretion escaping from the vulva, &c.

Q. Is it easy to diagnosticate between abortion and dysmenorrhœa in the first three months of supposed pregnancy? — *A.* No.

Q. What are the usual diagnostic signs of abortion? — *A.* Regular intermitting pain in the back, slight hemorrhage and watery discharge, with strong bearing down expulsive pains.

Q. What are the consequences of abortion? — *A.* Some women recover entirely, but others suffer much.

Q. How can you prevent abortion? — *A.* Diminish morbid irritability, either by bleeding or giving tonics; by revulsives, and styptics, &c.

Q. What mechanical means have we for arresting hemorrhage? — *A.* The tampon, made of muslin, or a sponge.

Q. What must first be done before using the tampon? — *A.* First reduce the force of the circulation, and then allay pain by opiates.

Q. When the ovum is detached from the uterine surface, what is the proper treatment? — *A.* Encourage its expulsion.

Q. If it is not easily expelled, what instruments have we to assist it? — *A.* Dewees's hook, and Hodge's abortion forceps.

Q. Upon what does uterine hemorrhage, depend at or after labour? — *A.* Upon detachment of the whole or some portion of the placenta.

Q. Is not hemorrhage sometimes unavoidable? — *A.* Yes; when the placenta is detached from the uterus by the uterus being developed more rapidly than the placenta; as when it is situated over the os uteri.

Q. How can you ascertain this? — *A.* By examination per vaginam.

Q. How can you arrest labour in these cases? — *A.* By placing the patient in a recumbent position, with the hips elevated, circulation reduced, and by the administration of styptics.

Q. How are you to deliver in such cases when necessary? — *A.* Dilate the os uteri; or when the placenta is over the mouth of the womb, perforate the placenta, and deliver through it; or else detach the placenta alongside partially; then pass up the hand and deliver by the feet.

Q. What means would you make use of to favour dilatation of the os uteri, prevent hemorrhage, &c.? — *A.* The tampon.

Q. When we have hemorrhage at the full term of pregnancy, what is the proper treatment? — *A.* Palliate during the first stage of labour, and deliver as rapidly as possible in the second stage.

Q. If the contraction of the uterus is slow, how would you facilitate it? — *A.* By ergot, frictions, &c.

THE END.

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