

**A handbook of legal medicine intended for the use of the legal profession /
by William Sellers.**

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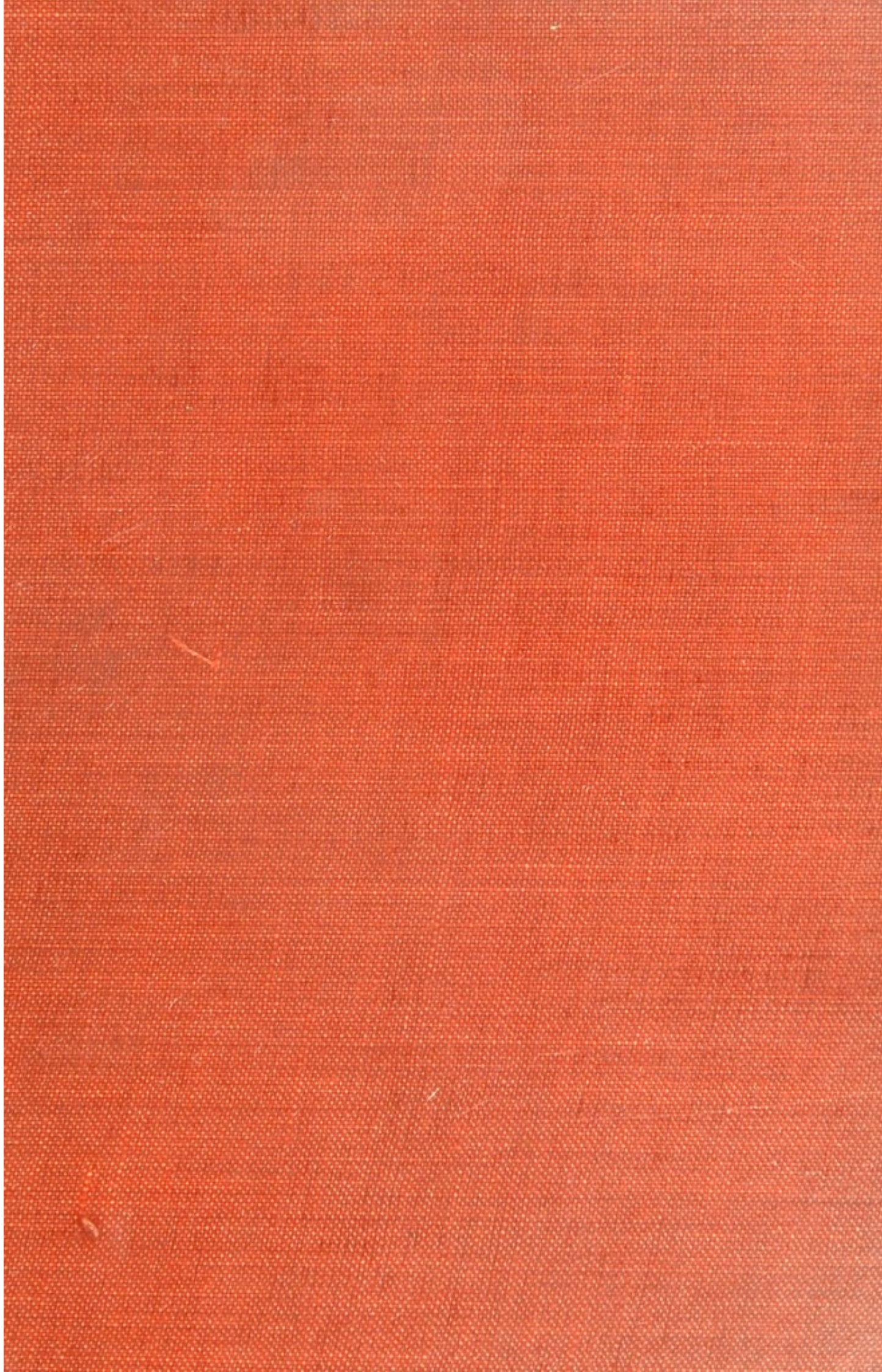
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A Handbook of Legal Medicine

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A Handbook of Legal Medicine

INTENDED FOR THE USE OF THE
LEGAL PROFESSION

BY

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Barrister-at-Law.



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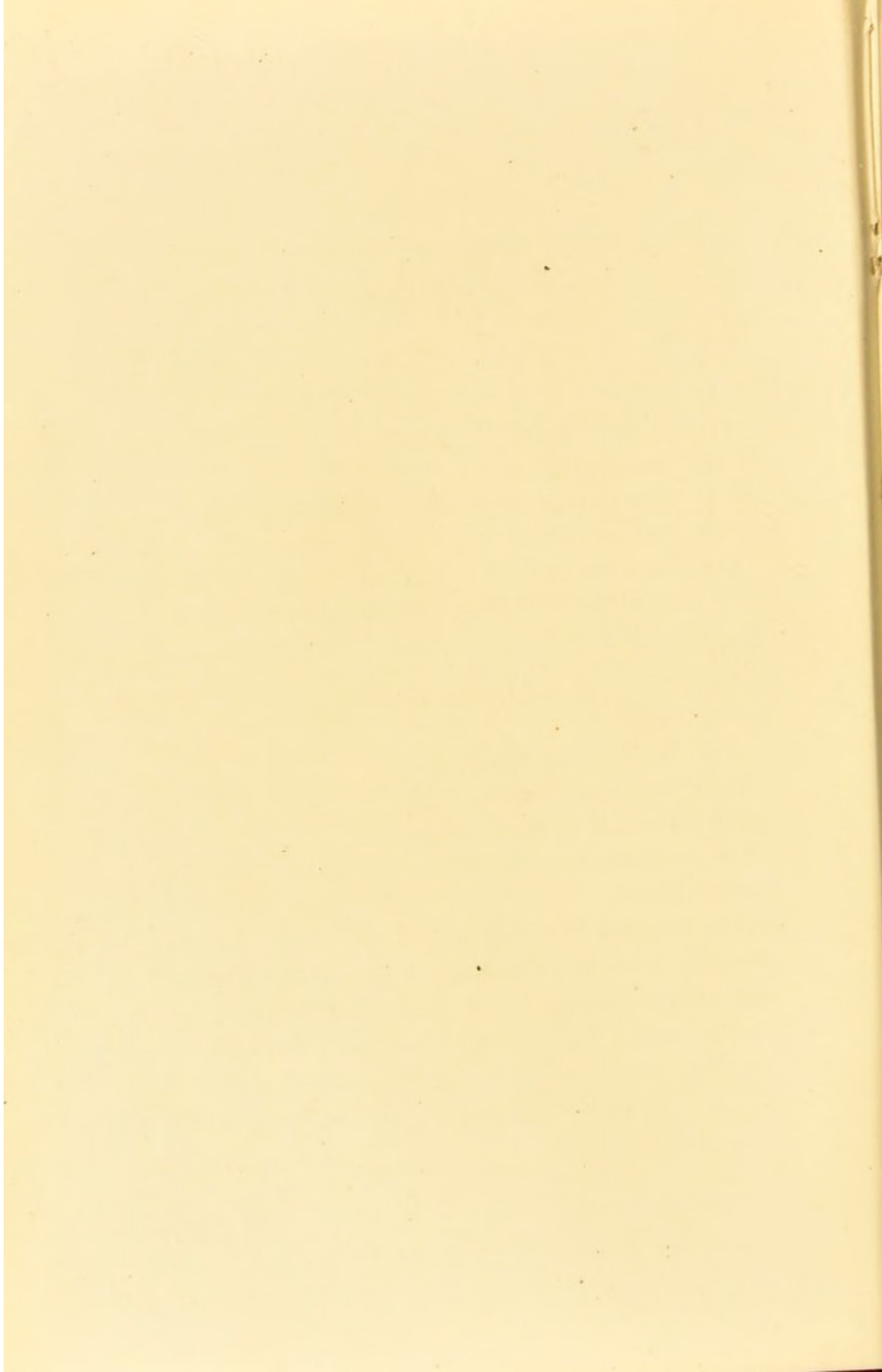
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PREFACE.

This handbook consists of a collection of the facts of medical jurisprudence compiled from the recognised text-books and chiefly of course from the classic work, "Taylor's Principles and Practice of Medical Jurisprudence," formerly edited by Dr. (now Sir) Thomas Stevenson, and since revised by Dr. Fred. J. Smith. I am also much indebted to a recent work "Lectures on Medical Jurisprudence," by Dr. Fred. J. Smith.

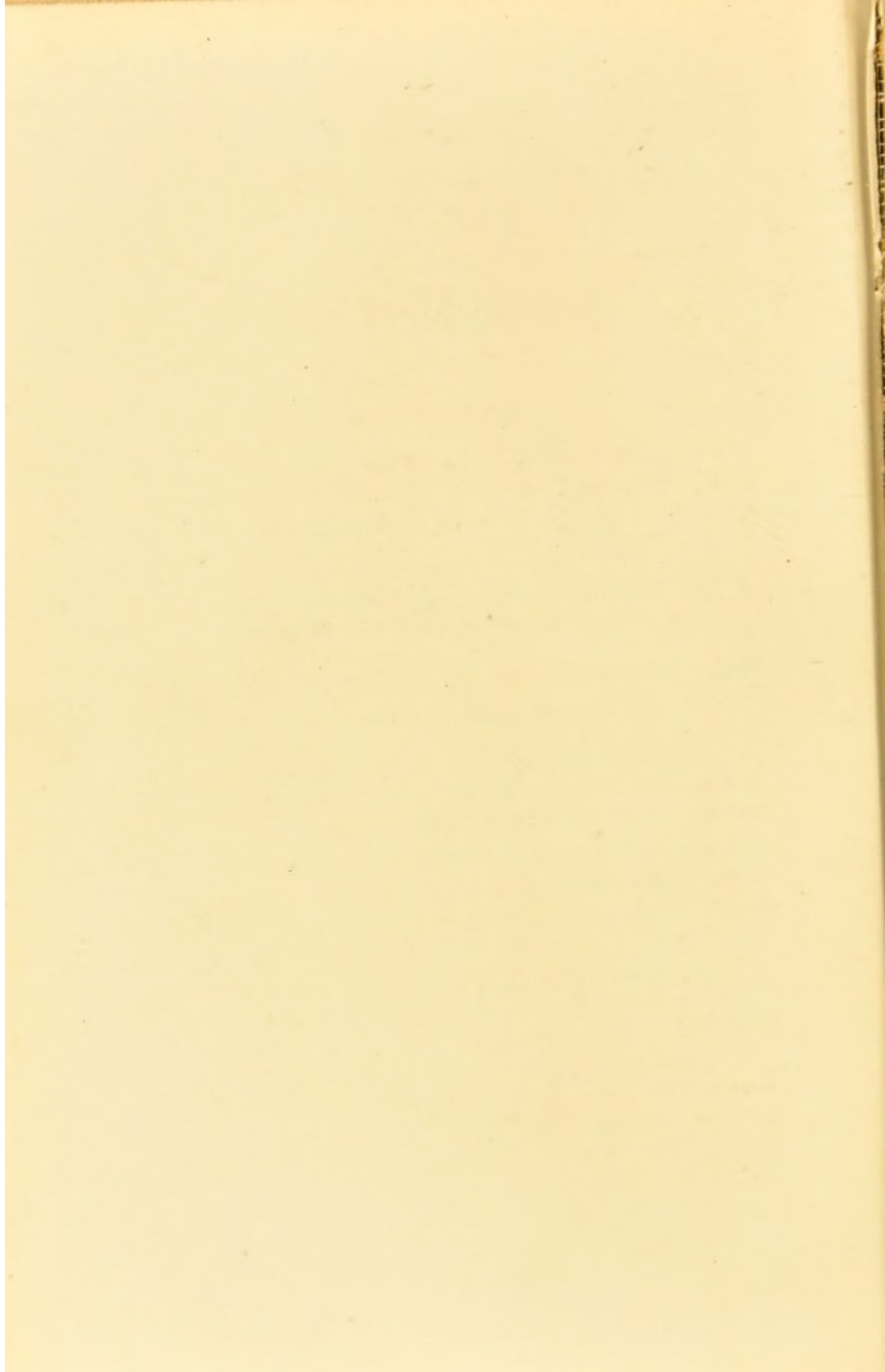
I have endeavoured to arrange the book in such a manner and with such explanations and illustrations as, it is hoped, may make medical and surgical problems in civil or criminal cases intelligible to members of the legal profession.

I trust also the book may prove useful to those Coroners who are not members of the medical profession, and who must on that account often have considerable difficulty in fully appreciating the evidence of medical witnesses. For permission to use the diagrams I am indebted to the courtesy of Messrs. Smith, Elder & Co. (Fig. 6) and to Mr. Henry Webb, of Bury (Figs. 1, 2, 4, 5 and 7), and I have also to thank my friend S. F. Butcher, Esq., President of the Society of Coroners of England and Wales, for permission to print the Appendix.



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Legal Medicine.

CHAPTER I.

Both in civil and criminal Courts of Law important issues often turn on the medical and surgical evidence. Hence it follows that even an elementary knowledge of medical and surgical subjects may prove of great assistance to members of the legal profession in the examination and cross-examination of medical witnesses.

Medical evidence may be required:—

1. In the Coroner's Court. It is the duty of the Coroner to hold an inquest in all cases of violent or unnatural death, and in all cases of sudden death, when there is any doubt that death may not have been due to natural causes.

2. In Police Courts, in cases of assaults, etc., and in the preliminary investigation by the magistrates before a person is committed for trial to Quarter Sessions or Assizes in more serious cases.

3. At Quarter Sessions and Assizes, where the evidence given before the magistrates is repeated or amplified.

4. In the Civil Courts and the County Courts in connection with actions alleging personal injuries due to negligence, and with claims under the Employers' Liability Act and the Workmen's Compensation Act.

5. In Lunacy and other enquiries where the mental condition of some of the parties may be in dispute.

There are some points which it may be useful to keep in mind in the examination of a medical witness:—

1. It is important that a clear distinction should be made between the facts observed by the witness and the inferences drawn therefrom. It will often happen that whilst the facts are correctly described, the inferences drawn and conclusions arrived at are quite erroneous and unwarranted.

2. The witness should be confined strictly to the points to which his evidence relates, *i.e.*, to the facts he has observed and the inferences deduced therefrom; he must not be allowed to express an opinion on the merits of the case generally.

3. If asked to express an opinion, care should be taken to ascertain that he has not formed his opinion on statements made by other persons describing circumstances and facts which have not been verified by his own observation.

4. If the witness makes use of notes, he will of course be asked as to the time and under what circumstances the notes were taken, and whether he is reading from original notes taken on the spot or from a copy; in the event of the notes being a copy the witness will not be allowed to refresh his memory from them.

5. As a medical witness not only describes facts, but also as an expert is asked to say what opinion he has formed from the facts observed by him, it may be useful to ascertain how largely his opinion has been formed from what he has observed himself

in the case in question and in other similar cases he may have met with in his experience, and how much of his knowledge is derived and his opinion formed from study of the recognised text-books. In cross-examination passages may be read from medical treatises, and the witness may be asked if he agrees with such extracts or not. In such cases, of course, the whole of the passage should be read, and not merely a garbled portion favourable to the case of the examiner.

6. Medical men in general practice are not often called upon to give evidence in serious cases, and hence it may sometimes be important to ask "Have you ever attended to or thought of these subjects before?" (Taylor). Where, however, a general practitioner has the misfortune to have to give evidence in a difficult case, he will be wise if he explains to the Court the difficulty of the subject, and declines to express an opinion wider than he feels honestly able to do.

7. Medical witnesses often tend to make use of exaggerated language and often speak in unnecessarily technical terms. Such language may often be effectively criticised, and judicious cross-examination may lead the jury to believe that the witness is not so wise or infallible as he would appear to be.

8. The witness will of course be asked generally as to his professional qualifications, his accuracy and special experience, and as to any bias he may have shown to one side or the other, or as to any confusion of memory as regards the facts.

9. In cross-examination the witness may be questioned as to any statements he may have made

in reference to the case, or as to anything he may have written in reference thereto.

10. Remember that, although the medical witness may be asked questions from books in cross-examination, in his examination-in-chief his opinion must be formed from observation and study, and he must not quote from medical textbooks in support of his opinion.

11. In the defence of a prisoner for murder or manslaughter, it is always important to ascertain what the medical witness has omitted to do. Possibly there may have been some important mistake in the treatment or some unnecessary surgical operation from which death has resulted; in such cases, although there could be no acquittal, the amount of punishment might be materially reduced.

12. Where a post-mortem examination has been made by a practitioner not a skilled pathologist or a police surgeon, both of whom may be expected to have special experience in this kind of work, the witness may be questioned as to his ability to make a proper examination, as to the time which has elapsed since he has made a post-mortem examination before, as to how many he has made or been present at during his life, as to his method of procedure, and as to his ability to distinguish the appearance of diseased organs from the natural post-mortem appearances. The witness should always be asked if he has examined every organ and every cavity; otherwise it may be suggested there may have been some other cause of death than the one which has been detected.

13. The law allows no privilege to medical men, and they must answer all questions asked which

are relevant to the issue, even though their answers violate an understood or implied pledge of professional secrecy.

14. Dying Declarations and Confessions are frequently made to medical men. In such cases the Dying Declaration or Confession must be:—

(a) Free and voluntary—no inducement or threat must be made which might possibly influence the mind of the declarant.

(b) No leading questions must be put.

(c) No comments must be made on what is being said.

(d) As far as possible the actual words spoken should be written down, and if the confession is taken by question and answer, both should be written down.

(e) After being written down the confession or declaration should be read over to and signed by the declarant, and counter-signed by the person to whom the confession is made.

(f) In these cases, as in witnessing a will, the medical witness thereby implies that the declarant or confessor was at the time in a proper sane mental condition. But the witness may be asked as to any delusions which may have been present, and which might affect the truth of the statements made as, e.g., in persons suffering from acute diseases as fevers or pneumonia, or from actual insanity, or from mental exhaustion the result of exposure and privation. Sometimes without delusions or insanity, it may be obvious that the declarant is of a vindictive disposition, and in spite of his solemn position is prompted by motives of hatred and revenge.

(g) As regards a dying declaration, in order to be admissible, the declarant, at the time of making it, must feel certain that he is going to die, he "must be," as it is said, "in a certain and hopeless anticipation of death." But the declaration does not become inadmissible if, after it is made, the declarant believes he may have a chance of recovery. (See Archbold Crim. Plead., 22nd ed., p. 294.)

15. In the examination of medical reports and the depositions of medical witnesses taken before the magistrates, one must be careful to see that no "hearsay" statements have been admitted, as it will often be found on close scrutiny that such hearsay statements have been put down in writing. Sometimes, in cases of death from natural causes or from accident, some amount of hearsay evidence is allowed in the Coroner's Court, the object of the Coroner's enquiry being to ascertain primarily the cause of the death of the person on whom the inquest is being held. In cases, however, of supposed murder or manslaughter, it is usual to have the suspected person in Court, i.e., if he is in custody, and in these cases it would be most improper to admit any evidence which would be inadmissible on the trial of the person accused.

16. In conclusion, it is useful to recognise the well-defined distinction made by medical practitioners between the signs and symptoms of diseases.

Signs are objective, i.e., things actually observed by the medical man. Thus the two ends of a broken bone may be seen or felt, or the sounds of the heart and the breathing may be heard on listening over the chest-wall.

Symptoms are subjective, i.e., they are conditions described by the patient himself and not otherwise perceptible. Thus a person may say he has a headache, or that he feels sick, or feels cold, or may say he has pain in any part of his body. Often, of course, the symptoms described by a person give indications to the medical man as to what signs will probably be found on proper examination.

CHAPTER II.

With a view to the easier understanding of the subject of medical jurisprudence, an elementary knowledge of the structure and functions of the body, or in technical language of anatomy and physiology, will be found useful, and a short account of these subjects will be given before proceeding with the subject of medical jurisprudence proper.

The human body is divided as follows :—

(a) Head.

1. Skull or brain-case.
2. Face.

(b) Trunk.

1. Chest or Thorax.
2. Belly or Abdomen.

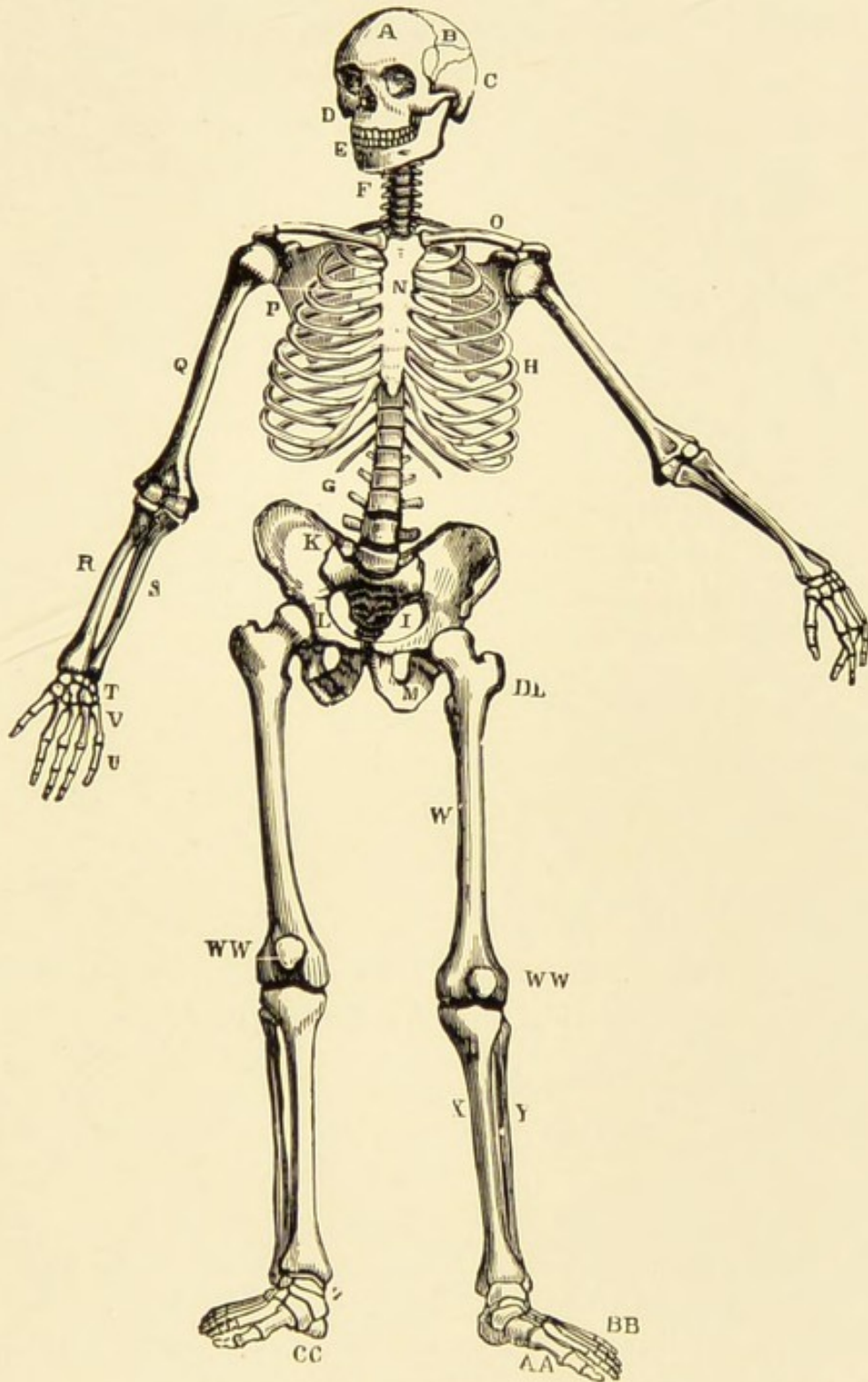
(c) Limbs.

1. Upper Arm, Forearm, Wrist, Fingers.
2. Thigh, Leg, Ankle, Toes.

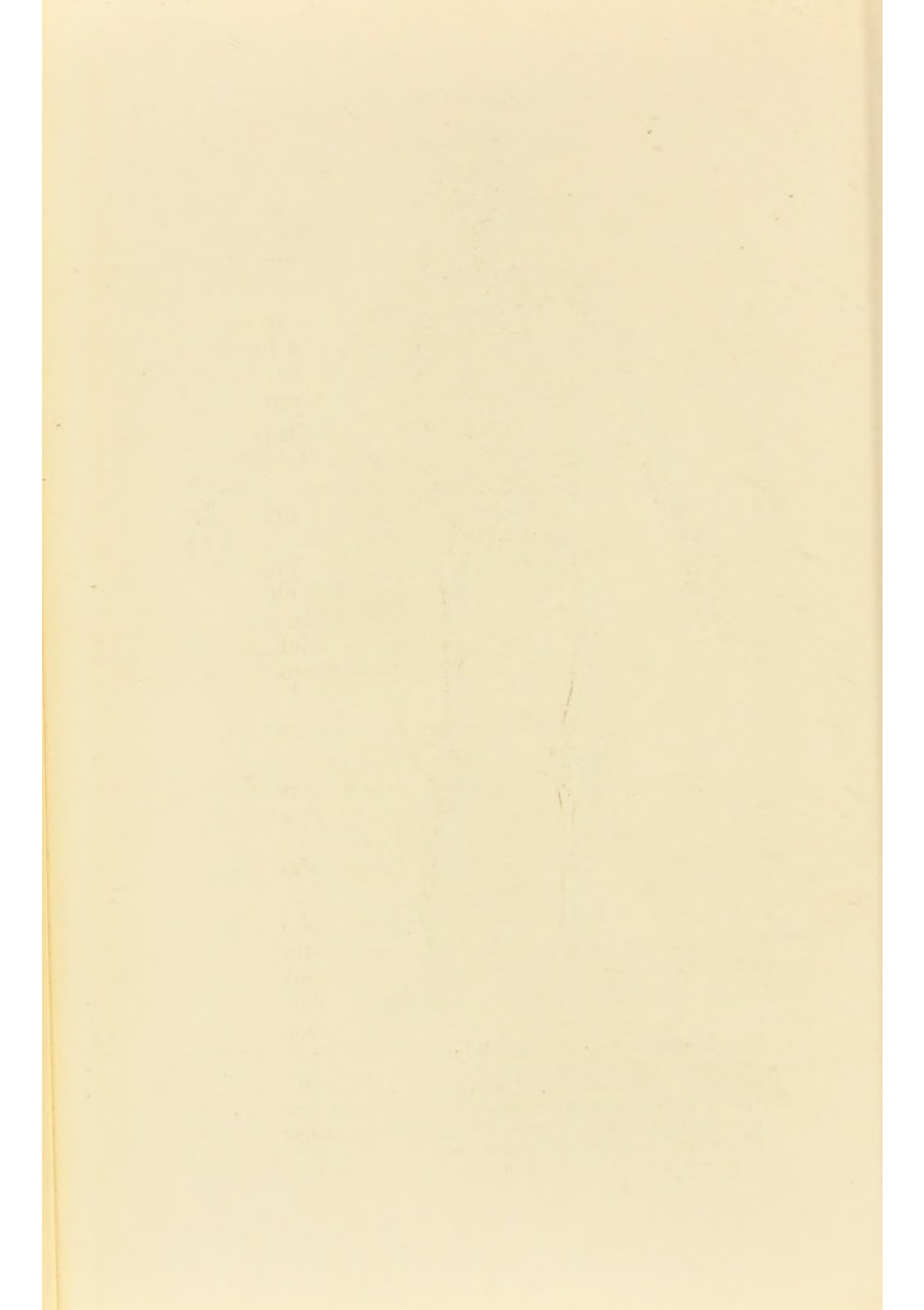
The framework on which the body is built is called the skeleton, and consists of over 200 bones, which vary in size and shape according to the duties they have to perform. The functions of the bones are :—

1. To act as a framework to which the muscles or flesh of the body are attached.
2. To support the weight of the body.

THE SKELETON.



A, frontal bone ; B, parietal ; C, temporal ; D, superior maxillary ; E, inferior maxillary ; F, cervical vertebræ ; O, clavicle ; N, sternum ; P, scapula ; H, ribs ; G, vertebral column ; K, ilium (haunch bone) ; L, pubis ; I, sacrum ; M, ischium ; DD, trochanter major ; W, femur ; WW, patella ; X, tibia ; Y, fibula ; Z, tarsus ; CC, calcis ; BB, phalanges ; AA, metatarsus ; Q, humerus ; R, radius ; S, ulna ; T, carpus ; V, metacarpus ; U, phalanges.



3. To form cases for the protection of the various organs, thus the bones of the skull enclose the brain, the ribs enclose the lungs and heart, etc.

The bones of the skull are all firmly joined together with the exception of the lower jaw bone; they form strong cases to protect the brain, and also the eyes, the ears, the nose and the tongue.

The skull rests on a series of bones called the spine or vertebral column, which extends from the head to the innominate or haunch-bones. The spine consists of 33 bones with a pad of gristle, or cartilage as it is called, between each. This pad of cartilage prevents the bones from jarring on movement, and makes the spinal column elastic. Extending from the top to the bottom of the spine is a channel to convey the spinal cord, which is a mass of nervous substance directly continuous with the brain.

The lower vertebræ join together to form one strong bone, the sacrum or rump-bone.

The sacrum is joined on each side to the two haunch-bones, which join together in front at the pubes, and so form a cavity called the pelvis, in which are lodged portions of the bowels and the bladder, and in women the womb.

The ribs number twelve on each side, and reach from the spine behind to the breast bone or sternum in front, forming a large cavity, in which are contained the heart and the lungs. The two lowest ribs on each side do not reach forward to the breast bone, but are loose at one end, and hence are called "floating ribs." At the back and upper portion of the ribs on each side are two flat bones, the scapulæ or shoulder-blades, to

which are attached many of the muscles which move the upper limbs.

Extending from each side of the breast-bone to the scapulæ are the clavicles or collar-bones, which so often are broken from falls on the hand.

In the upper arm is one bone, the humerus.

In the forearm are two bones, the radius and the ulna. There are numerous small bones in the wrist or carpus, hand and fingers (metacarpus and phalanges).

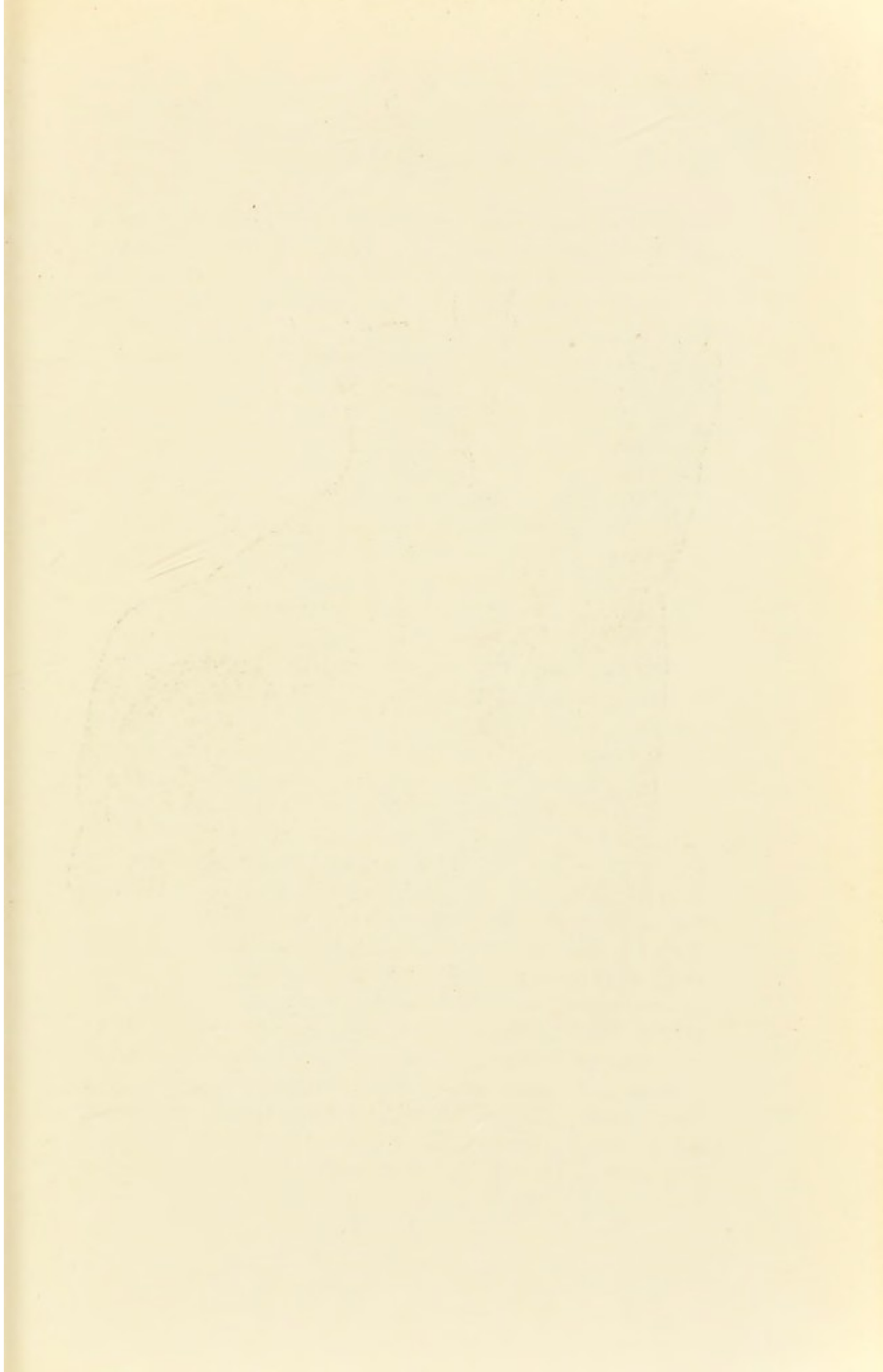
In the thigh there is one bone, the femur.

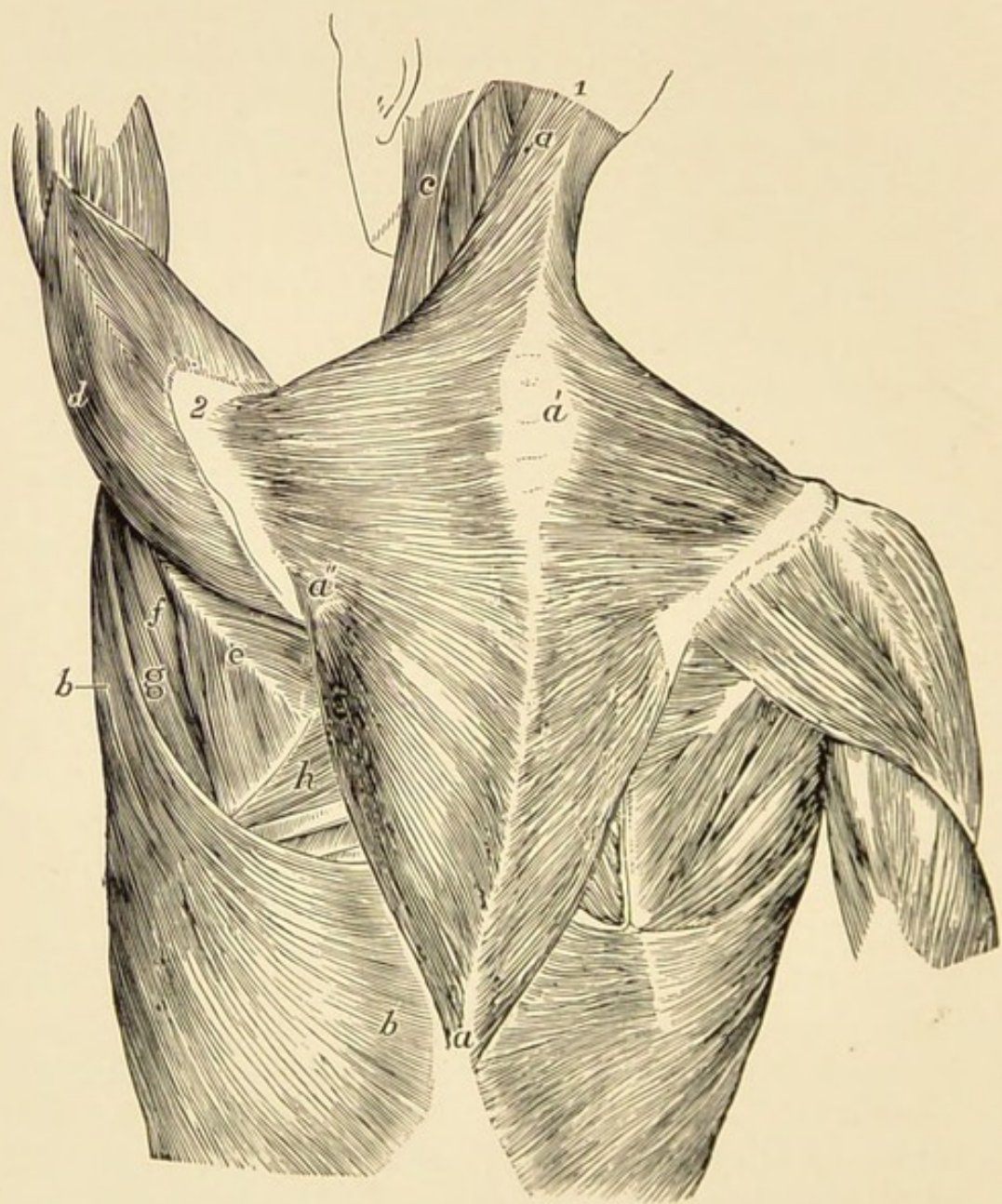
In the leg are two bones, the tibia or shin-bone and the fibula. In front of the knee is a small bone, the patella or knee-cap.

In the ankle and foot numerous bones similar to those in the wrist and hand, and called in a similar way the tarsus, metatarsus and phalanges.

The joints. When two or more bones come together they form a joint; joints working like a hinge, as the elbow, and ball and socket joints as the hip-joints, being most common. The ends of the bones where they form the joint are coated with cartilage or gristle, and the bones themselves are kept in position by means of bands of strong tissue called connective or fibrous tissue. When the ends of the bones forming a joint are displaced there is said to be a dislocation. When a bone is broken there is, in technical language, a fracture of the bone.

The bones are often broken by violence, either by direct violence, where a blow strikes the bone directly, or by indirect violence, where the bone is broken by being squeezed at the two ends and so breaks near the middle; e.g., the ribs are often broken by a crush in a crowd or the collar-bone by falls on the hand.





SUPERFICIAL VIEW OF THE TRUNK FROM BEHIND, SHEWING THE MUSCLES OF THE BACK, AND THE BACK OF THE NECK.

In surgical language there are four kinds of breaks or fractures as they are technically termed, viz. :—

1. Simple. Where the bone is broken in one place only and there is no skin wound.
2. Compound. Where the bone is broken and there is also a wound in the skin leading down to the broken ends of the bone.
3. Comminuted. Where the bone is broken into two or more pieces
4. Complicated. Where, in addition to the fracture of the bone, there is injury to important vessels or to adjacent organs, as, e.g., where the lungs or liver are injured by fracture of the ribs or the brain by fractures of the skull.

Dislocations of the shoulder, thigh and elbow are common accidents from violence, and sometimes in addition to a dislocation the bones may also be broken.

THE MUSCLES

Are the masses of red flesh which form the greatest bulk of the body. They are of various shapes and sizes, some being thick and round, others being thin and flat. At each of its ends a muscle is continuous with a strong band of fibrous tissue, called the tendon or sinew, which in its turn is attached to a bone. The muscle or red flesh possesses the power of contracting and becoming shorter and thicker under the influence of the will and of other causes; hence when the bone, to which a tendon at one end of a muscle is inserted, is fixed, whilst the other bone, to which the tendon

at the other end of the muscle is inserted, is loose and movable, contraction of the muscle between the two tendons must cause movement of the movable bone. By means of the bones and muscles thus acting together, we have a system of levers, and in this manner the muscles form the great motor agent of the body. The muscles vary in size and shape according to the work they have to do, some being thin and flat, others round and thick.

Lining the ends of the bones and the cartilage or gristle in a joint, is a delicate tissue called the synovial membrane, which secretes an oily fluid called the synovial fluid which facilitates the movements of the joints.

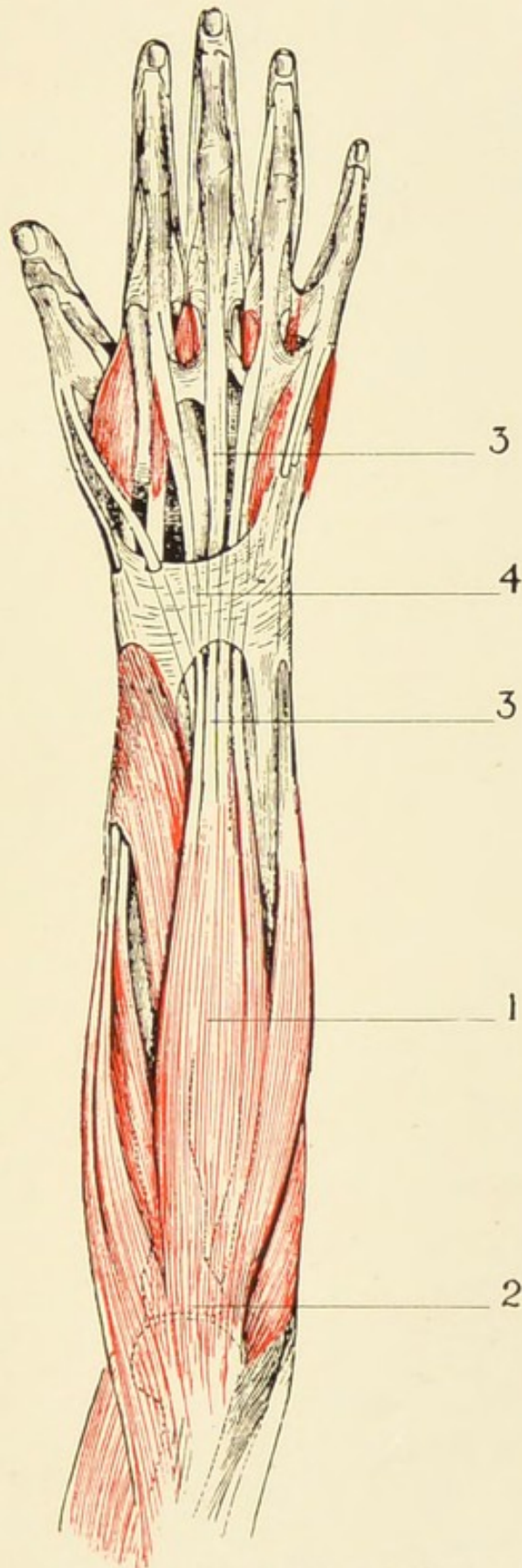
The skin or integument is the tough membrane which invests the whole of the body and covers the parts beneath. It consists of two layers, viz., (1) a superficial layer called the epidermis, which is neither sensitive nor vascular, and (2) a deeper layer, called the dermis, which is very sensitive and vascular.

At the apertures of the body, as e.g. at the mouth, the nose, and the anus, the skin is continuous with a somewhat similar but much thinner and more sensitive membrane, which secretes a slimy fluid called mucus, and which is hence called the mucous membrane.

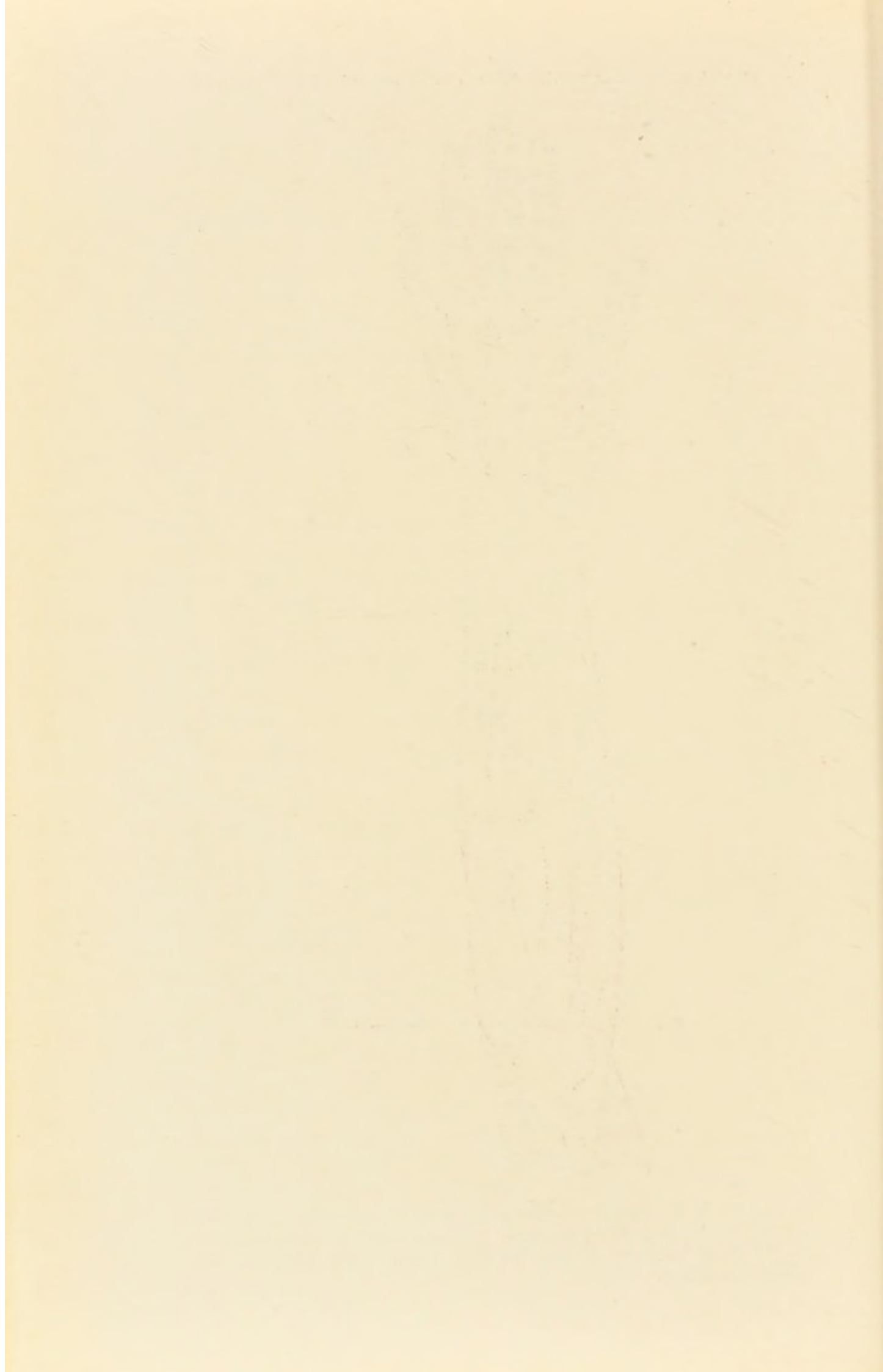
Under the skin is the mass of connective tissue, a kind of thready substance, which fills up all the interstices between the skin, bones, and muscles, and is the connecting medium by which the different tissues of the body are all held together.

Animal life cannot continue without work, i.e., without a constant recurrence of chemico-vital changes, and these changes all imply waste.

DIAGRAM OF MUSCLES AND TENDONS OF THE FOREARM.



1. Redbelly or contractile portion of the muscle. 2. Sinew or tendon fixed to the humerus. 3. Sinews going to the fingers. 4. Fibrous band of tissue binding down and keeping the sinews in place.



“Thus a living, active man, constantly exerts mechanical force, gives off heat, evolves carbonic acid, and water, and undergoes a loss of substance” (Huxley Physiology, p. 3). This constant loss of substance is combated by the sensations of hunger and thirst, which compel the individual to take into his body the three things necessary to support life, viz., fresh air, water and food. As we shall see, fresh air is supplied to the system by means of the lungs, whilst food and water are taken into the stomach. Food being taken into the stomach and bowels undergoes further chemical changes, so that a portion is digested and absorbed by the system, whilst the portion which is not digested and absorbed passes on through the bowels and eventually out of the body at the anus. For these various purposes of the living body, various organs are required; those which convert the food into nourishment are called the organs of alimentation; those which distribute the digested and nutritious portions of the food through the body are called the organs of circulation.

Those which get rid of the waste products produced by the chemico-vital processes of the body are called the organs of excretion.

The chief organs of alimentation are the mouth, gullet, stomach and bowels, with their appendages, as the liver, sweetbread, etc. Food, taken in at the mouth and masticated, passes into the stomach and bowels and is acted upon and digested, as it is termed, by juices secreted by the stomach, bowels and other organs, and is thereby reduced to a fluid or semi-fluid consistence. The nutritious portions of the food are then directly or indirectly absorbed into the blood, whilst the innutritious portions are excreted.

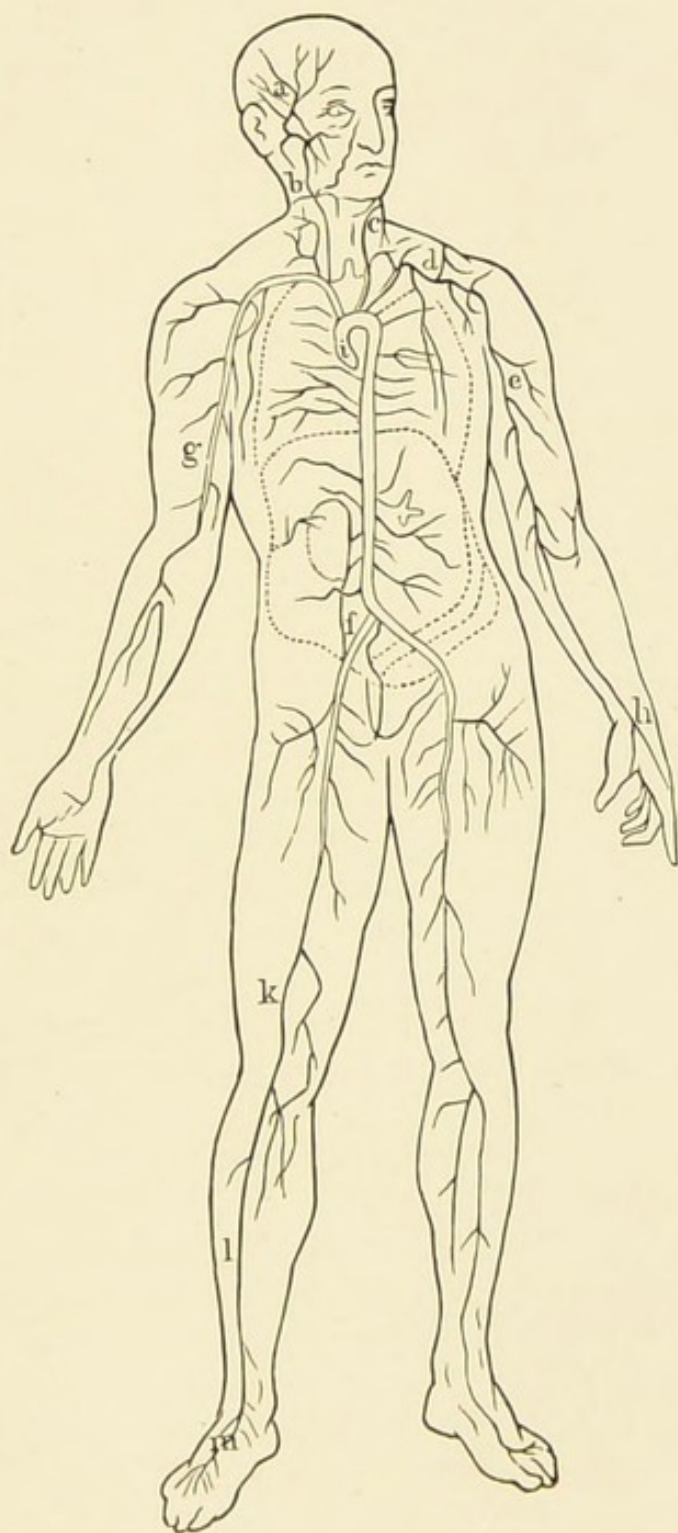
The blood is the red fluid, by which the now digested food is distributed to the tissues, and it is contained in a series of tubes or vessels, called respectively, arteries, veins, and capillaries, which vessels, together with a muscular organ, the heart, which pumps the blood through the body, form the organs of circulation.

The heart is the hollow muscular organ, situated in the cavity of the chest, a little to the left side behind the breast-bone, and is normally about the size of a closed fist. It contains four cavities or chambers, the two upper being called the auricles, the two lower the ventricles; hence there is a right and a left auricle, a right and a left ventricle. The blood is carried away from the heart by the vessels called arteries, which constantly divide and subdivide and so become smaller and smaller, until eventually they form a network of small microscopic tubes with very thin walls called capillaries. It is in the capillary circulation that the digested food is given up from the blood to the tissues, and the waste-products taken up from the tissues into the blood to be excreted and got rid of in one of the ways to be afterwards described.

CIRCULATION.

It will be noticed that the capillaries, after becoming smaller and smaller by constant subdivision, then gradually begin to grow larger and larger, until they are no longer microscopic, but become small veins; these again unite and become larger and larger until eventually all the impure blood returned from the tissues reaches the heart by means of two large veins which open into the right auricle of the heart.

THE ARTERIES.



This diagram gives a general idea of the position of the main Arteries. *i* is the aorta; *b c* carotid; *a* temporal; *d* subclavian; *e* axillary; *g* brachial; *h* radial; *f* femoral; *k l* anterior tibial; *m* metatarsal.

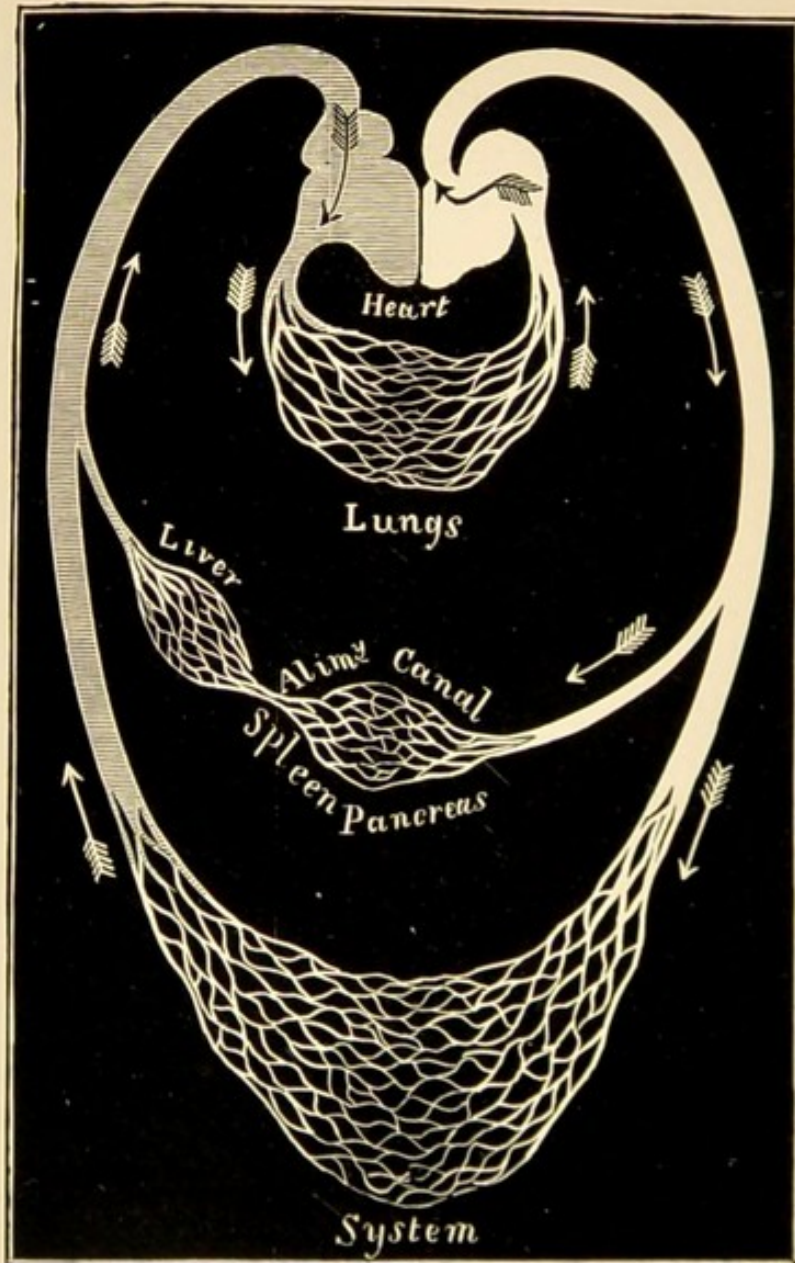


DIAGRAM OF THE CIRCULATION IN MAN (AND OTHER MAMMALS)

During life the heart contracts or beats regularly about 70 times per minute in the adult, and as each contraction forces the blood out of the heart into the vessels, the blood is circulated through the body. Thus when the right auricle, filled with the impure blood contracts, the blood is driven into the right ventricle; when the right ventricle contracts, the blood is driven into the pulmonary artery and so distributed through the lungs. After circulating through and being purified in the lungs the blood returns to the left auricle by the pulmonary veins. Thence it passes from the left auricle into the left ventricle, and thence, when the left ventricle contracts, it is driven into the large artery called the aorta, and so all over the body. From the aorta the blood passes through all the arteries and the arterial capillaries, which last are continuous with the venous capillaries, and these last again are continuous with small veins. The circulation of the blood is caused by the rhythmic contraction of the heart, the two auricles contracting simultaneously and driving the blood into the ventricles, and then the two ventricles likewise contracting and driving the blood into the arteries. The impure blood in the veins is conveyed by vessels, which gradually become larger trunks, and eventually is all turned into the right auricle by two large veins, viz., the *venæ cavæ*. The blood brought to the stomach, bowels and spleen by the veins, which end in a trunk called the portal vein, is distributed in the first instance to the liver, where it mingles with the blood of the hepatic or liver artery, and is eventually carried away to the heart by the hepatic vein, which opens into one of the *venæ cavæ* just referred to.

It will be noticed that the term artery is given

to a vessel which carries blood away from the heart, whilst a vein is a vessel which carries blood back to the heart. It will also be noticed that whilst speaking generally the veins carry impure blood and the arteries pure blood, the pulmonary veins carry the pure blood, the pulmonary arteries the impure blood. The reasons for this will appear later.

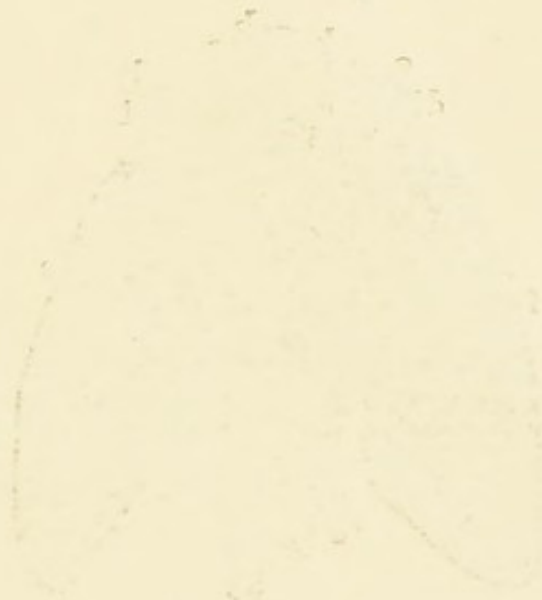
If a finger be placed on one of the superficial arteries in a living person, it will be felt to beat or pulsate synchronously with the beats of the heart. This pulsation in the arteries is caused by the forcible closure of the ventricles, which drives a new supply of blood into vessels already partially filled, and which vessels, being composed of elastic tissue, relax with the pressure. During the passage of the blood through the capillaries, the force of the heart-beats become gradually lost, and therefore in the veins there is no pulsation, and the blood flows in a steady stream. This point may be of importance in attempting to discover the source of bleeding from a wound, and in ascertaining whether the hæmorrhage be arterial or venous.

The regurgitation of blood from the ventricles into the auricles when the contraction of the ventricles has ceased and they have begun to expand, and from the vessels into the ventricles, is prevented by membranous partitions called the valves of the heart. When these are imperfect or diseased, serious symptoms may arise, and such valvular diseases are among common causes of sudden death.

The heart itself lies in a bag of fibrous tissue called the pericardium.

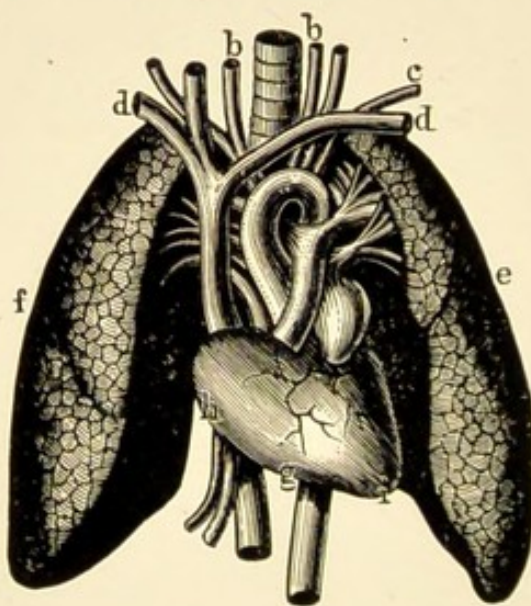
Hæmorrhage or bleeding is one of the com-

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THE HEART, LUNGS, AND LARGE BLOOD VESSELS.



h g i heart ; *e f* lungs ; *b b c* are branches from the aorta ; the aorta is the curved artery which goes behind the heart at *g* ; *d d* are veins from the upper portion of the body ; below *h* are the veins from the lower portion of the body ; the windpipe is shown in the centre ; the pulmonary artery is seen running upwards from the right side of the heart, and branching off to both lungs.

monest and most dangerous results of wounds and other injuries. It is caused by the rupture of a blood-vessel and may therefore be capillary, venous or arterial.

Capillary bleeding occurs after a graze or scratch and is usually, as might be expected, slight in amount.

Venous bleeding is more important and may be dangerous. It is recognised by the steady and non-jerky flow and by the dark-red or purple colour of the blood.

Arterial bleeding is the most serious, as the blood is pumped out in jerks in great force, and unless it is soon checked, death may result.

ORGANS OF RESPIRATION.

We have described already how the blood is carried to the lungs by means of the pulmonary arteries, and now we consider the uses and functions of the lungs themselves.

The lungs play a double part in the vital economy as they not only eliminate waste products such as carbonic acid, water, and organic matter, but also absorb into the system oxygen, without which life cannot continue.

The lungs are two large spongy organs, which together with the heart fill the cavity of the chest. They rest on a large flat muscle called the diaphragm or midriff, which separates the cavity of the chest from that of the belly or abdomen.

The trachea or windpipe is a flexible tube composed of gristle; it is continuous with the back of the throat at the upper end and runs down the front of the neck to the top of the breast-bone, where it divides into the two bronchi, one for each

lung. In the lungs the bronchi divide and subdivide like the branches of a tree and become smaller and smaller until eventually they end in air-cells. Each lung is made up of an enormous number of these air-cells, which are covered by and in close contact with, a network of capillary vessels, formed by the breaking-up and subdivision of the pulmonary vessels. In this manner the blood is brought into close relation with the air in the air-cells, and gives up to it carbonic acid, water and other waste products, and takes from it the supply of oxygen which it needs.

The two processes of respiration are:—

I. Inspiration or the act of filling the lungs with air, by means of which fresh air is brought into relation with the blood in the capillaries. It is performed by the contractions of the muscles attached to the ribs, and a simultaneous contraction and straightening of the muscle called the diaphragm.

II. Expiration, or the emptying of the lungs of air, by means of which the waste products taken up from the blood are got rid of. It is caused by the relaxation of the muscles of inspiration and by the diaphragm resuming its arched form.

A constant supply of fresh air for the lungs is necessary if life is to continue, and whenever and howsoever the supply of fresh air to the lungs is prevented, death from asphyxia or suffocation will soon take place.

The internal surface of the chest wall is lined by a fibrous membrane, which covers all the ribs and their muscles internally, and which is reflected over the surface of the lung. This membrane is called the pleura; it is often affected by disease, as in the

common disease of pleuritis or pleurisy, and in like manner the bag or pericardium, in which the heart lies, is also often diseased, giving rise to the disease pericarditis. Observe here that in medical language the termination -itis means inflammation of, as pericarditis, pleuritis, peritonitis, etc.

THE ABDOMEN OR BELLY

is the large cavity between the chest and the pelvis, and it contains the organs of digestion, viz., the stomach, bowels, liver, pancreas or sweetbread; also the spleen, the kidneys and many large vessels and nerves. The cavity of the belly is lined by a delicate membrane, called the peritoneum, which is reflected over the internal surface of the wall of the abdomen and to a greater or lesser degree over the various organs in the same way that the pleura lines the cavity of the chest. Food taken into the stomach is digested by means of juices secreted by the stomach and bowels, and also by juices secreted by the liver and sweetbread; as already described, the nutritious products are taken into the blood, partly directly into the blood-vessels and partly indirectly by means of another system of vessels called lymphatics, whilst the innutritious portion is excreted as the fæces.

The liver is a large organ seated in the upper and right side of the belly, and in addition to secreting the bile, which passes into the intestine and assists in digestion, has other important functions to perform which we need not further describe in relation to the conversion of starchy matters in the tissues into grape-sugar.

The kidneys are situated one in each loin, and secrete the urine, in which fluid is largely excreted

the urea formed by the decomposition of the nitrogenous elements of the food. The kidneys excrete also a large quantity of water.

In addition large quantities of water are eliminated by means of the skin of the body generally in the form of "sweat."

The spleen is situated at the upper and back part of the abdominal cavity, and its functions are obscure. It is supposed to be one of the organs where the blood-corpuses are formed.

The pancreas or sweetbread is an organ situated behind the stomach and in front of the spine. It secretes a juice which passes into the small intestine and assists digestion.

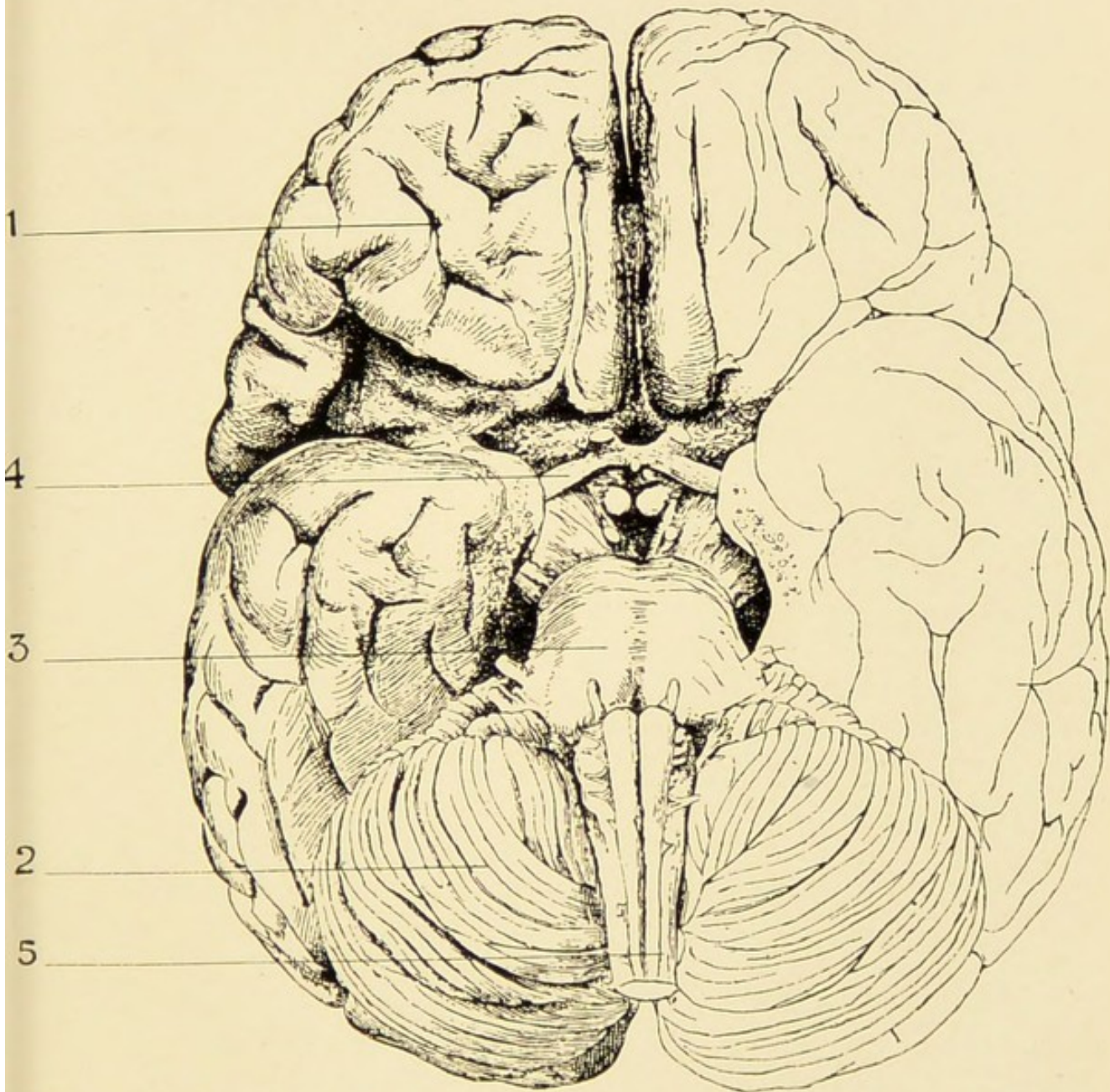
THE NERVOUS SYSTEM.

All the vital processes carried on by the different parts of the body are regulated by means of the nervous system, viz., the brain, the spinal cord and nerves. The brain consists of three chief portions, viz:—

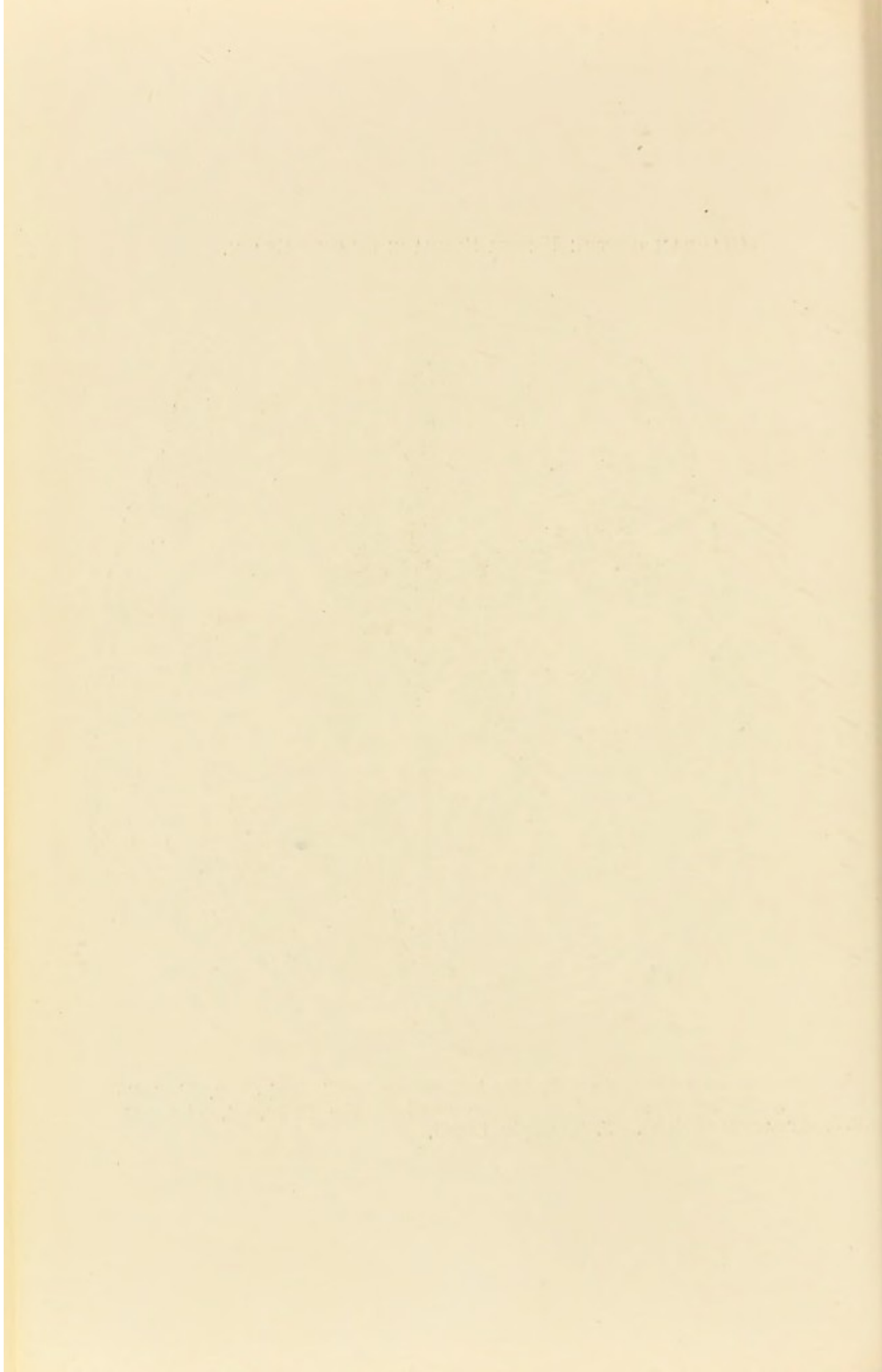
1. The cerebrum or great brain, which is the seat of the intellect, the emotions and the will.
2. The cerebellum or small brain, which contains masses or "centres" of nervous matter, which are said to regulate the movements of the body.
3. The medulla oblongata, which is the enlarged upper part of the spinal cord within the cavity of the skull.

The spinal cord is a column of soft nervous tissue occupying the channel between the vertebrae and continuous at the upper end with the portion of the brain called the medulla oblongata. From

DIAGRAM OF THE UNDER SURFACE OF THE BRAIN.



1. Cerebrum or great brain. 2. Cerebellum or small brain. 3. Medulla oblongata, the termination of the spinal cord in the brain. 4. The optic nerves or nerves of sight. 5. The spinal cord.



THE NERVOUS SYSTEM.



A, Large brain ; B, small brain ; the spinal cord is shown a continuation of the brain along the back, the other letters, CDE, &c., indicate the nerves branching from either brain or spinal cord to all parts of the body.

the sides of the spinal cord at intervals pass off thirty-one pairs of nerves.

If the spinal cord be cut, all parts of the body below the division are paralysed, i.e., they lose the power of sensation and motion, but as the nervous fibres cross each other as they pass from the spinal cord to the brain, disease affecting the right side of the brain causes paralysis of the left side of the body, and vice versâ.

The nerves are of two kinds, viz. :—

I. Cerebro-spinal, and these may be

- (a) Motor, i.e., nerves conveying impulses from the brain to a muscle.
- (b) Sensory, i.e., nerves receiving and conveying impressions from other parts of the body to the brain.
- (c) Compound. Most nerve trunks contain both motor and sensory fibres.

Thus if the leg be pricked with a pin, a sensory nerve carries the feeling to the brain, and then the impulse to move away from the pain causes an impulse to be sent by a motor nerve to muscles which contract and so move away the painful limb.

II. The sympathetic nervous system consists of a double chain of nervous centres lying along the sides of the spinal column. The sympathetic system is not directly under the influence of the will; it controls the involuntary muscles, such as the heart and the secreting and excreting organs.

All the systems which have been described must work harmoniously together if life is to continue. When the performance of their functions ceases death ensues. In all cases, however, the proximate causes of death may be reduced to two, viz.,

cessation of the circulation or cessation of the respiration. These functions may cease from direct causes or from causes operating indirectly by means of the nervous system; in the latter case the phenomena of dying are primary and distinct, and hence it is usual to consider three modes of death, viz. :—

1. Death beginning at the heart.
2. " " " lungs.
3. " " " head.

1. Death from failure of the circulation may be sudden; such death is said to be from syncope.

The word syncope means fainting, and an attack of syncope may be recovered from. Collapse is a form of heart failure differing from syncope only in the fact that consciousness is not lost. Fatal syncope may be caused by diseases of the heart or blood-vessels or by shock to the nervous system; it may occur at any time when the blood is in insufficient quantity, as after severe bleeding, or when it is altered in quality as in some diseases and in some cases of poisoning. The symptoms of syncope are great pallor, restlessness, sighing, and perhaps convulsions. After death the heart is found contracted, but note that there is no accumulation of blood in the lungs as in the form of dying described in the next paragraph.

2. Death from asphyxia is that form of death which occurs where the function of respiration is arrested, as in drowning and suffocation. When fresh air cannot reach the lungs, the blood cannot take up fresh oxygen, nor can it get rid of its waste carbonic acid and other impurities; consequently the blood in circulation becomes impure and poisons the tissues instead of supplying

nourishment to them. The symptoms of asphyxia are increased respiratory efforts, then blueness of the lips and skin, unconsciousness, coma, and death. The length of time required to produce asphyxia varies in different cases, but in cases of drowning, where fresh air has been absolutely prevented from reaching the lungs, recovery is very rare after five minutes of total immersion. On post-mortem examination the veins are found distended with very dark blood, which clots slowly; the right auricle and right ventricle of the heart are also distended with blood, whilst the left chambers are empty. But it is important to know that these signs are not absolutely constant as in some cases both sides of the heart have been found empty after undoubted death from asphyxia.

3. Coma includes all cases where the functions of the brain are primarily interfered with, and thus brings about death by causing paralysis of the circulation and respiration. Death from coma may result from injury or from diseases of the brain or from poisons. The symptoms of coma are insensibility, unconsciousness and stupor, followed by death. The post-mortem appearances are uncertain and of a mixed kind, but usually there is general overfilling or congestion of the blood-vessels of the brain.

Sudden death is very common from natural causes, and may occur:—

1. From many diseases which are well known to end often in sudden death, and which usually leave satisfactory evidence of their existence on post-mortem examination. Amongst such diseases are valvular diseases of the heart, fatty degeneration of the heart, cerebral apoplexy and others.

2. From diseases which may be suddenly fatal, but are not usually so ended; in these cases the post-mortem evidence is inconclusive. Among such diseases are diphtheria, pneumonia, rheumatic fever or Bright's disease.

3. There may be sudden death with no ascertainable disease at all, as, e.g., from intense mental excitement. In such cases there are no symptoms to suggest a fatal result in life, and no signs discoverable on post-mortem examination to account for death.

CHAPTER III.

SIGNS OF DEATH.

It is important to be able to recognise whether a person is actually or only apparently dead.

The signs of death may be :—

1. Inconclusive.
2. Conclusive.

1. Cessation of the circulation and respiration. If the breathing has completely stopped and the heart has ceased to beat there can be no doubt that the person is dead, but it is difficult to ascertain if this really be the case. Death may, however, be considered certain if a competent medical observer cannot hear the heart beat after listening for five minutes. In cases of trance and prolonged sleep there are always faint evidences of circulation and respiration.

2. Coldness of the body. During life chemical changes are constantly going on in the tissues, by which the temperature of the body is kept up to about 98·4° F. As soon as life ceases these chemico-vital changes cease, and the body gradually cools to the temperature of the surrounding air just like any other inanimate substance. As a rule, the body cools to the temperature of the air in from ten to twenty hours after death, but the time of cooling depends on

the temperature (1) of the external air, and (2) of the room where the body is lying; (3) on the amount of clothing, and (4) other similar circumstances. It is said that the bodies of persons who have died from suffocation or from breathing carbonic acid gas cool very slowly, and that sometimes the bodies of those who have died from wasting diseases, as consumption and cancer, cool very quickly. After death from cholera, yellow fever, tetanus and some brain diseases the temperature may rise for some hours after death. The body also often retains its heat for a long time after death from accident or acute disease.

3. Cadaveric rigidity. Rigor mortis. As soon as death occurs usually the whole muscular system becomes flaccid and soft; after a time, however, the body becomes stiff and rigid and the flesh of the limbs hard and contracted. This is what is known as cadaveric rigidity or rigor mortis. It usually commences about five hours after death, and lasts from 16 to 24 hours (Taylor); it usually commences latest and lasts longest in strong, muscular subjects, and usually comes on very early and disappears quickly in those dying from wasting diseases or after great exertion. Cadaveric rigidity first shows itself in the neck and lower jaw, and often so distorts the features that during this period mistakes of identity have often been made. Where death occurs immediately after great exertion, muscular spasm may pass into post-mortem rigidity soon after or at the time of death, and hence soldiers are often found still grasping their weapons and drowned persons grasping grass or weeds; in the latter case there would be a strong presumption that the body was alive when immersed. The fact that a weapon

remains grasped in the hand after death affords a strong presumption of suicide and not of homicide. Rigor mortis may be of such short duration as to escape notice, but when present it is a certain sign of death. Rigor mortis may resemble the rigidity of tetanus, apoplexy and some other diseases, but in these

- (a) The warmth of the body continues.
- (b) All the body becomes rigid at the same time, not different parts in succession.
- (c) If a joint be bent, when rigid from disease, it returns to its original position when the bending force is removed.

The presence of rigor mortis in the body of a new-born child shows it to have been recently living, but does not show that the child has been born alive. (Vide Infanticide, p. 211.)

4. The eyes become dull and lose their brightness after death, and become collapsed and flaccid. In deaths from poisoning by carbonic acid gas, or by prussic acid and its compounds, and also in deaths from apoplexy and some other diseases the eyes sometimes remain brilliant and prominent for some time after death.

5. The skin loses its elasticity.

In this country where burials do not take place for two or three days after life is extinct there can be no doubt as to the reality of death, and there is practically no risk of premature burial, but in hot countries where bodies are interred within a few hours after death the risk of being buried alive is a real one.

To recapitulate, the signs of death before the occurrence of putrefaction are:—

1. Cessation of circulation and respiration for an hour.
2. Gradual cooling of the body, limbs first, trunk later.
3. The appearance of rigor mortis.

II. Conclusive signs.

1. Cadaveric lividity or hypostasis. After death the blood stagnates in the capillary vessels, the red colouring matter of the blood exudes from the vessels into the tissues, and the skin becomes mottled over with bluish patches. This is known as cadaveric lividity or hypostasis. It is important to know that these mottlings may occur in large patches in irregular stripes and may simulate the appearance of violence inflicted during life. Cadaveric lividity begins usually from four to twelve hours after death; it can only occur whilst the blood remains fluid; the patches or stripes are all on the dependent portions of the body. Note that owing to the pressure of the clothes, etc., cadaveric lividity may simulate the effects of strangulation or of severe bruising.

It is often important to distinguish post-mortem lividity from bruises inflicted during life, and this may be done as follows:—

Bruises.	Hypostasis.
1. Skin probably abraded by the same violence which caused the bruise.	Skin not abraded.

- | | |
|--|---|
| 2. Appears at seat of injury; may or may not be a dependent part. | Always at a dependent part, <i>i.e.</i> , where gravity compels it to be. |
| 3. Edges of bruise not sharp; extravasated blood soaks irregularly beyond the actual source of bleeding. | Edges sharp; simply indicating the level of the blood still contained in the vessels. |
| 4. Often elevated. | Not elevated. |
| 5. On incision blood is seen to be outside the vessels. | Blood still in the vessels; if any oozing occurs drops can be seen issuing from the cut mouths of the vessels. |
| 6. Colour variegated, changes from day to day and indicates that the bruise was made during (local tissue) life. | Colour uniform; the changes in colour in living tissues do not go on in the dead tissues and so are not obscured in hypostasis (Smith). |

It is often of the utmost importance to be able to state how long it is since death took place.

The following conditions, which may be observed prior to the commencement of putrefaction, may give valuable indications on this point:—

Condition of body.	Time since death.
(a) Body more or less warm. Voluntary muscles relaxed.	A few minutes to 20 hours.

- (b) Body quite cold. 10 hours to 3 days.
Rigor mortis marked.
- (c) Body quite cold. No 1 to 3 days in hot
rigor mortis. Muscles weather; 4 to 8 days
do not respond to elec- in cool weather.
trical current. No
putrefaction.
- (d) Beginning of putre- 6 to 12 days (Taylor).
faction.

In one case recorded putrefactive changes were extreme at the end of sixteen hours, whilst in another they were scarcely noticeable at the end of thirty-five days. Still the above table may be taken as giving a fairly accurate approximation to the time when death took place.

2. Putrefaction usually begins about the third day after death, and does not commence until post-mortem rigidity has ceased. The changes from putrefaction are due to the action of bacteria on the dead tissues in the presence of air and moisture, and occur somewhat as follows:—

One to three days—skin of belly becomes green.

Three to five days—discolouration spreads. Gases accumulate in belly.

Eight to ten days—discolouration more marked. Offensive smell.

Fourteen to twenty days—skin peels off. The chest and belly become distended with gas. The nails and hair become loose.

The internal organs putrefy in a similar manner but somewhat later, and it is important to remember that the uterus or womb resists putre-

faction the longest of all, and may be quite recognisable many months after death; this condition may prove of assistance in deciding not only the question of sex of a body found dead, but also the question of whether there had been pregnancy or recent delivery of a child. During putrefaction the mucous membrane of the stomach or bowels often becomes greenish or yellow from the presence of bile, and this may simulate the appearance of death from poisoning by mineral acids; it may be distinguished by the fact that there is no softening or corrosion of the mucous membrane itself, and the throat and gullet are not affected, as would be the case in poisoning.

If putrefaction be present, the lungs of children which have been born dead may float in water and hence give rise to an erroneous impression that such child may have been born alive. (See Infanticide, p. 211.) Hence where a witness swears a new-born child was born alive, it may be well to ask him if there were any signs of putrefaction present. In the same way putrefaction may cause the eyes to be protruded and the tongue swollen and pressed against the teeth, and so cause appearances suggestive of hanging or strangling or other forms of asphyxia. In a pregnant woman the gases of putrefaction may expel the foetus after the mother is dead. The degree of putrefaction may be of great importance in determining how long a person has been dead. Putrefaction is often greatly delayed in poisoning by arsenic or phosphorus, and in a lesser degree by sulphuric acid.

Three things are necessary for putrefaction to occur in air, viz. :—

1. A certain temperature; extreme cold retards or prevents putrefaction.
2. Presence of moisture.
3. Free access of air.

Moisture, heat and free access of air all accelerate the process.

The bodies of children putrefy quicker than adults; of old people quicker than adults; and of women quicker than males.

Putrefaction also depends on site and mode of burial. Bodies full of fluid, as in cases of dropsy, putrefy quickly. Wounded parts putrefy rapidly, and the bodies of persons dying from acute disease more rapidly than those dying from slow wasting diseases.

The following table from Dr. Dixon Mann's book gives a general idea of the rate of progress of putrefaction:—

Putrefy quickly.	Putrefy slowly.
Larynx and Trachea.	Heart.
Brain.	Lungs.
Stomach.	Kidneys.
Intestines.	Bladder.
Spleen.	Diaphragm.
Liver.	Uterus, last of all.

Remember that the distension of the bodies of children by putrefactive gases causes them to appear much older than they are in fact; thus a new-born child may have the appearance of a child a year old.

TABLE OF PUTREFACTIVE CHANGES.

Light green colour about belly. Eyeballs soft and yielding to pressure	1 to 3 days.
Green colour spreading and intensified. Face and neck greenish. Gas begins to distend abdomen. Cornea fallen in; nails firm ...	8 to 10 days.
Dark green colour, brownish patches. Body bloated and distended. Features swollen, identification doubtful. Nails and hair loose, skin peeling	14 to 21 days.
Thorax and abdomen give way. Sutures of skull separate. Viscera pulpy. Bones of limbs separate at joints	4 to 6 months. (Luff).

Putrefaction in earth is similar to putrefaction in air, but the changes produced in the same tissue vary greatly in different cases. Usually all the soft parts will be lost in ten years. The bones, the teeth and the hair are the most indestructible portions of the body, and in exhumations of bodies long buried these will be the things to be looked for. Remember in exhumations always to take some person to identify the body exhumed.

In some cases the dead body, instead of undergoing the usual putrefactive changes, undergoes a peculiar soapy change, and becomes converted into a substance called adipocere; this occurs chiefly in

fat bodies exposed to moisture or humid soil, and may take from three months to a year.

In other cases the body becomes dried up and mummified, but this has not any medico-legal interest or importance.

Putrefaction in water takes place slowly as access of air is cut off, but is very rapid in bodies exposed to the air after removal from the water. The features become swollen and unrecognisable, and the skin so swollen that bruises and marks of violence show themselves. Changes from putrefaction cause the blood to be decomposed and dark, and cause congestion of the lungs and other organs, so as to simulate death from asphyxia or apoplexy.

In estimating the time which has elapsed since death the following tables from Caspar and Devergie may be useful:—

1. Respiration and circulation have ceased. Eye loses its lustre. Pupil inactive to light. Whole body ashy white. Heat more or less lost. Muscles relaxed. Must have been dead from ten to twelve hours at most.

2. Eyeball has lost its turgidity and is soft. Flattening of those muscles on which body is lying. Cadaveric hypostases form and grow larger, and form internally as well as externally. Cadaveric rigidity sets in. Must have died within two or three days at longest.

3. Bodies green, bloated and excoriated; impossible to say how long it is since death took place, and it is impossible at the end of one month to distinguish the corpse from one dead five or six months. (Casper.)

DEAD BODIES LYING IN WATER.

1. Post-mortem rigidity, coldness of surface. Muscles do not contract under galvanic stimulus; sodden appearance of the skin of the hands. Three to five days.

2. All body pliant; natural colour of skin. Skin of palm of hand very white. Four to eight days.

3. Body flaccid. Cuticle on backs of hands softened and pallid. Eight to twelve days.

4. Face bloated. Greenish tint on breast-bone. Skin of hands and feet perfectly white. Fifteen days.

5. Face reddish-brown. Eyelids green. Cuticle of hands and feet white, thick and corrugated. About a month.

6. Face swollen. Hair coming loose. Cuticle of hands and feet mostly detached. Two months.

7. Part of scalp, eyelids and nose destroyed. Face partly saponified; nails and cuticle of hands and feet detached. Three months.

8. Face, neck and thighs saponified. Hairy scalp destroyed and removed. Skull bones bare and becoming brittle. Four months.

(Devergie.)

At a later period distinctions are not available, and it is practically impossible to say how long the body may have been in the water.

AS REGARDS PERSONS FOUND DEAD.

A medical man is often one of the earliest intelligent witnesses of the facts in reference to

the body, and he may often be usefully examined as to his observation of the facts in question. He should therefore make notes on the spot of:—

1. The place where the body is found.
2. The position and attitude of the body.
3. The spot on which the body is found and the soil and surface on which the body lies; the surrounding soil should be examined for footprints, etc.
4. The position of surrounding objects.
5. The clothes of the dead person as to stains, cuts, tears, etc., and the direction thereof.
6. The conduct of the persons in attendance, more especially in cases where poisoning may be suspected. After making the above examination the identification of the body should be decided at once, before putrefactive changes may have rendered identification impossible.
7. All the appearances denoting the time which has elapsed since death should be carefully recorded and studied. (v. p. 32.)
8. All external injuries. The exact condition of wounds and bruises. Presence of foreign bodies in the mouth, gullet or windpipe or in the anus or vagina in women. Examine carefully for punctured wounds of the brain, which might easily be concealed.
9. In a post-mortem examination for medico-legal purposes every organ and every cavity ought to be examined. Further, a

saw only should be used for removing the skull-cap in order to examine the brain. The use of hammer and chisel is attended with danger of fracturing the skull, and hence of causing wrongful suspicions of death from violence, or, on the other hand, of affording a plausible suggestion for the defence, viz., that the fracture has been caused during the post-mortem examination.

In some cases the position in which the body itself is found may afford strong presumption of homicide, e.g., the body becomes rigid in the position in which it happened to be at the time of cooling; sometimes circumstances may show that it was interfered with before rigidity set in. In ordinary circumstances for some time after death the muscles remain flaccid, and the lower jaw drops. Hence if a body be found rigid with the lower jaw closed one could easily infer that the body had been interfered with whilst soft and warm. In suicidal hanging, however, the extremities are often found strangely contorted, the result of the muscular convulsions during dying being prolonged into post-mortem rigidity, as before described. (Taylor.)

It is said to be certain that muscular spasm may persist for some time after death, and may pass into and become continuous with post-mortem rigidity (Instantaneous rigor).

The appearances previously described as indicating the length of time which has elapsed since death took place, may be of importance not only as regarding the question of accident, suicide or murder, but also where two persons are found dead together, in deciding important questions of

survivorship, and in that way affecting the devolution of property.

After the occurrence of putrefaction the changes in the body are so variable in extent and in time, that it is impossible to conjecture how long it is since death occurred. In some diseases decomposition is very rapid, as after death from some fevers. Moisture also in the air has a much greater influence in hastening putrefaction than heat; in fact the changes produced by putrefaction are so uncertain that no medical man would be justified in expressing any opinion as to the time when death took place where the bodies are found much decomposed. Again remember that in alleged infanticide, the putrefied condition of the lungs may cause them to float in water, and that the mucous membrane of the stomach and bowels may, when putrefied in like manner, simulate the appearances produced by irritant poisons.

CHAPTER IV.

PERSONAL IDENTITY.

The question of personal identity is often of great importance as, e.g., in the detection of a person suspected of a crime or in cases of disputed inheritance.

The identification of the living may be aided by:—

1. Observation of the mental powers, memory, education, speech, gait and hand-writing. All these were exemplified in the Tichborne case.

2. By the complexion and general resemblance of features.

3. Presence or absence of known deformities or "birth-marks," or in some cases of "occupation" marks, i.e., special marks produced by the occupation of the person, as the horny hands of those who do much manual labour.

4. Evidence of old injuries which have left permanent results, as tattoo marks, the scars of old wounds, fractured bones which have united badly or remained ununited, as in the case of Dr. Livingstone, whose body was identified by an old ununited fracture of the humerus, the result of an injury sustained by the bite of a lion many years before his death.

5. Bertillon's measurements were, and I believe still are, largely used in France. The distances

between two fixed points or the length of certain bones are accurately measured and a record kept. Many measurements are taken on each person. It is found that by taking and recording a large number of such measurements that when a person is found to agree with all the measurements previously recorded of any person, then the two are one and the same. If all the measurements do not agree, then the person is one not previously recorded, and he is registered for future identification. M. Bertillon quite recently (June, 1905) gave evidence in a London Police Court in connection with extradition proceedings and explained his system.

6. Galton's method of thumb imprints is based on a similar principle to that of M. Bertillon, and is now largely used in our own country for the identification of suspected persons. The palmar part of the thumb is pressed on paper smeared with printer's ink, and thus leaves an impression marked by fine lines running in all directions. These lines, according to Mr. Galton, so apparently irregular, all run in certain directions and are constant and invariable in the same person; also the lines of no two separate individuals exactly correspond. Records of all these impressions can be kept and compared with impressions supposed to be new.

7. There may be permanent stains on the skin or on the clothing.

8. The teeth may afford a clue. Thus note the number in each jaw, their condition as to soundness or decay; also note any evidence of special dental work which may be present.

9. In the case of scars and tattoo marks it is important to notice (a) the number, (b) situation, (c) size and shape, (d) their colour, (e) their consistency and lastly whether raised above the level of the surrounding skin or depressed below it.

All wounds necessarily imply a scar when healed, but in some cases when the wound is small and has healed by what is known in surgery as "first intention," the scar may be so slight as to be practically undiscoverable. On the other hand it is probably safe to say that large scars never disappear and can never be destroyed except by the production of another scar. When therefore a person represents himself to be an individual, who was known to have distinct scar-marks, these marks, if present, would afford strong presumptive evidence in his favour, always remembering that such marks may be fraudulently imitated, and also that it is just possible that they may be purely coincidences.

SCARS are at first red, then brown, and finally like the healthy skin, but the time needed to accomplish these changes varies so greatly that it is impossible to do more than guess at the age of a scar from its appearance. All one can say is that a scar still red cannot be very old, a brown scar may have existed for months, and a white scar must be of old standing, at least of some months, probably of years. In addition to the other characteristics of scars, tattoo marks are of course coloured and are usually of an obvious design.

10. Photography may assist in the identification of the living, the eyes, ears, nose and mouth of different persons otherwise alike, showing marked contrasts. Identification may be assisted also by measurement of the stature and girth.

11. Colour of the hair may be useful, but we must remember that hair dyes are in common use, changing dark hair to light and vice-versâ. Thus hair is darkened by salts of lead, bismuth and silver, and is made light by chlorine and peroxide of hydrogen. These can be detected by chemical tests, but in addition the change in colour may be detected by allowing the hair to grow or by comparing the hair of the head with that of other parts of the body; one must remember that the hair on different parts of the body may vary considerably in colour.

12. Foot-prints sometimes assist in identifying a suspected person. Great care should, however, be exercised in coming to any conclusion from the presence of foot-prints, as the marks produced are influenced not only by the soil and surface on which they are impressed, and by the kind of shoes worn, but also by the fact that different marks result when the person is walking, running, or standing, as the case may be.

Questions have often arisen as to the degree of light necessary for identification; many persons have been recognised during flashes of lightning, and in some cases it is said, by the flash of a pistol, but the last statement seems reasonably open to doubt.

THE IDENTIFICATION OF THE DEAD

is often of the greatest importance, and may be required under three kinds of circumstances, viz.:

1. The entire body may be found or exhumed.
2. It may be necessary to reconstruct the body from portions of it found after having

been cut to pieces, and the limbs and other portions scattered and concealed in widely distant places.

3. By examination of a dead body, or of portions of it, or possibly of the skeleton only, it may be possible to determine the sex, and, approximately, the stature and age of the person at the time of death.

1. In the first case, if decomposition be not too far advanced we may recognise the features, sex and probable age, and there may also be indications of the occupation followed by the deceased.

The age may be approximately determined by means of the teeth, both in the living and the dead.

Thus in the living, in the young the teeth are divided into sets, viz., a temporary set and a permanent set. The temporary or milk teeth are twenty in number and appear approximately as follows:—

The lower central incisors when the child is about 7 months old.

The upper central incisors when the child is about 8 months old.

The upper lateral incisors when the child is about 7 to 9 months old.

The lower lateral incisors when the child is about 10 to 12 months old.

The canine or eye teeth when the child is about 17 months old.

The first temporary molars when the child is about 14 months old.

The second temporary molars when the child is about 22 to 24 months old.

As a matter of fact, however, in delicate children,

and even in those apparently in good health, the evolution of the teeth is often very delayed and irregular, and it is not at all uncommon for the last temporary molars not to appear until the end of the third year or even later than that.

As regards the permanent teeth, the following table is useful, but just as in the case of the temporary teeth, there are great variations in the order and in the time at which they appear.

Years	Incisors		Bicuspid		Molars			Total.	
	Central	Lateral	Cuspid	Anter.	Post.	Ant.	Sec.		Post.
7	—	—	—	—	—	4	—	—	4
8	4	—	—	—	—	4	—	—	8
9	4	4	—	—	—	4	—	—	12
10	4	4	—	4	—	4	—	—	16
11	4	4	—	4	4	4	—	—	20
12-12½	4	4	4	4	4	4	—	—	24
12-14	4	4	4	4	4	4	4	—	28
18-25	4	4	4	4	4	4	4	4	32

(Guy and Ferrier.)

It should also be remembered that owing to their hardness the teeth and the lower jaw may be preserved and recognisable for long periods after death.

Opinions as to age formed by the presence of grey hairs, baldness, senile appearances and so forth are deceptive and of no real value.

The question of age in the living may be of legal importance:—

1. As regards a person coming of age, which occurs on the first moment of the day preceding the anniversary of the complete birth.
2. In questions as to heirship and tenancy by the courtesy.

3. As an aid to identification.
4. In questions of rape.
5. In relation to marriage and making a will.
6. As to capability of procreation, legitimacy.
7. Fœtal age is of importance as to whether a child could have been born alive in cases of infanticide.

AGE OF THE DEAD.

At the time of birth the bones have not assumed their proper structure and are soft and cartilaginous. The development of bone proceeds from brownish spots in various parts of the bones, and the presence of these centres of ossification, as they are called, may be of great importance in deciding whether the body of a child found dead is that of a child so far mature that it could have had an extra-uterine existence. In the medical books will be found full tables of the times at which the points of ossification in the different bones appear after birth, but for our purpose we need go no further than to say that a point of ossification in the lower end of the thigh-bone is most important in determining that the body of a child is a body which has at all events reached its full time, i.e., that it is the body of a nine months' child. The absence of this centre of ossification in the lower end of the thigh-bone would indicate that at all events the child was not at its full time.

THE QUESTION OF SEX

may be important in infants and adults.

In infants the right of succession to property may depend on the sex of the new-born child.

In some cases, owing to various malformations, infants are born the sex of whom it is difficult to determine. Such individuals may live and grow to be adults, and are termed hermaphrodites.

Hermaphrodites are of three kinds:—

1. Where the organs of generation of a male resemble those of a female.
2. Where the organs of generation of a female resemble those of a male.

The above are called cases of false hermaphroditism.

3. Where the organs of generation of the two sexes are blended, i.e., there are in the same person both ovaries and testicles.

The last is termed true hermaphroditism, and is very rare.

In some cases the penis of a male child remains open on the under surface and adherent to the belly above, and thus the parts resemble those of a female. Such a condition is called hypospadias. In other cases the upper surface of the penis remains open; this is called epispadias.

It would be entirely a question for an experienced medical witness to decide after examination of the organs which sex predominated; assistance would be rendered by the other physical characteristics of the individual, as, e.g., the shape of the body and mammæ, the hair, the sexual preferences, etc.

SEX OF THE DEAD.

This question is generally raised in regard to the skeleton only, but in the case of a body exhumed or found months after death, remember that the uterus is very late in decomposing, and may be

recognised after all the other organs are undistinguishable.

The following table copied from Taylor contains the chief points to attend to in the examination of a skeleton:—

1. Are the bones those of a human being or of some other animal? No mistake is possible where the bones are examined by a medical man, but remarkable reports may be spread abroad by the laity until such examination has been made.

2. Is the skeleton that of a female or a male? Female bones are lighter and smoother; the projections less marked and the joints smaller. The skull and face generally are smaller, as are the jaws and teeth and the chin less prominent. The most important distinctions, however, are in the pelvis. The ilia are more expanded and wider, the sacrum more concave, the pubes more shallow, the entire pelvis is larger in its outlets than the male.

3. How long has the skeleton been in the ground? Usually the soft parts are all destroyed in ten years, but the further changes in the bones vary in duration, and it is impossible to say how long the body may have been buried. If the bone to be examined is one of the long bones, and it is very brittle, light and easily scraped to powder, it has probably been buried more than fifteen or twenty years.

4. The probable age may in some cases be determined by examining the jaws and teeth, as before described.

5. The probable stature may also be determined, as before described, by adding about an inch and a half to the stature of the entire skeleton.

6. The race to which the individual belonged. The different races of mankind differ in the shape and proportion of the bones, chiefly in those of the skull and the limbs.

7. Solitary bones should be examined as to which side of the body they belonged and whether they are parts of one or more skeletons. For example, the presence of two left thigh-bones would prove they were from more than one body.

8. Whether the bones had been previously fractured. The body of Dr. Livingstone was identified from the presence of a fracture of the humerus which had never united.

9. Presence or absence of personal deformities, presence or absence of extra fingers or toes.

10. Have the bones been calcined? This is important, especially in relation to infanticide, where the murderer tries to destroy the body of his victim by burning. In such a case, if only ash remains, it is impossible to say whether it came from human bone, as there is no distinction between the ash from the bones of human beings and that from the bones of other animals or between the ash of foetal and adult bones.

11. Sometimes fractures may be found, as of the skull or long bones, pointing to violence having been inflicted during life.

AS REGARDS THE HAIR IN CRIMINAL EVIDENCE.

1. Is the object submitted for examination hair or some other substance? This can only be determined by the microscope, and cross-examination may show that microscopical examination has

not been attempted. Hair may easily be mistaken for fibres of cotton, linen, silk or wool, and vice versâ. (Taylor, vol. i. 564.)

2. If hair, is it human? The hair of animals is usually thicker, coarser and less transparent, but the hair of some dogs is very like human hair. Sometimes it may be important that the hair found is similar to or different from the hair of the assailant or the injured or dead persons.

3. It is impossible to say what part of the body the hair has come from.

Only an expert microscopist could swear positively that the specimen examined was, or was not, human hair.

CHAPTER V.

PRESUMPTION OF DEATH. SURVIVORSHIP.

A person, who is shown to have been once alive, is presumed to be still alive, and the onus of proving the death lies on the person asserting it.

A person who has not been heard of for seven years is presumed to have died at the end of seven years after he has last been heard of. This question is important in relation to prosecutions for Bigamy. (See Archibald, *Crim. Pract.*, p. 1120.)

It may also be important in relation to the disposal of property, the payment of insurance moneys, etc.

Where two persons die at, or nearly at, the same time, as in shipwrecks and other cases, the question as to who is the survivor in English law is a question of fact to be determined by the court, taking into consideration all the circumstances of each case. Thus in cases of death from asphyxia, as in a room poisoned with coke-fumes, much would depend on the position of the bodies, as to whether on the bed or the floor, or near to or far from a window; generally it is said that as women consume less oxygen than men, *coeteris paribus*, the woman would survive.

Complicated questions as to the clothing, ability to swim, would arise in cases of drowning after shipwreck.

Young people bear cold badly, as do the aged and women.

Hunger and thirst affect the young more than the aged, hence, *coeteris paribus*, they would sooner prove fatal to the former than the latter.

Generally no fixed rules can be made, and the question must be determined on the facts in each particular case, always bearing in mind that the onus of proof is on the person asserting, and that the law raises no presumption on either side. This is much more correct than saying "that the law presumes both to have perished at the same time." Obviously if two dead bodies are found at the same time and one is still warm, whilst the other is cold, a clear inference could be drawn as to which was the survivor. (V. p. 32 as to length of time which has elapsed since death.)

CHAPTER VI.

WOUNDS,

it is said, now include all injuries inflicted by mechanical violence, but, generally speaking, the legal conception of a wound is the same as the popular one, viz., an injury involving a solution of the continuity of the skin; both the cuticle, or epidermis, and the true skin, or dermis, must be divided, as division of the cuticle alone is not sufficient to be a "wound" in law. Formerly, in order to obtain a conviction for wounding, it was necessary to prove "a solution of continuity in the soft parts, suddenly occasioned by external causes," but now, by the statute 24 and 25, Vict. ch. 100, s. 18, it is provided that "Whosoever shall by any means whatever wound or cause grievous bodily harm shall be liable on conviction," etc., so that in all indictments for wounding where there is any doubt as to the wounding it is the practice to add an indictment charging the prisoner with "causing grievous bodily harm with intent" etc., in which case proof of actual division of the skin is not necessary. In former times there were great doubts and learned arguments as to what constituted a wound, some authorities holding that the skin must be divided, whilst others held that internal injuries could be included under the term "wound" even where the skin was uninjured; in some cases fractures and dislocations have been held to be wounds. (But see Archibald, 22nd ed., p. 805.)

A wound, then, may be defined as "a breach of continuity in the structure of the body, whether external or internal, suddenly occasioned by mechanical violence." (Taylor.)

A medical witness will generally swear that all wounds involving the large vessels, as, e.g., the carotid arteries or jugular veins in the neck, the femoral artery in the thigh or the brachial artery in the arm (v. diagram), and wounds involving the important organs of the body, as, e.g., the brain, lungs, heart or liver, are wounds which are "dangerous to life," i.e., that they are immediately dangerous, dangerous of themselves even in the absence of rare and unexpected complication. On the contrary, no medical witness would call a simple cut finger "dangerous to life" because fatal erysipelas or pyæmia or tetanus has been known in rare instances to follow such a simple and superficial injury.

In cases of fatal injury from violence or accident dying declarations are often taken by medical men. This subject has already been mentioned in Chapter I., and need not be repeated, except to note that there is often delirium in cases of head injury or after loss of blood, and that generally a person at the point of death, though apparently rational, is often mentally confused, and therefore identification made under such circumstances should be viewed with the greatest suspicion.

Remember also that dying declarations are only admissible where a person is charged with the murder or manslaughter of the declarant, and are not admissible for example where a person is charged with procuring the abortion of the declarant, who has afterwards died.

The phrase "Grievous bodily harm" means vaguely a lesser degree of injury and danger than wounding; usually the whole question for the jury is whether the wounding or injury was with *INTENT* to do grievous bodily harm; such intent would be inferred from the use of weapons or the nature of the wound or wounds and other similar circumstances given in evidence. But on an indictment for wounding with intent to do grievous bodily harm, the accused may be found guilty under 14 and 15 Vic., ch. 19, s. 5 of the lesser offence of "unlawful wounding" without alleging any "intent" to do grievous bodily harm.

In the examination of a wounded person one notes:—

- I. The number of wounds inflicted, because
 - (a) The greater the number of wounds, the greater the probability of severe or dangerous shock to the nervous system.
 - (b) Generally speaking the more wounds, the more bleeding, and therefore the more tendency to syncope or fainting.
 - (c) The more wounds, the less probability that they are self-inflicted; this inference must be drawn with caution, as the insane often inflict horrible mutilations on themselves.
 - (d) Numerous wounds may afford some evidence of a struggle.
 - (e) Some of the wounds may possibly help to indicate the nature of the weapon used.
- II. The position of the wounds.
 - (a) Some wounds could not possibly have been self-inflicted.
 - (b) If they involve large vessels or important organs, so much greater the danger to life.

III. The direction of the wounds may afford some indication as to the manner in which they were inflicted; but here again great caution should be used before forming an opinion which might easily be false and might so cause the conviction of an innocent person.

IV. Length and Depth. Generally the danger is directly proportionate to the length and depth of the wound.

V. The nature of the wound, as to whether lacerated, punctured, incised, contused, all of which are important in relation to the danger to life and as affording a clue to the weapon used.

VI. Any foreign bodies found in the wound, as dirt, stones, hair, bits of glass, etc.

VII. The amount of apparent bleeding, as seen on the clothes or floor, or surrounding the wounded person.

VIII. The amount of redness and swelling round the wound, which points are important as regards the question whether the wounds were inflicted before or after death. Redness and swelling are both signs of inflammation, which is a vital process not possible after death.

As to the question whether a wound is dangerous to life the following should be noted:—

1. The amount of bleeding, shown by the amount of blood visible, and by the pallor or faintness of the wounded person; but remember that bleeding may be going on internally, so that a person may be pale and fainting and die rapidly from internal bleeding without a drop of blood escaping externally, as in injuries to the lungs or liver, or the large vessels coming from the heart.

2. The organ wounded. All wounds of the brain

are very dangerous. Wounds of the lungs are dangerous from hæmorrhage and from their liability to set up inflammation of the lungs or pleurisy; wounds of the abdomen are liable to set up peritonitis and internal hæmorrhage. In addition to their immediate danger all wounds of organs are liable to cause death later by the super-vention of blood-poisoning, or septicæmia.

3. Shock. In rare cases, blows on the heart or belly have caused sudden death without any apparent external traces of violence, or without any indications of internal injury on post-mortem examination. In such cases death is due to shock to the nervous system.

4. After the immediate danger has ceased, there may in all wounds be danger from:—

- (a) Secondary hæmorrhage, internally or externally. The natural method by which hæmorrhage is stopped is by the formation of a clot of blood at the torn portion of the vessel. In art, the formation of this clot is assisted by the application of pressure or of a ligature. Sometimes the clot gives way or the ligature slips and secondary hæmorrhage then ensues.
- (b) Some wounds leave permanent effects, as scarring or closing of passages, and so cause death indirectly. Thus swallowing corrosive fluids may cause stricture of the gullet. Kicks on the perineum (the space between the root of the penis and the anus) may cause stricture of the urethra, and hence lead to retention of urine, followed by disease of the bladder and kidneys.

(c) Old wounds may in some cases set up lock-jaw or fatal blood-poisoning.

One may be asked if a wound is likely to cause permanent injury.

1. If a limb, an eye, or an ear be lost, this is obvious.
2. In cases of injuries to the eye, in many cases there is danger not only to the injured eye, but also to the sound eye from the occurrence of what is called "sympathetic ophthalmia," which is an acute inflammation of the eye often ending in total blindness. In other cases the nature of the wound may be such that the blood supply to the part is interfered with and gangrene or mortification may ensue.
3. As before described, cicatrisation of wounds may lead to permanent contractions and deformities of the limbs and to strictures of internal passages.
4. In cases of injury to the nervous system where there is a large amount of shock as in railway accidents, very complicated questions arise as to how much of the illness is due to the shock from the injury, and how much is due to the mental excitement produced by the hope or the fear as to the anticipated amount of compensation the injured person is likely to recover. This subject will be discussed later.

Sometimes it may be necessary to express an opinion as to the length of time since the wound

has been inflicted; this is often very difficult. Generally we may say if a wound be

- (a) Clean and merely scabbed over with blood-clot, 10 to 24 hours have elapsed.
- (b) If pus or matter has formed, about 36 to 48 hours.
- (c) If granulation tissue is formed, about a week must have elapsed. Granulation tissue is the new tissue formed in the repair and healing up of wounds and sores.

Wounds sometimes give indications as to the weapon which has been used, thus:—

1. The skin is elastic; hence the wound appears smaller usually than the weapon which made it.
2. Skin is movable, one may give therefore a jagged incision even with a sharp knife.
3. A sharp weapon usually causes a clean cut, but
4. When the skin is close to bone, as on the top of the head, a blunt weapon or a fall may also cause a clean cut.
5. The weapon may have dirt, hair, etc., on it similar to dirt, hair, etc., found in the wound.
6. As regards bruises or contusions, we must remember that people vary greatly in their susceptibility to bruising; some persons, as, e.g., anæmic women, bruise very easily. In such cases it would be dangerous to infer from the presence of large bruises that any serious violence had been inflicted.

7. The bones of chronic lunatics are very brittle and break very easily. Hence be very careful in inferring excessive violence merely on the ground that some ribs or other bones in a lunatic have been found fractured. In such cases the unbroken ribs should be removed and examined to show whether they are in fact brittle.
8. Lastly, remember one can only say at the most that a wound might have been inflicted by a weapon produced, not that it actually has been so produced unless the person was caught in the act.

Contused wounds, or contusions, or bruises, or ecchymoses as they are technically termed, are caused by blows with blunt instruments. There is effusion of blood into the connective tissue, which effusion causes discolouration of the skin, owing to the force of the blow causing a rupture of some of the blood-vessels underneath the skin. Where the skin is loose and yielding, the discolouration may show itself at once, but if the bruise be deeper-seated, i.e., if the blood-vessels ruptured are deeply seated, several days may pass by before the discolouration becomes visible. In such a case also the blood may not reach the surface immediately over or below the seat of injury, but may find its way among the tissues and muscles, and finally appear under the skin at a considerable distance from the original place of injury. By the time it reaches the surface, so much time may have elapsed, that the discolouration instead of being blue as in a fresh bruise, will be green or yellow.

An effusion of blood which is deep-seated, and does not produce external discoloration, and is

recognised by touch, is called an extravasation. As the blood becomes absorbed, the colour of a bruise gradually fades away; in some cases the effused blood instead of becoming absorbed, acts as an irritant to the tissues, and the result is the formation of an abscess which has to burst or to be incised in order to get rid of the matter or pus before recovery is complete.

In a dead person a bruise may be mistaken for post-mortem lividity or vice versâ, but the distinction is that on cutting open the part it will be found that in a bruise the discolouration and effusion of blood extend right into the deeper layers of the skin itself, whilst in post-mortem lividity the effusion is confined to the tissues lying beneath the skin. (See also p. 27 ante).

Sometimes the shape of a bruise gives evidence of the nature of the weapon, as e.g., the mark of the cord in hanging; the shape of a bruise, however, depends on so many circumstances, as e.g., the force of the blow, the kind of weapon, the part affected, the condition of the person injured, that too definite inferences cannot or ought not to be drawn.

Where the parts are soft and yielding there may be no bruising of the skin, although the violence has been sufficient to cause fatal injuries in the organs beneath the skin. Many fatal cases are on record where persons have been killed by being run over by wagons, carriages, etc., where the liver, spleen and bowels and bladder have been found ruptured, but the skin of the abdomen has shown no discolouration or other indication of bruising. When, however, severe injuries of hard parts are unattended by bruising the presumption

against their having been caused by a blow is strong. (G. and F.)

Where the person is dead, it is often of the greatest importance to be able to say whether bruises found on the body were inflicted before or after death, and hence it is of consequence to know that up to two or three hours after death bruises may be inflicted more or less resembling bruises inflicted during life. (Christison.)

If the bruises have been inflicted during life there will probably be much swelling and some signs of inflammation; on incision the effusion of blood will be considerable and the clots large. If the skin itself is discoloured it is certain that the wound has been inflicted during life or only a few minutes after death. Great difficulties arise if the body is not examined until putrefaction has set in, as, in consequence thereof, there may be great changes of colour and consistence, and in addition the pressure of putrefactive gases may cause copious bleedings from the ruptured vessels. Therefore no confident opinion as to the time when a bruise was inflicted can be given where putrefaction is much advanced.

Fractures produced immediately after death cannot be distinguished from fractures produced during life, but if produced some time before death inflammatory changes and indications of repair could be recognised, which could only have gone on during life.

WOUNDS

may be incised, punctured and lacerated, the meanings of which words explain themselves.

In all recent wounds there are :—

1. Bleeding—more or less, depending on the kind and situation of the wound. Incised wounds usually bleed freely, whilst lacerated wounds may scarcely bleed at all.
2. Retraction of the edges of the wound.
3. Clots of blood between the edges of the wound and in the cellular tissue. The blood, which is fluid in the living body, on being shed or on death, loses its fluidity and becomes partly solid, forming a red clot, from which a clear liquid separates.

Free hæmorrhage is usually indicative of a wound having been inflicted during life, unless putrefaction has set in, when, as previously stated, free hæmorrhage may occur from the pressure of putrefactive gases in the blood-vessels.

Wounds inflicted immediately after death may cause the same appearances as those inflicted during life, but where wounds are inflicted an hour or two after death the appearances are quite distinct. The characters of a wound inflicted during life are :—

1. If there are any signs of gangrene or pus or inflammation, as redness and swelling, or cicatrisation, obviously the wound must have been inflicted some time before death. But generally when death has occurred within a few hours of injury,
2. The edges of the skin will be everted owing to the elasticity of the skin.

3. There will be abundant bleeding, often arterial in character, with general diffusion of blood into the surrounding parts.
4. There will be clots of blood in the wound itself.

If the wound be not inflicted until some hours after death we find:—

1. No effused blood, or, if any, it is venous.
2. The blood is in small quantity and usually liquid, and does not clot as living blood does when shed.
3. The edges of the wound are soft, not elastic, and therefore in apposition and not everted.
4. Only a little or no blood in the cellular tissue; and
5. No clots in the wound. (Taylor.)

Hence, as a rule, a witness questioned on this point will not be justified in going further than to say that a wound was inflicted during life, or that it must have been inflicted immediately after death; on the other hand, he may be able to say it was not inflicted until some hours after death.

Lacerated wounds cause usually less hæmorrhage than incised wounds; thus sometimes a whole limb, as an arm, may be torn off without serious bleeding. Lacerated wounds do not (1) cause so much discoloration as contused wounds; (2) do not correspond in shape with the cause; and (3) there is much more difficulty in deciding whether the wound was inflicted during life or after death.

Punctured wounds or stabs are usually smaller than the weapon which causes them, and they are

dangerous chiefly from their liability to injure internal organs, and to cause internal hæmorrhage.

It is important to remember that ecchymosis or bruising inflicted during life may not show until after death; thus the mark of the cord in hanging may not show until some time after death, and a person killed by being run over by a wagon may not show the bruise until many hours after the injury.

But if the ecchymosis, or pouring out of blood, be due to an old injury, when it does appear on the surface it will show changes of colour pointing to its ancient origin; that is to say, it will not be dark or blue, but rather green or yellow.

The use of a weapon in producing a wound is not essential for a conviction for wounding, but goes materially to the question of malice and intent. The words of the statute are: "Whosoever shall, by any means whatsoever, wound or cause any grievous bodily harm," etc. Where the prosecution allege that a wound has been caused by a knife, and the defence is that the wound was accidentally caused by a fall on glass or earthenware or any sharp substance, it is essential that the surgeon should have examined the wound very promptly after the injury, as otherwise there will be no possibility of distinguishing whether the wound was lacerated or incised or whether it was likely to have been caused in the one way rather than the other.

Lacerated wounds are often the result of accident, and in newly-born children they may give rise to a suspicion of infanticide.

As regards contusions, it is not often possible to say whether they have been caused by a blow or fall, but (1) several wounds with copious effusion

beneath each point to a weapon. (2) If the contusion is on the summit of the head it is not likely to have been caused by a fall. (3) Foreign bodies in the wound, as sand or dirt, like that of the soil where the body is found, point to a fall.

But where the defence is that death was a result of a fall, one must remember "if there be blows and then the person fall by means of the blows, and as a result of the fall he dies, that is manslaughter in the person who struck the blow," the law being that if a person, in doing an unlawful act, causes death, that person is guilty of manslaughter at least.

It is often most difficult to say, from the examination of a wound, what kind of weapon, or whether any weapon at all, has been used, and a surgeon should never venture to give an opinion on this point merely because he has heard that a weapon was used. He should form his opinion entirely on the result of his own observation, and not be influenced by what is suggested to him. If he cannot form an opinion from his own observation he should decline to give any opinion at all. He can, of course, if a weapon be handed to him, say whether the wounds might, or might not, have been inflicted with it.

The surgeon should always carefully examine the dress for marks of blood or dirt, the direction of cuts or stabs; and it is important to remember that the skin may be wounded easily through the dress without the dress itself being cut or torn.

Where a person has died from a wound the important question for the jurist always is, Was it the result of accident, suicide or murder? The evidence available from the wound itself depends

on (1) its situation; (2) its nature and extent; (3) direction.

1. From situation. Suicides chiefly wound themselves in front and on the sides, as the throat by cutting, the brain, mouth or chest in suicide by pistol. If the fingers are soiled with powder that would afford a strong presumption of suicide. Wounds at the back are probably not suicidal. Wounds in exposed parts of the body are usually accidental or suicidal; wounds in parts not easily accessible point to homicide. Any wound producible by a suicide may be imitated by a murderer, but many murderous wounds could not be produced by the person himself.

Accidental wounds usually occur on exposed parts; some wounds are obviously not accidental, as, e.g., gunshot wounds of the mouth.

2. Nature and extent of wound. Suicidal wounds are usually stabs or cuts. Contused wounds are not usually suicidal, unless caused by a deliberate fall from a height. The shape of wounds may be of importance, as in cut throat; suicidal cuts being from left to right (in a right-handed person), and passing above the thyroid cartilage; whilst homicidal wounds of the throat are usually below the thyroid cartilage (Littlejohn). A wound of very large extent and depth points rather to homicide, but some suicides show great determination in accomplishing their object.

In all cases where the person is insane extreme caution is necessary in forming the opinion that wounds are not suicidal, but must, from their extent and severity, be homicidal, as such persons have again and again been known to inflict remarkable and numerous wounds upon themselves.

Sometimes the nature and extent of a wound may be such that it could not be suicidal or accidental, but must be homicidal, as, *e.g.*, wounds inflicted where the injured person could not reach.

3. Direction of the wound. Suicidal cut throats usually cut from above downwards, and the wound does not extend further than the wound in the skin; homicidal wounds often go deep into the tissues beyond the extent of the skin wound.

The question of suicide or accident will usually have to be determined by other circumstantial evidence, pointing to design or otherwise; in reference to cut-throats especially, we must remember that many persons are ambidextrous, *i.e.*, can use both hands with equal facility.

Whilst incised wounds are usually suicidal or homicidal, stabs are frequently accidental arising from falls, etc., when a person carries sharp instruments in his pockets. In these cases the direction of the wound is usually from below upwards.

The presence of several wounds may afford a slight presumption against suicide, but many murderers accomplish their purpose with one wound, and many suicides, especially the truly insane, inflict many wounds in their efforts at self-destruction. Nevertheless, if there be several wounds, some of them may be quite inconsistent with suicide. The use of several weapons affords no presumption of homicide. A suicide may attempt to cut his throat and afterwards shoot himself.

Suicide is much more common than homicide, hence one would always think of suicide first, and only come to the more serious conclusion after due

consideration of the points discussed, of the place where the body was found and all the other circumstances in the case.

Where there are two or more MORTAL wounds, there is a presumption against suicide, but even after mortal injuries a person may not die at once. Remarkable acts of volition and movement are recorded after the infliction of mortal wounds, which make one extremely cautious in drawing conclusions in favour of homicide on this ground alone. But generally where there are two or three or four wounds all able to produce death very rapidly, the presumption in favour of murder would be great. If there are several wounds, some mortal and some not, it is probable that the non-mortal wounds were inflicted first; but each case would have to be decided on its own particular facts.

In addition to the evidence derived from the wound itself, the medical witness is often one of the earliest and most intelligent persons on the spot after a sudden death; he should, therefore, carefully observe all the surroundings in the case, which may be of assistance afterwards both to the Court in enquiring into the crime, if such it be, and to himself in making his own evidence more complete and reliable. See also chapters on investigation of poisons and the chapter on persons found dead.

Thus he may gain some information from the following:—

1. The position of the body may be such as to be inconsistent with suicide, and its condition should be noted as regards the presence or absence of rigor mortis, lividity, or putrefaction, all of

which would give one an idea as to the length of time which had elapsed since death.

2. Position of the weapon. If the weapon be missing it must be homicide. Note whether it is found near or far from the body, and remember that if the body has been removed, evidence depending on the relative positions of the body and weapon will not be allowed (Taylor). Usually in suicide the weapon is grasped in the hand or is on the floor near the corpse. If the weapon is grasped in the hand, the presumption of suicide is very strong. The nature, shape, and kind of edge of the weapon should all be noted.

3. Blood on weapons. There may be no blood found on the weapon at all, whether it be a cutting instrument as a knife, or a heavy instrument, as a hammer. If blood is found on a weapon the manner in which it is smeared may afford some clue as to whether it has been purposely smeared on by a murderer for the purpose of simulating suicide. Blood on a weapon may be dry or wet or only as a film; if coagulated there would be a strong presumption that it had come from a living body or at all events from a body very recently dead. Remember also that it would not be possible to swear that the blood was that of a human being; we shall find that it is only possible to say from microscopic examination of the blood whether it be the blood of a mammal, i.e., of an animal belonging to the genus mammalia, and not the blood of a bird or reptile. It is impossible to go further and swear the blood is human blood.

4. Hair and other substances on weapons. Here the important questions are two, viz.:—

1. Is the substance hair at all or are the fibres those of cotton-wool or the like? Any person fairly accustomed to microscopic work would have no difficulty in deciding this point.
2. Is the hair that of a human being or of some other animal? As a rule the hair of animals is coarser, shorter, and thicker than human hair, but the hair of some dogs is very like that of a human being.

Sometimes it may be of use to compare the hair of the assailant or deceased with that found on the weapon or in the wound, but great caution is needed in drawing conclusions from such comparison. It is of the greatest importance to remember that no person can be examined without his consent, and that any such examination without consent would constitute an assault for which an action would lie.

5. Foreign bodies in wounds. Wadding found in or near a body after a gunshot wound often gives an important clue, and should always be kept for production in Court, as also should the bullet or shot, if found; in some cases it has been found possible to determine by chemical examination how long an interval has elapsed since a gun or other firearm has been discharged. Foreign bodies found in the wound may give indication as to the place where the crime was committed, and portions of the weapon itself may also be found.

6. Marks of blood on clothing and furniture. Usually there is the greatest quantity of blood near the place where the deceased has died. Blood far from the body will show the person has moved or been moved, and may in some cases show that

the body has been moved after death. Extensive splashing of blood over a room would indicate severe struggling. It is always a fair subject of enquiry, whether there are any marks of blood about the apartment which no one but a murderer could have produced (Taylor). If there be a wound of the throat or chest, and the blood has flowed down in front, probably the wound was inflicted whilst the deceased was in the erect position; if the blood has flowed down the sides of the neck and chest, probably the body was lying down. As this is said to be unusual in suicides it might raise a suspicion of homicide, to be confirmed or refuted by other circumstances.

Where any or several of the large blood-vessels are found divided, and nevertheless the quantity of blood found on the spot is small, there is a presumption of homicide—a presumption that either (1) the crime had been committed elsewhere and the body had been removed, or (2) possibly that death had been caused by some other means and the vessels had been divided after death.

Sometimes the form and direction of blood-stains may give indication as to the position of the person when the wound was inflicted.

7. Always examine the mouth, throat and hands in dead persons. There may be bloody saliva in the mouth, marks of the hands or nails of the assailant on the throat, and the hands may be found cut and scratched with struggling.

Sometimes mud on the clothing of the prisoner may by microscopic examination be recognised as similar to the mud where the body was found. In fact all stains on the clothing of either the deceased or the prisoner, whether of blood, dirt, or other matters should be carefully examined and com-

pared, but it is necessary to remember that it by no means follows that a murderer who accomplishes his purpose by wounds must get stained with blood himself. The plea that the prisoner's clothing is unsoiled is often advanced on behalf of the prisoner in such cases, but is absolutely untenable. Several cases, however, are recorded by Taylor in which this defence has been set up and in some cases successfully.

On the other hand, too much importance should not be attached to small and insignificant blood-stains found on a suspected person. They may be due to ordinary cuts, or scratches, or even in dirty people to the scratching produced by the irritation of fleas, etc.; often also stains which look like and are taken for blood are found on examination to be stains from rust, etc.

Even if no blood be found on the assailant, his body should always be thoroughly examined for other marks of contusion or injury which might have been produced by a struggle (but see ante, p. 66).

In some cases of injury to the head, the brain matter may be found on the spot or the weapon; this would be detected by microscopic examination by a competent person.

BLOOD-STAINS.

The examination of blood-stains is often very difficult, especially when the quantity is small and some time has passed since the blood was effused. It is often advisable to take a photograph of blood-splashes on furniture, etc., before doing anything further in order to show the exact position in the room where the splashes were found.

Blood itself is made up of a colourless liquid called the plasma, in which are floating multitudes of fine reddish particles, called the corpuscles of the blood. The corpuscles differ in shape and size in different kinds of animals, and hence with the microscope one can distinguish the blood of birds and reptiles from that of mammals, such as horses and man. When blood is shed from a vessel, and also when life ceases, it clots, that is to say the plasma becomes turbid and shows innumerable filaments traversing it in all directions. These filaments (fibrin, as they are called) unite together, and with the corpuscles form a semi-solid mass or clot. The time at which blood clots after being shed varies with many circumstances, as e.g., the temperature of the surrounding air and other causes.

Blood-stains may be examined in three ways:—

1. Chemically.
2. Microscopically.
3. By spectrum analysis.

The essential portion of the chemical process consists in the identification not of the corpuscles of the blood, but of the red colouring matter, called the Hæmoglobin.

A recent blood-stain is red, but it soon becomes brown, and after a day or two it is impossible to fix the age of the stain. It is unnecessary for our purpose to go into detail regarding the different chemical processes for the detection of blood, but we may note that blood-stains may resemble superficially the following, but differ in their chemical reactions.

1. Red dyes of all kinds.
2. Iron-moulds.

3. Red paints.
4. Juices of fruits or vegetables.
5. On weapons, lemon or orange juices, etc.
6. Iron-rust.

The colour of blood-stains may be washed out, but when the stain is dried, provided any colour remains at all, chemical reaction showing the presence of blood may be obtained. In the case of rusty weapons, we must remember also that old stains of blood mixed with rust may be perfectly innocent; in any case no reliance should be placed on physical appearances alone or on the evidence of non-professional persons.

Usually in wounds both arterial and venous blood escapes, and when dried and examined from a stain no difference can be detected between the two. If the blood is sprinkled about, it affords some presumption that it was effused during life, as the sprinkling is probably caused by the blood being expelled from the artery in jets, which could not occur after the heart had ceased to beat; but great caution is required in drawing conclusions from such appearances. There is no chemical method of distinguishing the blood of a man from that of a woman, or that of a child from that of an adult, or that of an animal, if a mammal, from the blood of man. Menstrual blood is slightly altered from normal blood, but the differences are insignificant.

In the Guaiacum test for blood, great precautions are needed that the test liquid is fit for use, and the effect should be immediate; if the reaction only appears after an interval of time, the test is unreliable. It is unnecessary to describe this test in further detail for our purpose, and it is only

mentioned in case a witness should say he has used this method, he should be cross-examined closely as to his method of procedure and the purity of his reagents.

In the hands of a skilled person, spectrum analysis will discover the most minute trace of blood, and the results are unlike those produced by any other known substance; it is of course safer to always apply all the three kinds of tests.

Microscopical examination is also invaluable in the hands of a skilled person, but it is impossible by this means to do more than to state that the stain is mammalian blood; whether it be the blood of a human being cannot be asserted. Just as the chemical tests disclose no difference between the blood of men and animals, in like manner the microscope; with this important exception that by its means the blood of fishes, birds and reptiles can be distinguished from the blood of mammals, owing to the difference in size and shape of the red-corpuscles; even this may be of great use in the detection of crime. The witness, however, cannot say more than that the blood examined is (1) not that of a bird, a fish, or a reptile, (2) that it is the blood of a mammal, and that it (3) might be the blood of a human being. In any case no reliance could be placed on the microscopic examination of an old blood-stain, where the witness had not had large experience of this kind of microscopic work. A further test for blood is by the production by chemical methods of hæmin crystals, which may afford corroborative evidence. This is, however, very technical, and would only be useful if the witness were an expert chemist.

Self-inflicted wounds may be made from many motives, as to attempt suicide or to excite com-

passion, avoid work, to throw false charges against another person, or to divert suspicion. Often wounds may be self-inflicted where there is no apparent motive. Suicidal wounds are of course often severe or fatal, but generally self-inflicted wounds bear the following characters:—

1. They are often superficial.
2. They are usually in front of the person.
3. They are often numerous.
4. The hands are usually untouched.
5. The wounds are usually not inflicted near what may be called the mortal parts of the body.
6. The wounds on the skin do not correspond with cuts in the clothes.
7. Usually the wounds are stabs or cuts, not contused wounds.
8. In the case of self-inflicted wounds from firearms, there would be evidence that they were near wounds, such as scorching, blackening, presence of wadding, etc.

Where a person charges another with assault and wounding, and there is suspicion that the wounds were self-inflicted, all the facts must be duly weighed, but some assistance may be gathered from the following:—

1. The relative positions of the assailant and the assailed at the time of the alleged attack.
2. The situation, direction and depth of the wounds.
3. Situation and direction of marks of blood or wounds on the person or dress of either or of both assailant and assailed.

4. The marks of blood and the quantity effused at the spot where the struggle is alleged to have taken place. (Taylor.)

It is very important to remember that insane people often inflict wounds on themselves so severe and remarkable as to make it appear impossible for them to have been self-inflicted, and very serious wrongful charges of wounding may be made in such cases, unless this fact be kept in mind.

CAUSE OF DEATH AFTER WOUNDS.

Where the life and liberty of a person are at stake the cause of death must be reasonably certain, and it is often difficult, where death does not occur soon after an injury, to decide how far death might be due to the injury and how far to some latent disease. In such a case a medical witness should at once state his doubts and difficulties freely and unreservedly; if there is any reasonable doubt at all as to the cause of death, the prisoner must have the benefit of it.

Wounds may cause death:—

1. Directly, as when one dies soon after an injury without any other cause to account for it, from shock or hæmorrhage.
2. Indirectly. Wounds may cause secondary diseases, such as lock-jaw, septicæmia, erysipelas, which may prove fatal.

Wounds are directly fatal in three ways:—

1. From hæmorrhage. Either the quantity of blood lost may cause fatal syncope, or, in another way, the blood effused may interfere with some vital organ. Thus a very small quantity of blood effused on the brain may cause coma and death,

or wounds of the throat may be fatal by bleeding into the windpipe and causing death from asphyxia. These, however, are more properly deaths from mechanical causes than from hæmorrhage itself.

The amount of hæmorrhage needed to cause death varies in different people; generally young or old people or people in ill-health bear loss of blood worse than vigorous adults, women worse than men; in infants very slight bleeding may be fatal. Many persons are the subject of a constitutional peculiarity, which causes them to bleed excessively from slight cuts or injuries, and are known as "bleeders." In such persons even the hæmorrhage from a slight accidental cut or after the extraction of a tooth may be fatal. Such persons are said to be of the "hæmorrhagic diathesis" or constitution.

Loss of blood is much more fatal when the loss is sudden than when the loss is gradual. Internal hæmorrhage may prove fatal, as in the cavity of the belly after injury to the large vessels or organs, such as the liver and spleen, without any external indication to point to the cause of death. Where a body is found amidst a pool of blood it does not follow that all the blood was effused during life, for blood may continue to ooze as long as it remains liquid, but the quantity so effused is usually small unless large vessels are implicated.

2. Death may occur from mechanical injury to important organs, as in crushing of the brain, heart, lungs, liver, etc. Here death may result from hæmorrhage or frequently enough from shock alone, the hæmorrhage being only slight.

3. Death may occur from shock alone, even where the injury is too slight apparently to

account for it. Thus a person may die from a burn or scald, where the local injury is not very severe, and persons have been killed at times by a blow on the pit of the stomach so slight as to cause no bruise externally or any manifest injury internally. Similar cases are on record where death has resulted from concussion of the brain where post-mortem examination has disclosed no appreciable lesion. In railway accidents, too, the same thing may happen. In some cases also a person who has received a large number of injuries, none of themselves sufficient to cause death, may die from shock, as sometimes occurs after a fight, or after a severe flogging. A medical witness, therefore, where death occurs suddenly after the infliction of violence, and nothing is found on post-mortem examination to account for the sudden illness and death, may be justified in giving his opinion that death was due to shock caused by the effects of numerous injuries, each of which separately may have been only moderately severe. It is no excuse that a person, who dies from violence, is already suffering from a mortal disease. The question is, "Would the deceased have been likely to die at the same time and under the same circumstances had there been no violence?" (Taylor.) Where death has resulted apparently from shock, i.e., from causes too trifling in ordinary cases to account for death, and no sufficient changes are found on post-mortem examination, the medical witness, in attributing death to shock, should admit candidly that he cannot determine the cause of death with certainty and that he has formed his opinion by a process of exclusion.

Wounded persons may die from natural causes,

and great care is requisite where death has occurred after slight violence, in making certain that death was not due to some existing or latent disease, as, e.g., where a boy died after a wrestling bout, and death was found to have been due really to a strangulated hernia; or a person wounded may possibly be suffering from apoplexy, phthisis or heart disease, and die from these diseases. Then, unless it be proved that death was accelerated by the injury, and that the progress of the disease was so aggravated by the injury that death ensued earlier than it otherwise would have done, there could be no verdict of manslaughter.

Formerly there could be no charge of homicide where there was no bodily injury, as, e.g., where death had been caused by fright; but now, by the 14 and 15 Vict., c. 100, S. 4, there is no necessity to prove actual bodily injury, as by that section it is enacted that in any indictment for murder or manslaughter it shall not be necessary to set forth the manner or means by which the death of the deceased was caused. But it is doubtful whether it would still not be necessary at the trial to prove, as a matter of fact, what was the actual cause of death, i.e., that death was actually due to injuries inflicted by felonious violence, and it would be therefore necessary to show what the injuries were and in what manner they had proved fatal.

In cases where death results from wounds indirectly after a considerable interval of time, the legal responsibility remains, provided death is clearly due to the injury, and is not dependent on any other cause; if there be any reasonable doubt as to the injury having been the cause of death, the prisoner is entitled to be acquitted. In injuries to the head and spine death often occurs

unexpectedly after long periods, but the longest interval recorded between the injury and death, where a conviction has been obtained is eleven months. There can be no homicide unless death takes place within a year and a day from the injury.

After recovery from the immediate effects of a wound, pyæmia, erysipelas, tetanus, gangrene or inflammation may supervene, and may become secondary causes of death.

The secondary causes of death may be distinguished thus, according to Taylor:—

1. The cause may be unavoidable. Of this kind are tetanus, erysipelas, septicæmia, which may come on in spite of proper care and treatment.

2. The cause may have been avoidable by proper treatment. Here the medical witness might give an opinion as to how far the injury had been made serious or fatal by the effects of the treatment; if the original wound were slight and unimportant and death really resulted from the treatment adopted, probably there would be an acquittal or a very lenient punishment.

3. Comparative skill of treatment. But where death ensues after treatment conducted by ordinary skill and care there must be a conviction, even although by special skill the fatal result might have been avoided. In such cases a good defence may sometimes be set up on the ground that the surgeon has tried novel or unusual methods of treatment, and that had he followed the ordinary practice in such cases the result would have been different. Often the only defence in a prosecution for wounding may be to criticise the treatment adopted:—

1. Were the wounds made and kept properly aseptic?
2. Did blood-poisoning arise as a result of careless treatment?
3. Was any operation done?
4. If so, was it done only to save life?
5. Was there any consultation before operation or to decide whether any operation was necessary or not?
6. If in a town, and the wound itself, or the proposed operation was dangerous to life, was the assistance of a hospital surgeon obtained?

But all these points would only go towards mitigation of punishment.

4. The cause avoidable but for imprudence or neglect on the part of the wounded person. Here the person accused remains responsible unless death is wholly unconnected with the injury. "No man is authorised to place another in such a predicament as to make the preservation of his life depend merely on his own prudence." Where, however, death was very largely due to the imprudence or recklessness of the deceased, the punishment would probably be small.

5. The cause avoidable but for an abnormal or unhealthy state of the body of the wounded person. Where slight wounds prove fatal, owing to the unhealthy condition of the deceased, and where the fact of death from such wounds would ordinarily be unusual and unexpected, there could be no acquittal, but the punishment would probably be small. As before stated, the general question is, whether the violence has accelerated

death directly or indirectly. It must always be remembered that no crime varies so much in degree as manslaughter; in the one case it may be almost murder, in another it may be practically an accident.

6. Abnormal conditions of parts of the body, the abnormal conditions being unknown to the assailant, might probably alter the case. Thus in some persons the skull is abnormally thin, and a slight blow might cause death; other bones may be very brittle, as, e.g., the ribs, and might break from slight causes. In such cases probably, in the absence of evidence of malice, there would be an acquittal, or, at all events, on conviction the punishment would be small.

7. Difficulty of proof in death from secondary causes. Where death occurs after acts of violence, but the real cause of death is some fatal disease, apparently set up by the injury, more especially when there is a long interval between the injury and death, a good defence may be set up on the ground that the disease in question may occur in healthy people and quite unconnected with any violence. To rebut this the prosecution may reply that the secondary disease, although sometimes occurring naturally and without any injury, was yet unusual, and that there did not exist in the case in question any of the usual known causes of the secondary fatal disease independently of the violence or injury. It will be remembered that this question arose in the case of the man charged with the murder of the Rev. Mr. Kensit at Liverpool in the year 1904.

The commonest diseases which cause wounds to be indirectly fatal are:—

Tetanus, or lock-jaw, is supposed to be due to a microbe which thrives in dirt, and it often occurs after bruises or lacerations, even slight ones. It usually appears from the 3rd to the 10th day after the injury, but may appear three or four weeks afterwards.

Tetanus from wounds (traumatic tetanus) is usually fatal. Tetanus may also arise (idiopathic tetanus) without any wound, and where an injury is very slight and tetanus supervenes, the defence may be set up that the disease has arisen naturally and not from the injury. We must, however, remember that idiopathic tetanus is very rare, and its existence is denied by many authorities.

Fatal erysipelas may occur after slight injuries, and often follows burns, scalds, and scalp wounds. It is an acute inflammation of the skin and subcutaneous tissues tending to spread rapidly. Some people are peculiarly susceptible, and suffer again and again. Like tetanus, erysipelas may be

- (a) Traumatic, i.e., resulting from injury, or
- (b) Idiopathic or natural,

and a similar defence may be set up as in the case of tetanus, especially where, as sometimes happens, the disease attacks a part of the body far away from the wound. Erysipelas may come on at any time so long as there is any actual wound, *i.e.*, right up to the time when the wound is fully healed, but it would not be easy to satisfy a jury that a fatal acute attack of erysipelas of the face was due to a wound on the leg of old standing.

Delirium tremens often comes on after injuries to persons of alcoholic habits, whether the injury be slight or severe, and is often fatal. It often also comes on after surgical operations on

intemperate people. Where death occurs from delirium tremens after a slight injury, it may be proved that the constitution of the deceased was hopelessly bad, and that in the absence of chronic disease of the lung or kidneys and other organs, the injury would have been trifling. In such case punishment would be slight.

Death after surgical operation. Where a person dies after a surgical operation, undertaken as the best and ordinary method of treating an injury caused by violence, the prisoner will be held responsible. Severe operations are still frequently fatal, although the general adoption of aseptic and antiseptic methods of treatment has made great improvements in this respect. Where an operation is performed unnecessarily or unskilfully, and death resulted from it, probably the prisoner would be acquitted.

Where an injury has been improperly treated and an operation is required owing to such improper treatment, and the person dies after the operation, the responsibility of the prisoner ceases. Where death has followed a surgical operation undertaken after an injury the important points, therefore, to be considered are:—

1. The absolute necessity for the operation itself.
2. The competency of the operator.
3. That the wound was dangerous and likely to prove fatal without operation.

Where an honest opinion is formed by a competent person that an operation is necessary to save life, and such operation is then performed and death ensues, although it be afterwards found

that the operation was, in fact, not necessary, there can be no acquittal.

Pyæmia, i.e., septicæmia, or blood-poisoning, is a frequent consequence of wounds and injuries. It may develop in spite of all care, and may also come on independently of any injury like erysipelas or tetanus (idiopathic pyæmia).

Malpraxis. Any person acting in a medical capacity, whether duly qualified and registered or not, is bound to show reasonable skill, and if death should result owing to the gross ignorance of such person, he would be guilty of manslaughter. Where, however, an unqualified person is called to act in an emergency, as often occurs in the case of midwives, such a high degree of skill would not be expected as in the case of a properly qualified medical man; it would be sufficient in such a case to show that the accused person adopted all the usual means in ordinary cases of child-birth, and it would not be reasonable to expect a degree of skill adequate for all emergencies, or even such a degree of skill as might reasonably be expected from a duly qualified medical man. But now see the provisions of the Midwives Act, 2 Edward VII, ch. 17, 1902. In the same manner, in the treatment of a complicated injury from accident in the country, a country surgeon could not be expected to have the same amount of skill as might be met with in surgeons possessing special experience practising in large towns; it would be sufficient for him to show that he had a reasonable amount of professional knowledge, and that he had applied such knowledge with proper skill to the case before him.

Criminal malpraxis must be very gross—ignorance so serious that no person professing the ordinary

skill of his profession could be guilty of. A civil action for malpraxis might lie where a medical man has tried some novel method of treatment without the consent of the patient and damage has resulted therefrom.

ANÆSTHETICS.

When death has resulted during the administration of an anæsthetic it may be proper to enquire into all the circumstances under which the anæsthetic was given.

The usual methods of producing anæsthesia are by the inhalation of the vapours of nitrous oxide, chloroform and ether. Of these the first is by far the safest, but the anæsthesia, although very profound whilst it lasts, only continues for a very short time. Nitrous oxide is very largely used by dentists for the painless extraction of teeth, and it is the only one of the three which can safely be administered by the operator himself. In the case of chloroform and ether, the administration requires constant care and watchfulness, and should be the sole duty of one person. As a rule ether is safer than chloroform, but the vapour is very irritating, and hence it is not suitable for the very young or for the aged, who are liable to bronchial irritation. It is also very inflammable. Chloroform is apt to be fatal by its depressing action on the heart; hence whenever chloroform is administered it is proper to have at hand ready for immediate use stimulants such as ether for injection under the skin, and an electric battery. Owing to its depressing effect on the heart, chloroform should never be given unless the patient is in the recumbent position, and, if possible, it is desirable

to avoid its administration to persons known to be suffering from diseases of the heart.

Local anæsthesia may be produced by the subcutaneous injection of a solution of cocaine, and also by freezing the part with the spray of chloride of ethyl, but these need not be considered.

See table on anæsthetics in the Appendix.

ACTS INDICATING VOLITION AND LOCOMOTION AFTER INJURY.

Sometimes questions may arise after death from injuries, as to what power of volition and what power of locomotion had the deceased after the injury. Where the injury did not affect the head or limbs and was not severe, no questions can arise, but many cases are on record where persons have died hours or even days after the infliction of such severe injuries as one would have expected to have been at once fatal, and the problem to solve is as to what it was possible that such person may have been able to accomplish since the infliction of the injury. It is very difficult to give a definite opinion in cases of this kind; remarkable cases are on record which show that extreme caution is necessary before coming to a conclusion that the powers alleged are impossible. Thus persons have often walked some miles after an injury to the head, which has proved fatal within 48 hours. In such cases as these a medical witness is not confined to his own individual experience; he may be asked whether such a thing is medically possible, relying on his general professional knowledge and experience (Taylor). Persons have been known to live some time after wounds of the heart; in one case a person lived eleven days after a bullet wound of that organ. Wounds of the large arteries of the

neck (the carotids) or the jugular veins, though usually immediately fatal, may not be so, and after cuts involving division of several of these vessels, persons have been known to run twenty yards and to live perhaps half a minute. Where the wind-pipe is divided but not the vessels of the throat, the person may recover, and remember in such a case the person injured would not be able to use the voice in order to cry for help.

Ruptures of the diaphragm, liver, spleen or kidney, are all compatible with the retention of muscular power and volition; as to the length of time before which they become fatal, this depends largely on the amount of shock and hæmorrhage, and on the after-effects.

After rupture of the bladder, usually a person cannot move, but even this is not invariable, one case being recorded where a man walked a quarter of a mile and another where a man walked two miles after such an injury, which proved fatal in after days.

Where no exertion at all is made, persons may live for some minutes after injuries one would be disposed to consider certain to cause instantaneous death. Hence a body on the face may have turned over from the back and vice versâ, and in cases of fatal injury to the head automatic or reflex motions may have been performed independent of volition before death has occurred. The fact that all these things are possible should make a medical witness extremely cautious in expressing an opinion that similar results are impossible in any particular case and in swearing, after any injury, that death must have been absolutely instantaneous.

Where there has been severe struggling the question is different, for obviously although after

a severe injury there may be some slight power of moving, yet a mortal wound would be quite incompatible with severe struggling; it may be possible to say from the evidence of struggling whether a blow has been inflicted in self-defence or for the purpose of murder.

CHAPTER VII.

WOUNDS OF SPECIAL PARTS AS REGARDS THEIR DANGER AND THEIR INFLUENCE IN CAUSING DEATH.

Wounds of the head. Scalp wounds, if not deep, are usually not dangerous, unless contused or lacerated, when erysipelas may follow; but the prognosis is always uncertain, as inflammation may spread from the wound and extend to the brain and so cause death.

Persons may recover after severe wounds of the head, such as fractures of the skull; on the other hand apparently trivial injuries to the head often end fatally. A person may die suddenly two or three weeks after a blow on the head, and death may be found to have been due to an abscess of the brain due to the blow, which has caused no symptoms and no external signs of injury.

Concussion of the brain is caused by blows or falls on the head. The symptoms of concussion are injury causing faintness and unconsciousness, followed by recovery or death. Often vomiting is a sign of commencing recovery. After death no change may be found in the brain on post-mortem examination. After an injury to the head, a person may move about and go on with his usual business for one, two, or three weeks, and then suddenly die from the injury. In such cases it is always open to the defence to urge that death was due not to the injury but to some intervening cause, but the plea is not a correct one.

Concussion of the brain or even fracture of the base of the skull may take place from a fall on the feet. Concussion of the brain is often mistaken for intoxication and vice versâ, especially as stimulants are often given to revive an injured person, and hence there may be an alcoholic smell in the breath of one suffering from an injury. If there be no alcoholic smell, the presumption would of course be against intoxication. Intoxication on the other hand, may be so profound as to simulate serious brain injury, and if, as may easily be the case, it is associated with slight bruises on the head or face, the diagnosis may be very difficult. In all cases of doubt clearly the surgeon should act on the most serious hypothesis, as the true nature of the case will be disclosed after a few hours at the most. In cases where persons are taken to police-cells or hospitals, and this question arises, no harm can arise from regarding the case for a few hours as a serious one and acting accordingly, and thus the frequent scandals that arise from the deaths of people in police cells who suffered from brain injuries, and who were supposed to be only drunk, would be avoided. Clearly in all cases where a person is arrested profoundly unconscious, whether his breath smell of alcohol or not, the police should throw the responsibility of deciding as to the cause of the unconsciousness on a medical man.

Where the injuries are more severe so that blood is poured out on the surface of or into the substance of the brain, the symptoms are practically those of concussion, but the insensibility is more profound and a favourable termination much less common. The question which often arises where death occurs, is, was the injury due to a blow or a fall?

It is probably impossible to say which is true, as blows or falls on the head may both produce incised wounds of scalp. There may be great effusion of blood on the surface of the brain, and even laceration of the brain itself, without corresponding external injuries, and without any fracture of the skull. Persons so injured may improve for a time and then relapse and die owing to fresh effusion taking place. Effusion of blood on or in the brain may also be due to disease, owing to a diseased state of the blood-vessels, and it may often be a very difficult question to decide whether such an effusion is due to the injury or to the latent disease. The plea that the bleeding was due to disease often affords a good defence where death has happened after a prize-fight. When the effusion is caused by violence, it may be on the opposite surface of the brain and not immediately underneath the part struck by the blow. Usually effusions of blood from disease take place in the substance of the brain, but they may occur on the surface; when effused by violence, but the brain itself is not lacerated, the bleeding is on the surface or at the base, and not in the cerebral substance. In all cases the condition of the brain and its arteries should be carefully examined, as if the arteries are diseased, very slight blows or even a little nervous excitement might cause rupture. As a rule in effusion from violence the torn vessel may be seen, but it is not easy to distinguish spontaneous effusions from those due to violence.

Effusion of blood on the brain may occur from simple excitement or fits of temper, but this is very rare in the young and healthy; when the person assaulted is old and of intemperate habits, and generally diseased constitution, such an event is

quite common. In all cases of death from effusion on the brain following fights or struggles, the medical witness will have to express his opinion as to the probability of the effusion being due to blows or to excitement. Where a person recovers from the first effects of the injury, and eventually dies long afterwards (in one case four months), there may be a doubt as to what was the cause of death. Recent effusions are red in colour, but become brown in from a fortnight to three weeks after the injury, but it is practically impossible for a surgeon to give more than a guess at the date of an old effusion.

Wounds of the brain itself may be immediately fatal, or may be recovered from. If not fatal at once, they may be fatal later from inflammatory mischief, which may not give rise to any symptoms until a long time after the injury.

Wounds of the face are often followed by great deformity, and if deep may prove fatal by extension to the brain. Wounds of the eye sockets are very dangerous, as there is only a thin layer of bone between the orbit and the brain, which layer of bone is easily punctured by a stab with a sharp-pointed weapon. Wounds of one eye are also serious because of the danger of the sound eye becoming affected and so causing total blindness. (Sympathetic ophthalmia.)

Injuries to the spine are not often met with as regards criminal investigation, but they are very important in connection with railway accidents, concussions of the spine being a common result of a railway collision.

Fractures of the spine are not uncommon as the result of severe accidents, especially in miners from the fall of dirt or coal on their backs whilst

they are bent down at work. They are usually associated with displacement of the bones and consequent compression of the spinal cord. The result of fracture of the spine is then to cause more or less complete paralysis of sensation and motion below the level of the fracture, the degree of paralysis depending on the amount of compression of the cord. The nearer the fracture is to the skull the more fatal it becomes. Where there is any disease of the bones or ligaments of the spine slight violence may cause fracture, displacement and death. As in the case of brain injuries, where there is no fracture or compression of the cord the progress of disease may be most insidious, and death may take place quite suddenly and unexpectedly. A stab in the neck may sometimes pass between the bones of the spine and divide the spinal marrow, and so cause death. Usually after fracture of the spine, wherever situated, the person cannot walk, but where there is no displacement there are exceptions even to this.

Concussion of the spine, i.e., severe shaking of the spine without actual wound or injury of the bones of the vertebræ or any bleeding into the spinal canal or cord or any laceration of the spinal marrow may give rise to symptoms, either immediately or they may only appear many weeks after the occurrence of the injury. The latter is often the case after railway accidents.

RAILWAY ACCIDENTS.

When a person is injured in a railway collision, even although there may be no wound or fracture of bones, there often develops a very curious train of symptoms, the first of which is usually sprain

of the back and spine, produced by the person being thrown to and fro in the carriage by the violence of the collision. The whole of the spinal column may be rendered extremely sensitive and painful, so that the person is unable to bear the slightest movement. In addition to the actual sprain or other injury, there is always more or less collapse and shock, and it is peculiar that such shock after railway injuries often does not pass off easily as after other injuries, but, on the contrary, there become developed great mental depression and bodily weakness, accompanied by various forms of loss of sensation or of the power of movement in various parts of the body, affections of sight, sleeplessness, headaches and other symptoms, which are grouped together by medical men under the generic title of neurasthenia. Langour, fatigue and hysterical symptoms are marked features, and are as prominent, and more so, in males than in females. Often the symptoms of paralysis are so severe as to raise the strongest suspicions of organic disease of the brain or spine. The prospect of litigation has a very bad effect on such persons, and the hopes or the fears of the amount of compensation the person expects tend to protract the illness very considerably. As a general rule, recovery is fairly rapid after the amount of compensation is settled, but in some cases where there has apparently been no organic mischief, even the ending of all litigation and the payment of adequate compensation have no good effect, and the patient eventually develops undoubted signs of organic mischief of the spine or brain.

Formerly many of the semi-paralytic symptoms developed after railway accidents were attributed to concussion of the spine; probably as a rule the

spine suffers no more than any other part of the body in a railway accident, and it must be very rare that functional concussion, or mere shaking of the spine, without any laceration or hæmorrhage, ends in structural degeneration. When there has been concussion of the spine from a railway accident it must be remembered that there must have been more or less concussion also of the brain, and it has been suggested that the term "railway brain" would be more appropriate than "railway spine."

When these cases come on for trial there is often the greatest diversity of views expressed by the medical witnesses called as experts on each side, not so much as to the actual present condition of the person but as to the length of time which will elapse before complete recovery will take place, one witness perhaps expressing an opinion that recovery will be a matter of years, whilst another will regard it as a matter of weeks or at most of months. If there be no incipient organic disease, so that it may be taken that recovery is practically certain, it will generally be found that the shorter estimates are very much more likely to turn out to be the true ones, and there can be no doubt that the amount of damages awarded by juries in these cases usually err largely on the side of liberality to the plaintiff.

Wounds of the chest-wall are not usually dangerous unless the ribs or sternum are injured. In such cases the broken bones may cause profuse bleeding into the chest and also lacerate the lungs and pleura, and so set up inflammation of the lungs and pleurisy. Fractures of the upper ribs are more dangerous than fractures of the lower ribs only because more violence is needed to break

them. In wounds which penetrate the chest, the lungs, the heart or large vessels, or the gullet may all be injured. A large artery (the intercostal artery) runs along the lower surface of each rib, and fracture of the rib may cause laceration of the artery and fatal bleeding into the cavity of the chest without any injury to the lung itself.

In wounds of the lungs the chief primary danger is hæmorrhage, and the danger is all the greater as the bleeding may be into the cavity of the chest and no blood may escape externally; hence the hæmorrhage may not be suspected at first, and even if suspected it will probably be impossible to arrest it. Whenever a person is apparently recovering from a wound of the chest and then dies owing to some recklessness or imprudence on his part, such circumstances might help to lessen the punishment inflicted on the assailant.

The lungs may be torn and hæmorrhage take place from external injury without fracture of the ribs. Injuries to the lungs may be followed by pneumonia, pleurisy or abscess.

Wounds of the heart are almost invariably rapidly fatal, but in some cases, where the wound has not reached to the cavities and has penetrated obliquely, death may be delayed for some days.

Rupture of the heart may occur from disease or accident, and cause rapid death. It may occur from blows or falls, and may be unaccompanied by marks of external violence or any fracture of the ribs or sternum. The natural causes of rupture are violent mental emotions, or violent physical exertion in constrained position. When the organ is in a condition of fatty degeneration, which may occur and exist without any signs or symptoms to make the disease suspected, any slight excitement

or exertion may prove fatal; in fact fatty degeneration of the heart is a common cause of the sudden deaths of elderly people. After attacks of rheumatism the heart is often more or less diseased, and in cases of rheumatic fever the heart symptoms may precede the joint symptoms. It is said that it is possible for a person to have an attack of rheumatic fever without any affection of the joints, the whole activity of the morbid process being concentrated on the heart. In such a case any over-exertion or strain may prove fatal to one apparently in good health.

Wounds of the large arteries and veins are usually fatal from profuse hæmorrhage before any assistance can be rendered. Sometimes bleeding from a small vessel may be fatal if the rent be concealed and the bleeding be internal, or if the bleeding is allowed to go on for several hours without proper treatment to arrest it.

Sudden death may also occur where air gets into a wounded vein, especially where the vein wounded is about the neck or top of the chest. In these cases the bubble of air destroys life by passing into the circulation and interfering with the function of the heart and lungs.

Wounds of the midriff or diaphragm cannot usually occur without implication of other important organs in its vicinity as, e.g., the lungs on the upper side, the liver, stomach and spleen on the lower. Some cases are recorded where the diaphragm has been injured and torn, and death has been caused indirectly by the passage of coils of the bowels through the injured portion and the formation of a strangulated hernia, the coils of intestine being squeezed in the rent so that the passage of fæces is prevented and the circulation

in the bowel arrested. When the stomach and bowels are distended violent falls on the belly may rupture the fibres of the diaphragm; in such cases, if the rupture be large, death may be immediate, but one case is recorded where the person lived nine months after the injury, and eventually died from another cause.

Wounds of the abdominal walls may be dangerous from bleeding, or later from suppurative inflammation in the abdominal muscles extending to the peritoneum and causing septic peritonitis; in the latter case, the suppuration may be due to improper treatment or negligence, and in the case of death such negligence, etc., may be proved on behalf of the defence in mitigation of punishment.

Even after recovery from a wound of the abdominal wall, such weakness may be left that the bowels push the wall of the abdomen before them and form a ventral hernia.

Contusions of the abdominal wall are still more dangerous. As before mentioned, a blow on the pit of the stomach may cause death instantaneously—even a blow so slight as to cause no bruising of the skin externally, or to produce any marks internally discoverable on post-mortem examination. In such cases death is supposed to be due to the effect of the blow being transmitted to the brain by means of a mass of nerves or a nerve-centre situated at the pit of the stomach called the solar plexus. Blows on the abdominal wall may also cause peritonitis, which may be fatal or may be recovered from. But, as before stated, violence to the belly-wall is not always accompanied with ecchymosis or abrasion of the skin, and the organs in the abdomen may be fatally injured by blows, kicks, or falls without any

discolouration of the skin itself. On the other hand, effusions of blood in the sheaths of the abdominal muscles may be due to natural causes; probably a blow sufficient to produce such an effusion would be accompanied by ecchymosis or bruising.

The liver and spleen are often ruptured by violence or by blows or falls, but it is said the liver may also be lacerated by a fall on the feet from a height. The blood effused after these injuries gravitates down towards the pelvis and the lower part of the cavity of the peritoneum. Usually ruptures of the liver are fatal within a few hours, but one case is recorded where the person survived eight years. Ruptures of the liver may take place from violence applied to the chest, without any marks of violence in the region of the liver.

Wounds of the gall bladder are attended with effusion of bile into the peritoneal cavity and may set up fatal peritonitis.

The spleen is a very vascular organ, and a slight degree of violence may be sufficient to cause a rupture without leaving any mark externally. A rupture of the spleen, owing to its vascularity, would always be a grave and almost certainly a fatal injury.

Rupture of the kidneys from violence is very rare; they are situated well back in the hollow of the loins and are largely out of the way of injury either accidental or intentional. A ruptured kidney is not inconsistent with a power of muscular exertion and locomotion or with the excretion of the urine.

Ruptures of the intestines may occur from disease; hence whenever a rupture is found which is said to have been produced from injury, all the

ruptured portion of the bowels should be carefully examined for indications of softening or ulceration from disease, as the defence may be set up that the rupture was due to natural causes. If there be no ulceration or softening, the rupture must have been due to the injury, but if some evidence of disease be found, then this may have predisposed to the rupture, even if it has not actually and solely caused it. Ruptures of the intestines may occur from a slight cause; and sometimes a person so injured may be able to walk about and dangerous symptoms may not come on for 24 to 48 hours. One common cause of intestinal ulceration, which may be suddenly and unexpectedly fatal from rupture of the bowel is latent typhoid fever, which may in some cases go on to the extent of dangerous ulceration of the bowels without any constitutional symptoms severe enough to keep the person in bed or even to desist from work. In such a case there would be more than one ulcer and other signs of typhoid fever would be present in other portions of the gut.

Wounds and ruptures of the stomach from violence are rare, but may cause death speedily by shock. Perforation of the stomach may occur from violence or naturally in cases where there has been previous ulceration—in fact, perforation of a gastric or stomach-ulcer is probably one of the commonest causes of sudden death in young females. In rupture from violence there may be no mark of external injury, and the injured person may be able to move about.

Ruptures of the bladder are very uncommon, except as the result of falls or blows on the lower part of the abdomen when the bladder is distended. When undistended the bladder lies in the pelvis,

and is well protected from injury. When distended it rises up in the belly, and may be felt like a hard ball just above the pelvic bones. In some cases rupture may proceed from over-distension alone, but this is very rare. In the only cases where this effect would appear probable, viz., in cases of stricture of the urethra in males attended with complete retention of urine and consequent distension of the bladder, the rupture is usually not in the bladder itself, but in the portion of the urethra immediately behind the stricture; the urethra being the channel to carry away the water, and extending from the bladder to the end of the penis.

Rupture of the bladder, when it does occur, is usually in the upper and back part, and the result is that urine is effused into the peritoneal cavity and death occurs from peritonitis. If the rupture be lower down, and the urine finds its way into the cellular tissue outside the peritoneum, there is more hope of recovery. Death occurs usually within a week, and may occur suddenly from shock. Blows causing rupture of the bladder rarely cause any external marks, "owing to the yielding and elastic nature of the parietes of the abdomen." When, however, the bladder is not distended, it is difficult to imagine how a blow or kick could rupture it at all, unless the blow were so violent as to press right down into the pelvis, in which case one would also expect to find marks of ecchymosis on the skin.

Spontaneous rupture, as before stated, is very rare, but it may occur (1) where the person suffers from some form of paralysis attended with loss of sensation, and hence has no feeling that the bladder is becoming distended, and (2) where the bladder

itself is ulcerated or diseased. In pregnant women rupture of the bladder may occur from an accidental fall or from the pressure of the child's head during child-birth, where care has not been taken to guard against over-distension by the timely use of the catheter. Usually after rupture of the bladder there is intense pain and shock, and retention of urine, but occasionally persons so affected retain the power of exertion and motion. In gunshot wounds of the bladder, the effusion may not occur until the tissues killed by the bullet begin to slough and separate, and consequently fatal symptoms may not appear until much later than in ordinary cases. Rupture of the bladder is commonly caused by drunken fights when the bladder is distended, as is often the case in the intemperate beer-drinker.

The uterus is not often injured, unless pregnant; if pregnant, kicks or blows may cause hæmorrhage and abortion or possibly death.

Wounds of the genital organs may be fatal from hæmorrhage in females, whose genital organs are exceedingly vascular. Deep incised wounds on the genital organs are strongly presumptive of deliberate malice on the part of an assailant. Such wounds may however arise, especially in women, from the breaking of earthenware chamber utensils; self mutilation and castration are common amongst male lunatics. Contused wounds of the female genitals may prove fatal from laceration of the parts and consequent hæmorrhage. Kicks and blows on the genitals, if fatal at all, are fatal from hæmorrhage, and kicks inflicted after death would not, as may be suggested in defence, produce such an amount of effusion as would account for death.

FRACTURES OF BONES

occur from falls, blows, or from muscular action, and take place more readily in the old than the young and in the young than the adult. In old age the bones often become very brittle and fracture from slight injury. The bones also become very brittle from syphilis, scurvy, rickets, cancer, and in insane persons. In some apparently healthy persons also the bones are very brittle. Sometimes the bones of the skull are abnormally thin, so that a slight amount of violence may be enough to cause a fatal fracture. In addition to the above abnormalities there may be in some cases a natural thinning of the outer table of the skull, which may give the appearance of a depression caused by a fracture.

The elbow, the heel-bone, and the knee-pan may all be broken by sudden and violent muscular exertion; more rarely the humerus or thigh-bone may be broken in the same way. Even the ribs have been known to be fractured by muscular exertion. Fractures are of four kinds, viz.:—

1. Simple. Where the bone is broken but there is no skin-wound.
2. Compound. Where the skin is broken as well as the bone; in many cases the end of the broken bone may project through the skin.
3. Complicated. Where the end of the broken bone is injuring some internal organ, as e.g., the brain may be injured by a fractured skull, the lung by the end of a broken rib.

4. Comminuted. Where a bone is not only broken, but is crushed into several pieces, the fracture is said to be comminuted.

As a rule a simple fracture with ordinary care is not dangerous; in very rare cases little plugs of fat (fatty embolism) from the seat of fracture may unexpectedly get into the circulation and so cause sudden death, but generally speaking a cure for a simple fracture is only a question of time. In some cases either on account of careless treatment, or even in spite of careful treatment, a fractured bone fails to unite (un-united fracture), and various kinds of special treatment may then have to be adopted.

Compound fractures are always more or less dangerous from the risk of septicæmia, erysipelas, or tetanus, especially in people of advanced years or those whose constitutions are enfeebled by overwork or intemperate habits; in the latter class delirium tremens of a fatal kind is very apt to follow any kind of injury.

A fracture produced soon after death would bear all the same characters as one produced shortly before death, except that probably in the latter case there would be more hæmorrhage.

If produced about ten hours before death, there would be an effusion of blood between the ends of the bones with more or less injury to the muscles; if produced longer still before death signs of inflammation would be present; thus if the person had lived 24 hours after the accident, some inflammatory lymph would be poured out round the broken parts. If the person survive longer, soft new tissue (callus) is formed which gradually hardens into the new bone. According to the

character and density of the "callus," it is possible to make a guess as to the time which has elapsed since the fracture, but as the process of repair varies greatly according to the age and constitution of the patient and many other circumstances, no precise opinion can be given. Generally a simple fracture of the thigh-bone will unite in about six to eight weeks, of the leg five to six weeks, of the upper arm four to six weeks, and the fore-arm three to five weeks. Fractured ribs usually unite in about four to six weeks, but union may be delayed for two months. As before stated, in all fractures union may sometimes be delayed for many weeks or may fail altogether. This is especially the case where the bones are not kept absolutely fixed during the process of repair. If a bone has once been fractured, it rarely unites so evenly that the seat of fracture may not be detected by touch or sight. A person with a broken arm or ribs can move about, although probably the pain would be too acute to allow of any severe exertion; in fractures of the thigh locomotion is impossible, but after fractures of the tibia or fibula, without much displacement of the bone, and especially when only the latter bone is broken, persons have sometimes been known to walk considerable distances.

DISLOCATIONS

are common in the young and adults, but not so common in the aged or where from any reason the bones have become brittle. Like fractures, dislocations may be simple or compound; in the latter case only are they usually dangerous. Dislocation may occur naturally from disease of the joints and

sometimes from violent muscular spasm, as in an epileptic convulsion. Where a limb is dislocated, movement or exertion with it is impossible. Dislocations rarely become the subject of medico-legal enquiries. Some fractures closely resemble dislocations, as e.g., fractures of the upper end of the humerus or femur resemble closely dislocation of the shoulder and hip respectively. In all cases both of fracture and dislocation, there may be some slight permanent deformity or impairment of function, even with the most skilful treatment, and if excessive the deformity or impaired power of moving may expose the surgeon to an action for malpraxis. As a rule a dislocation is readily reduced if seen soon after the injury, but if the surgeon allows days to elapse before the dislocation is discovered, great difficulty may be found in getting the bone into its proper place, and considerable violence may require to be used in the effort.

GUNSHOT WOUNDS

have special characteristics and require special consideration. Wounds of this kind are contused wounds, and they have in addition to the usual dangers of contused wounds a further liability to destroy the tissues with which they come in contact, and so set up local mortification. Death may take place (a) immediately, from (1) shock, (2) hæmorrhage, (3) where they penetrate one of the large cavities of the body, as e.g., the skull, from actual injury to the organs therein; or (b) indirectly and after an interval of time from the effects of septicæmia, gangrene, erysipelas, etc., or from the effects of an operation which may have become imperative to save life. In many cases of

death from gunshot wounds death after the legal limit of a year and a day from the date of the injury, beyond which there can be no charge of homicide, is much exceeded.

It is by no means easy to detect whether a bullet wound was inflicted before or after death, unless some vessel is injured, when there would be effusion of blood. In the dead body, no effusion of blood would be found in the absence of injury to some large vessel.

The characters of gunshot wounds differ where the gun is fired close to the body, and where it is fired from a distance. In the first case, the edges of the wound are lacerated and generally blackened, the skin is bruised round the aperture made by the bullet and is discoloured by the powder; the clothes in the neighbourhood of the wound are blackened and sometimes set on fire. The signs of blackening will be absent if one of the new smokeless explosives be used. The bullet may have passed through the body, in which case there will be two apertures, one of entrance and one of exit. The bleeding from a gunshot wound is generally slight, and is commoner at the aperture of exit than at that of entrance. The aperture of entrance may be round, or if the bullet strike the surface obliquely it may be oval or valvular. As a rule, the aperture of exit will be larger and more lacerated than that of entrance. In the second case, viz., where a bullet is fired at a distance, the aperture of entrance will be round or oval and well-defined, the skin depressed, the edges faintly bruised; there will be no blackening or burning or signs of bleeding in the surrounding parts. If there be an orifice of exit, it will be large and irregular, with the edges everted and the skin

torn; usually the orifice of exit will be three or four times as large as the orifice of entrance.

If the bullet can be found, it should be carefully preserved for production at the trial, both for comparison with other bullets which may be found on the accused person, and also in order to see if it fit the weapon which is supposed to have caused the injury.

The hole in the dress or clothes of the person may present the same characteristics as the wound in the skin; sometimes pieces of the dress may be carried into the wound.

Usually a bullet fired close to the body will pass through it, but this is not always the case, bullets shot into the mouth being often found lodged somewhere within the skull.

The bullet may sometimes cause several wounds by splitting in the body against a bone. Hence it is impossible to say that from the fact that there are several wounds there must have been several discharges. It is impossible also to say that a bullet must have been fired from a distance merely because it has lodged in the body instead of passing through.

In some cases of reported death from a gunshot wound, the bullet may not be found, but the discovery of the bullet, although highly desirable, would not be absolutely necessary to prove that death was due to a gunshot wound if the other evidence were satisfactory. It must be remembered that the course of a bullet in the body may be sometimes deflected very remarkably, and that it may be found in positions where nobody could have expected to find it.

Like all other wounds, gunshot wounds do not show any changes for a few hours, and hence it

may be impossible to say at what time the wound was inflicted or how long the injured person survived it. Even if severe bleeding be found, it may have been caused not by the bullet itself, but by the attempts of the wounded person to move.

As regards the question of suicide or homicide :—

- | 1. Suicidal Wounds. | Homicidal Wounds. |
|--|---|
| Usually directed to a vital part. | May be fired at any part. |
| 2. Have the characters of wounds inflicted near the body. | Wound inflicted from a distance. |
| 3. Hand which fired the pistol often blackened. | Hand not blackened. |
| 4. Weapon may be grasped in the hand when the body is found. | This could not be imitated by a murderer. |
| 5. Ball may or may not have passed through the body. | Usually bullet found in the body. |
| 6. Aperture of entrance seldom at the back of the body. | May be anywhere. |
| 7. Evidence of design. | |
| 8. The suicide usually only fires one shot. | |

Accidental gunshot wounds have the following characters :—

1. Usually the wounds have the appearances of wounds inflicted from a short distance.

2. Often do not touch vital parts, or, if they do, other circumstances will show want of design, or will indicate how in all probability the accident happened.
3. If the wound be in the back, it cannot be accidental if it were fired by the person injured himself.

Further evidence on these points may be obtained by considering the position of the body and the weapon when found.

DEATH FROM SMALL SHOT.

1. If discharged near the body, it may strike without spreading, and so produce extensive lacerations.
2. If discharged at a distance, it spreads before striking, and so does much less injury.
3. Probably no rules can be deduced from the different appearances of the wounds of entrance and exit in the case of small-shot.
4. It is rare for small shot to traverse the body, unless discharged very near to the body.
5. A single pellet may, of course, destroy life if it reaches a vital part.

A gun loaded only with wadding or even with gun-powder may cause a fatal wound, either immediately from bleeding, or later from septi-cæmia or tetanus, etc.

Sometimes approximate conclusions as to the time when a weapon was fired may be derived from an examination of the deposit on the interior of the barrel of the weapon. (Guy and Ferrier, p. 360.)

It is said that sometimes an assailant may be identified by the flash of light produced by the discharge of the gun or pistol, and cases are on record both in this country and abroad where such evidence has been tendered and received, and has assisted in the conviction of prisoners. Such evidence should be received with very great suspicion and caution.

BURNS AND SCALDS.

A burn is the injury produced by the application of dry heat to the surface of the body.

A scald is the injury produced by hot or boiling liquids and steam.

The effects of both on the body are similar, and the effects of scalds from molten metals or boiling oils could not be distinguished from burns; it is, however, at times important to distinguish scalds from boiling water from burns, as the scald might be accidental, or the burn criminal or vice versâ.

The differences in such a case would be:—

Scald.	Burn.
1. Sodden state of skin.	Parts destroyed or charred.
2. No destruction of substance.	Cuticle blackened dry and shrivelled.

Burns are usually divided into six degrees of severity:—

1. Where there is redness of the skin without blistering.
2. Severe inflammation of skin with formation of blisters.

3. Superficial part of skin destroyed, yellow or brown patches; after healing a scar is left.
4. Skin all destroyed down to cellular tissue beneath, eschars or pieces of dead skin, which loosen.
- 5 and 6. Skin, tissue and muscles all involved and killed.

If the person survive, the eschars, or dead portions of tissue all slowly separate, with great inflammation and suppuration. The dangers of a burn to life depend not so much on the severity of the burn as on the extent of surface involved, even superficial burns being highly dangerous where a large portion of the body is involved.

Neither a burn nor a scald comes within the legal definition of a wound, but both are by statute included among the bodily injuries dangerous to life.

Burns and scalds are very fatal in children, and in some cases, when severe, they may be accompanied by stupor or coma. As opium is often given for the purpose of relieving pain, and as children are at all times extremely susceptible to the influence of the drug, where death occurs from stupor after a burn it may be alleged that the death is the result of narcotic poisoning and not of the burn.

Death may take place from shock to the nervous system, or from the violent inflammation set up later by the separation of the destroyed tissues. In large fires, death may be the result of suffocation from the want of proper air or the presence of carbonic acid and other products of combustion.

The post-mortem appearances after death

from burning are various, the chief question of medico-legal interest being as to whether the burning took place before or after death, as the body may be burnt by a murderer after death either for the purpose of destroying it, or the clothes may be set on fire in order to conceal wounds or other injuries, and to give the impression that death has been caused by accidental burning. It has already been pointed out that in infanticide it is not uncommon to attempt to destroy the body in this way.

If vesication or blistering be present, we get valuable indications that the burning took place during life, but, unfortunately, vesication is only common in scalds from boiling water. The time of appearance of vesication after the injury varies from a few minutes to several hours. Blisters may be produced after death, but in this case they are found to contain air instead of liquid serum, except in the case of persons suffering from dropsy, when it is said blisters may be produced at almost any time after death filled with serum just like blisters produced during life. Many experiments on this subject have been performed, and the general results are as follows:—

1. Blisters may be produced both on dead and living bodies.
2. They require a higher temperature to produce them on the dead than on the living.
3. In the living, the serum effused is highly albuminous and forms a firm clot on treatment with nitric acid; in the dead the serum is thin and watery, and only becomes a little milky on treatment with heat or nitric acid.

In burns, there is usually a white line of skin surrounding the burnt portion, and outside this is a deep-red line, gradually shading off into the surrounding skin, but this is not invariable; hence its absence is no proof of the burn having been produced after death.

If soot be found in the larynx or trachea, it is probable that respiration occurred after exposure to fire. When several burns are found on the same body it may sometimes be possible to say by the difference in their appearances as to inflammation suppuration, sloughing, etc., as to whether they were all inflicted at the same time, and it may also be possible to say approximately from the appearance of the burn how long the person survived the injury.

Burns are very rarely suicidal; sometimes they are homicidal, but generally they are accidental. There would be suspicion of homicide:—

1. If several parts of the body are burnt at the same time, and the burns are such as could not be readily explained as the result of the accident.
2. There are other marks of violence on the body.

Burns by strong acids or alkalies, etc., now come within 24 and 25 Vict., c. 100, s. 29, which enacts *inter alia* that any person throwing any corrosive fluid or any destructive substance with intent to disfigure or disable or do grievous bodily harm shall be liable to penal servitude for life or to imprisonment. Formerly prisoners sometimes escaped on the ground that injuries so inflicted were not wounds. These injuries may be distinguished from ordinary burns and scalds (1) by the description of the first symptoms, and (2) the

destroyed part or eschar is soft and not dry as in a burn; (3) the destroyed skin sloughs away just to the extent of the part touched, and there is no redness of the skin near the injury; (4) the nature of the stain produced may indicate the liquid employed, thus nitric acid produces yellow stains, sulphuric acid dark-brown stains. Stains of the liquid will probably also be found on the clothes or the furniture of the room. In some cases probably, the only question for a witness will be as to whether the liquid used comes within the designation of a "corrosive liquid or destructive substance."

It is not necessary to constitute this felony that the person thrown at should be actually injured, the mere throwing with intent being sufficient.

Unless the injured person has survived long enough for signs of inflammatory reaction to develop, it is not possible to say whether the corrosive liquid was thrown on the body before or after death.

It is unnecessary to devote any space or time to the subject of spontaneous combustion, such an occurrence being absolutely unauthenticated and in the highest degree improbable. Sometimes in the case of corpulent people, especially those who are addicted to habits of intemperance, there may occur an unusual combustibility, it is said, so that if the clothes or bed-furniture happen to get on fire, the body may be quite consumed without any other fuel. But even these cases are rare, and they in their turn are quite different from the spontaneous combustion, which was formerly suggested as an explanation of some mysterious cases where persons had been burnt to death without apparent exposure to fire.

CHAPTER VIII.

POISONS.

There are many definitions of a poison, none of them quite satisfactory. Generally we may say that any substance which when absorbed into the body in any way, in small quantity, is dangerous to life or at the least is injurious to health, is a poison. Poisons in the great majority of cases are swallowed, but sometimes they are injected under the skin or inserted into the rectum or the vagina, or they may be inhaled into the lungs.

The difference between a medicine and a poison is one of degree; most poisons are useful medicines in small doses and most medicines are more or less poisonous in large doses. A "deadly poison" is one which is either (1) fatal in a small dose or (2) kills very rapidly in a large dose.

"A poison is a substance which either by its direct action upon the skin or mucous membrane or after absorption into the blood, is capable of injuriously affecting health or destroying life" (Luff).

Some substances, such as the strong acids and alkalies, are included amongst the poisons, although they never become absorbed into the body. Such substances produce fatal results by local destruction of the tissues in the same manner as destruction of the tissues by burns.

The sale of poisons in this country is regulated by the Pharmacy Act, 1868, 31 and 32 Vict. c. 121, which enacts that all persons selling or compounding poisons must be qualified, and then schedules poisons under two heads:—

1. The seller must register the sale, and enter in a book the name and address of the purchaser, and the object for which the substance is being bought. Amongst this head are included arsenic, prussic acid, cyanide of potassium and cyanides generally, strychnine, atropine, aconite, tartar emetic, corrosive sublimate, cantharides, savin and ergot of rye.
2. The seller need not register the sale, but the bottle or parcel containing the substance must be labelled with the word "Poison," and have on it also the name and address of the seller. Amongst this class are included oxalic acid, chloroform, chloral, white and red precipitate, belladonna, nux vomica, opium and its preparations, etc.

"Whosoever shall administer, or cause to be administered to or taken by any person, any poison or other destructive thing, with intent to commit murder, shall be guilty of felony." 24 and 25 Vict., c. 100, s. 14. If death do not ensue, the prisoner may still be convicted of an attempt to murder by poison. By the offences against the Person Act, 1861 (24 and 25 Vict., c. 100, s. 15), it is made a felony to attempt to commit murder "by any other means than those previously specified," and hence these sections include attempts to murder by the

application of poisons to external sores, etc. The same section includes also all attempts to administer chloroform, laudanum or other stupefying drugs in order to enable a person to commit a felony.

Poisons may be administered merely to annoy or injure, but not with intent to murder. Hence it is provided by the 24 and 25 Vict., ch. 100, as follows:—

Section 23. Whosoever shall unlawfully and maliciously administer to, or cause to be administered to, or taken by any other person, any poison or other destructive or noxious thing, so as thereby to inflict on such person any grievous bodily harm shall be guilty of felony.

Section 24. Whosoever shall unlawfully and maliciously administer to, or cause to be administered to, or taken by any other person, any poison or other destructive or noxious thing with intent to injure, aggrieve or annoy such person, shall be guilty of a misdemeanour.

Section 25 enacts that if the jury are not satisfied that a person, if guilty of the felony in Section 23, they may still find the prisoner guilty of the misdemeanour charged in Section 24.

Hence a medical witness must always prove that the drug administered is either a "poison" or a "noxious" thing.

What is a destructive or noxious thing is a question of fact.

In criminal law the intent with which a poison is administered is the most important point, neither the kind of poison nor the dose being very material except in so far as they may give rise to presumptions as to the intent or motive with which the poison was given.

If a poison be given with intent to murder, the mere fact that the amount given was insufficient to cause death would be no excuse, nor would it be any excuse if the poison in the same case were given in such a form that it could not exert any poisonous action as the intent would be there all the same.

Mechanical irritants as powdered glass, iron filings, pins, needles, etc., would all come under the designation of destructive things.

The mode of action of poisons may be :—

I. Local, shown by

- (a) Corrosion, as where nitric acid or strong alkalies are taken.
- (b) Inflammation, as where arsenic or antimony is taken.
- (c) Effect on the nerves locally, as where sensibility to pain is lost in a part to which cocaine is applied.

II. Remote, effects may be

- (a) Reflex, as where strong local corrosion may cause shock and syncope by reflex action on the heart.
- (b) Specific, which includes the specialisation of different poisons on different parts of the body, as where opium produces stupor and coma, belladonna produces delirium, lead poisoning produces paralysis, etc.

(G. and F.)

It is important to know that many of the best marked symptoms of poisoning are also well-known symptoms in various diseases. In order to produce their specific effects, poisons must be absorbed into

the circulation and so get carried by the blood to the parts they affect. As a rule the rapidity of action of poisons is directly in proportion to the rapidity with which they are absorbed; hence they usually act quicker if injected into a vein or under the skin than if swallowed into the stomach, and in such circumstances they are usually fatal in smaller doses.

The action of poisons is modified by:—

1. Their quantity. Generally the larger the dose, the more severe and fatal the symptoms. Some poisons, however, in large doses act as emetics (i.e., they produce vomiting) when swallowed, and so are vomited up and never get absorbed, whereas in smaller doses they are retained and so can exert their specific poisonous action.

2. Form. Liquids act quicker than solids, as they are more quickly absorbed, and all mixtures rendering a poison more soluble increase the rapidity of its action.

3. The part to which the poison is applied. Poisons act quickest when inserted into a vein or a wound, or under the skin, or sometimes when inhaled by the lungs; more slowly when swallowed; slowest or not at all when applied to the unbroken skin.

4. The condition of the body itself.

- (a) Age. Children are remarkably susceptible to some poisons, as opium, whilst of others, as e.g., belladonna, they can take comparatively large doses with impunity.

- (b) Habit diminishes the effect of some poisons. Thus habitual takers of opium take large quantities without fatal effects; the diminished influence of poisons owing to habit chiefly belongs to organic poisons, i.e., to those obtained from the vegetable world, as opium and tobacco, and is very limited in the case of mineral substances. It is said that tolerance may be acquired by the constant use of arsenic, and the Styrians are said to take this poison regularly for the purpose of improving their appearance. Even in the case of arsenic, however, the result is usually the opposite of this, and long continued use demands a constant diminution of the dose. Even where tolerance has been acquired, it is established that the long continued use of such substances is liable to impair health and cause disease.
- (c) Idiosyncrasy. Some people are much more severely and easily affected by certain poisons than others owing to a latent or unsuspected peculiarity in the constitution of the individual. Thus some persons are poisoned by taking shell-fish, some by eating mushrooms. Such persons do not get rid of their susceptibility by long-continued dosing, unlike the tolerance established in ordinary persons by habit.
- (d) Age. Where the vital powers are enfeebled by age, there is increased susceptibility to poisons.

- (e) Disease usually renders the body less susceptible, but the effects of disease on the influence of different poisons are so variable that no general conclusions can be drawn, e.g., persons suffering from chronic disease of the kidneys are very susceptible to some poisons, as mercury and opium.
- (f) Sleep. During sleep all the bodily functions are more or less suspended, and consequently poisons administered during sleep act less quickly than during the waking condition.

CLASSIFICATION OF POISONS.

I. Inorganic poisons are either :—

(a) Corrosive or (b) irritant.

II. Organic poisons may be :—

(a) Irritants.

(b) Having specific actions on remote organs.

The corrosive and the inorganic and organic irritant poisons are dangerous either (1) from their local action, or (2) from the local action causing shock and collapse by reflex action, whereas the other poisons are dangerous from their remote specific action, and must be absorbed into the blood, before they can do any harm.

Irritant poisons, both inorganic and organic, cause violent vomiting and purging with pain in the belly, while corrosive poisons in addition cause local destruction of tissues. If diluted, corrosive poisons may cause all the symptoms of irritant poisoning without corrosion. Usually corrosives act more rapidly than mere irritants.

Class (b) of the organic poisons may be called generally the neurotic poisons, as they act on the nervous system causing stupor, delirium, paralysis or convulsions, and only rarely causing vomiting and purging.

Whilst this classification is useful, it must be remembered that the substances in each class sometimes act in an unusual and unexpected way, irritants sometimes affecting the brain, and neurotics sometimes causing pain and vomiting like irritants. Some poisons also have a complicated action, causing at first vomiting and pain, and later on stupor, paralysis or convulsions.

EVIDENCE OF POISONING.

Where a person is still living and obviously suffering from illness, what are the indications which would lead one to suspect that the illness was due to poison?

1. The symptoms appear suddenly, usually in a person in good health at the time.

Many poisons begin to act within a few minutes after being swallowed, as strychnine and prussic acid; arsenic and other irritants begin to act in about half an hour. Poisonous foods may act quickly, or on the other hand symptoms may not show themselves for several hours. Some diseases, as before stated, lessen the influence of some poisons, for example large doses of opium may be safely taken in cases of dysentery, lock-jaw, and other diseases; on the other hand, some diseases cause increased susceptibility to poisons, for example small doses of opium may be fatal where there is chronic Bright's disease or a tendency to apoplexy, and persons suffering from chronic in-

inflammations of the stomach and bowels are very susceptible to the influence of irritants like arsenic and antimony.

Usually the person poisoned is in good health, but poisons may be given in medicine or food to those already ill; in such cases suspicion might only arise in the case of an unexpected exacerbation or an entire change in the character of the symptoms. One must always remember also that there are many diseases which have a sudden onset without apparent cause, and these must be eliminated before a diagnosis of poison is made. Thus an attack of acute colic with vomiting and severe pain may simulate an attack of inflammation from poison.

2. The symptoms appear soon after a meal or after food or drink or medicine has been taken.

This is a most important indication, the symptoms of poisoning usually appearing within an hour after the poison has been swallowed. In rare cases the poison may be administered per rectum or per vaginam, or, as in the case of chloroform, by the lungs, and such methods must be kept in mind; but in the great majority of cases the poison is swallowed mixed with food or liquids or medicine.

3. Where several people partake at the same time of the same food or medicine, and all suffer from similar symptoms.

This is a most valuable indication where it exists, as it is very improbable that several people would be attacked in the same way at the same time by ordinary illness. It does not follow, of course, that all who partake of the suspected food will suffer in an equal degree; as a rule those who have partaken most freely will suffer most; if, however,

some have partaken so freely that the poison has caused copious vomiting they may suffer less than those who have partaken more sparingly and have retained the whole in the stomach.

Without any admixture of poison, it is well known that some foods may become poisonous, as in the case of pork-pies and tinned foods, and that such foods may be poisonous although persons have eaten from the same dish a few hours previously with impunity. In such cases peculiar fermentative and bacterial changes take place in the food, resulting in the presence of noxious compounds called "ptomaines" in the system and consequent ptomaine poisoning.

5. The rapid course of the symptoms to a fatal termination is very common in poisoning, but it is also common in many diseases, so that too much value should not be attached to this point.

6. The discovery of poison in the food eaten or drunk, or in the matters vomited, or in the excretions, as in the urine. If it is possible to examine portions of the food, all the matters vomited, and the urine, and after thorough examination no poison is found, then probably death is due to natural causes.

Poisoning may sometimes be feigned or may be imputed. Persons may put poison into food, but it is seldom they venture to swallow the food themselves. Therefore, although poison be found in food and in vomited matters, it does not follow that the poison has ever been in the stomach, unless the witness actually sees the matters vomited, as the poisons may have been put into the vomited matter after it had been ejected. The

same observation would apply to the urine unless the witness saw it actually voided.

When the person is already dead, in addition to the indications acquired from the circumstances already described, there will be the following further means of forming an opinion:—

1. The time at which death takes place after the symptoms first occurred. Usually poisons in fatal cases cause death within a definite period, and from this point alone a suspicion of poisoning may sometimes be negatived. But there are also large variations in the time in which death is caused by different poisons in fatal doses. Thus prussic acid may be fatal in two minutes, and usually kills within twenty minutes, if it is going to be fatal at all. Oxalic acid may destroy life in ten minutes to an hour. Arsenic may kill in from two hours to 24 hours or even much longer.

On the other hand some diseases are fatal very rapidly, as e.g., heart disease or apoplexy. Poisoning by opium and other narcotics, which may resemble an attack of apoplexy in the symptoms, is not usually fatal in less than five to six hours, and never causes death within a few minutes; hence the very rapidity of the symptoms may be a proof that death was not due to poison.

The above observations all apply to the ordinary cases of acute homicidal, suicidal or accidental poisoning; many cases, however, are on record where death has been caused by chronic poisoning, i.e., by the long-continued administration of poisons in doses too small to cause immediately fatal results, and where the symptoms caused thereby may simulate the symptoms caused by natural diseases to a remarkable degree. There

can be no doubt that whilst many criminals have been detected and punished for such crimes as these, numerous other cases of poisoning must have occurred, where the medical men in attendance have never suspected the real cause of their patient's death. Arsenic, antimony and strychnine have all been used in this way, and have caused death after long intervals, the symptoms in the case of poisoning by antimony and arsenic having been attributed to dysentery or gastritis, and in the case of poisoning by strychnine, to angina pectoris, and epilepsy with tetanic convulsions.

2. Post-mortem examination gives no special indications on mere external examination. On internal examination irritant poisons are found to act chiefly on the stomach and bowels, when they inflame or corrode, causing softening, thickening, ulceration or perforation.

Neurotic poisons do not cause well-marked post-mortem appearances, and in exceptional cases both irritant and neurotic poisons may kill without leaving any definite changes in the body discoverable on post-mortem examination. The usual changes found, however, are in the stomach and bowels, and they all may be produced by natural disease. They are :—

1. Redness of the mucous membrane of the stomach and bowels, not distinguishable from that produced by disease, unless poison be also found in the stomach, in which case only would it be safe to say the redness was due to poison. In all cases the redness is so quickly altered by putrefaction that it is impossible to speak as to the cause thereof.

2. Ulceration rarely occurs from irritant poisoning, and is common from disease. If ulceration do occur from poison there is generally widely-diffused redness in the stomach and duodenum, whereas if the ulceration be from disease the redness is only in the neighbourhood of the ulcer.

3. Softening only occurs from disease, putrefaction or corrosive poisons; if from the last there would be evident marks of corrosion in the mouth and throat.

4. Perforation of the stomach or bowels may arise :—
 1. From disease.
 2. From poison.

If from poison it may result from :—

- (a) Corrosion.
- (b) Ulceration.

If from poison, it is usually from corrosion. Cases of perforation from disease are very common, and may come on very suddenly and simulate irritant poisoning.

The chief distinctions are as follows :—

Perforation from Disease	Perforation from Poison
1. Chiefly attacks young anæmic women.	May attack anybody.
2. Preceding illness usually very slight.	
3. Sudden severe pain after food.	Pain comes on slowly and gets gradually worse.
4. Slight vomiting and no purging.	Severe vomiting, usually purging.
5. Death in 24 to 36 hours.	Never less than 24 hours.
6. Death results from peritonitis.	
7. History of case.	Poisons in the stomach. (Taylor).

It must be noted (1) that it is quite consistent with chronic poisoning that no poison be found in the body after death, and (2) that negative evidence may be of great importance, as e.g., absence of all signs of corrosion or inflammation where death has been attributed to poisoning by corrosives or irritants respectively.

The following table from Taylor gives shortly the points the medical witness should attend to in all cases of suspected poisoning, and as to which he may be usefully examined.

With respect to Symptoms note :—

1. Time of their occurrence and their nature.
2. Exact time they appeared after food taken.

3. Order of their occurrence.
4. Whether they steadily went worse or whether any remission.
5. Previous illnesses of persons attacked.
6. Did they recur more violently after any food or medicine.
7. Procure and collect all vomited matters.
8. Note nature of all kinds of food used at a meal.
9. Note all voluntary explanations made by those present.
10. If more than one affected, how many, and if so did they all partake of same food.
11. If other people had taken food without ill effects.
12. If the person be dead, note the position of the body and all surrounding objects.
13. Note conduct generally of all persons present.

With respect to Examination of the Body.

1. Note external appearance, state of countenance.
2. Note all marks of violence or discomposure of dress.
3. Presence or absence of warmth of body.
4. Presence of rigidity or cadaveric spasm.
5. If found dead, note when last seen alive.
6. Note all circumstances suspicious of murder or suicide.
7. Time after death when inspection made.

8. Observe carefully stomach and bowels for signs of irritant poison.
9. Collect contents of stomach carefully for analysis.
10. Note signs of corrosion in mouth, throat, etc.
11. Examine all the organs.
12. Examine the vagina in females—also the uterus to see if pregnancy existed.
13. Keep the liver for chemical analysis.
14. Keep the bladder and urine for examination.

The usual defence in poisoning cases is that death took place from natural causes and not from poison, and, as will have been inferred, the post-mortem changes from disease so closely resemble those from poison that in the absence of poison in the stomach, vomited matters or food, there is every probability that the defence will succeed. In cases where the viscera are kept for examination, always enquire if any preservative or antiseptic has been added, as this is most improper; also take care that the identity of the body or the viscera or food examined is thoroughly proved. Also see that all vessels, etc., used are thoroughly clean.

Further information will be gained from chemical analysis and experiments on animals into which it will not be necessary to go, but the following table and remarks copied from Smith's Medical Jurisprudence will indicate to the expert the probable questions he will be asked, and will

indicate also points of defence which may be raised in different cases.

As to articles received for special analysis :—

		Remarks.
1.	When, where, and from whom received.	Affording legal proof of continuity of possession and identification.
2.	Sealed or exposed, how sealed.	Has reference to possible addition of poison by interested persons, or by the nature of the covering (e.g., arsenical papers), and also possibly to decomposition occurring in organic mixtures.
3.	Number of articles, description, nature, and quantity of each.	Refers to identity of articles.
4.	When did you analyse it and where.	Raises questions of why delay and the possibilities of delay affording chance of fraud, mischief or decomposition.
5.	Alone or assisted and by whom.	Question of fraud by interested parties or mistakes in the articles.

6. Tests applied. These may be questions from specialists on the other side.
7. Was the poison pure or mixed. Ditto.
8. Strength of poison in the mixtures and the total quantity present. Very important with reference to dose of poison or "noxious thing" administered and may have an influence on motive (whether to kill or only to annoy).
9. If not a poison was it a noxious thing. Loophole for cross-examination with room for differences of opinion on dose and conditions affecting action of poisons, etc.
10. Could it have been produced in the body by natural means or was it a natural constituent of the body. A most important question for the defence when ptomaines or leucomaines are found, and alleged to be the cause of death, or when very small quantities only of some poisonous metal are found, and it is asserted by the prosecution that this has been "administered."

11. Could the poison found have been present in your reagents. Refers especially to metals, arsenic, and lead, which may be found in the reagents used for the chemical analysis.
12. Was it found also in the medicine or food that had not been taken. Has obvious detective bearings on the questions—Who administered the poison? How was it administered? One dose or many? One article of food or many? When could it have been mixed, etc.
13. In what organs did you find it. Bears on the powers of certain organs to retain certain poisons, the brain to hold lead, the liver arsenic, etc.
14. What is the dose necessary to kill. Is originally matter of speculation and observation, but later matter of record from previous undoubted cases; must know the minimum lethal dose but remember what a wide range there is and how different circumstances affect it.

The chief Poisons are :—

<i>Name.</i>	<i>Smallest fatal dose.</i>	<i>What disease they simulate.</i>
Sulphuric Acid	1 dram	—
Nitric Acid	2 drams	—
Hydrochloric Acid	1 dram	—
Caustic Potash	40 grains	—
Ammonia	2 drams	—
Oxalic Acid	60 grains	Convulsions, Coma, Neuritis
Carbolic Acid	1 dram	—
Phosphorus	1½ grains	—
Arsenic	2 grains	Gastritis, Gastric Ulcer, Enteritis, &c., Dysen- tery, Diarrhœa, &c.
Antimony	1½ grains	Do.
Corrosive Sublimate	3 grains	Do.
Lead Salts	—	Cause paralysis of limbs
Copper	—	—
Ptomaine Poisoning	—	Gastro-enteritis, Diarr- hœa, Cholera, Dysen- tery
Opium	4 grains	Apoplexy, Fevers, Men- ingitis, Brain Diseases
Belladonna	2 grains of Atropine	Mania, Delirium of Fevers, &c.
Strychnine	$\frac{1}{16}$ grain	Tetanus, Epilepsy
Prussic Acid	30 drops of Ac. Hy. B.P.	—

Table of most common poisons used by Suicides
from 1886 to 1895 for England and Wales,
from Report of Registrar General.

	<i>Males.</i>	<i>Females.</i>
Carbolic acid	404	455
Opium and its preps....	384	204
Prussic acid, etc....	312	34
Oxalic acid	161	118
H. Cl.	100	60
Strychnine	83	95
Vermin killers	44	52
Arsenic	36	20
Phosphorus	32	61
Ammonia	25	28
H ₂ SO ₄	27	24
HNO ₃	22	10
Corrosive Sublim.	16	8

(Dixon-Mann).

N.B.—Notice contrast between Males and Females
in poisoning, by Prussic Acid.

Relative frequency of common Poisons causing
death from Accident.

Lead	1182
Opium	1038
Chloroform	460
Carbolic acid	290
Poisoned foods	136
Coal Gas	106
Alcohol	95
Chloral Hydrate	93
H.Cl.	77
Ammonia	69
Phosphorus	67

Belladonna	...	...	...	...	61
Arsenic	...	...	...	...	52
Aconite	...	...	...	...	45
Strychnine	...	...	...	...	43
C. O.	...	...	...	...	32
Sewer Gas	...	...	...	...	30

Commonest Poisons used by Murderers.

H.C.N., etc.	...	...	...	...	14
Strychnine	...	...	...	...	8
Carbolic Acid	...	...	...	...	5
Opium	...	...	...	...	3
Arsenic	...	...	...	...	2
Chloral Hydro.	...	...	...	...	1
Chloroform	...	...	...	...	1
H. Cl.	...	...	...	...	1
H ₂ SO ₄	...	...	...	...	1
Ammonia	...	...	...	...	1

(Dixon-Mann).

Note that the bodies of those who have died from arsenical poisoning may resist putrefaction, but as the minimum lethal dose is very small, probably putrefactive changes will go on as usual, except in cases where death has been due to chronic poisoning.

Ptomaines are alkaloids or chemical substances of a certain type produced by the decomposition and putrefaction of animal matter. They may be formed after death or they may be formed during life as a "result of chemical changes induced by some agency acting within the organism, as a result of which the bacteria of putrefaction split up highly organised matter into its primary constituents." Many of the chemical combinations

formed in the tissues during putrefaction are very fugitive and prone to change; each separate change of chemical composition may cause a variation in their "toxicity," i.e., their power to produce poisonous effects. There are no chemical tests known by which ptomaines as a class can be distinguished from the vegetable alkaloids, such as morphia, strychnine, etc., but on the other hand, no known ptomaine gives the same chemical reactions AND at the same time possesses the same physiological properties as any of the vegetable alkaloids. In cases of poisoning by some of the alkaloids, which yield no special chemical reactions, it may be urged on behalf of the defence that the poison found in the body was a "ptomaine," i.e., a product of the post-mortem decomposition of the tissues, but there are clear distinctions between the two (see Dixon Mann, *loc. cit.*, 3rd edition, 660 seq.). It is said that only two actively poisonous ptomaines have been obtained from the dead body, one of which (neurin) does not appear until five days after death and the other (mydalein) not until seven days after death. As the post-mortem examination would, as a rule, be held not later than the third or fourth day after death, and usually much sooner, there will not generally be much risk of confusing the two. This is, however, a highly specialised and little understood subject, and only the evidence of a very high authority would be of any value either for the prosecution or the defence.

POISONOUS FOODS.

Meat may be poisonous:—

1. From presence of disease in the animal when slaughtered.

2. From the development of bacteria after the animal has been slaughtered.

In both the above cases there is a true infection of the system of the person partaking of the meat, and there may be a period of incubation between the partaking of the food and the appearance of the symptoms.

3. From the development of "ptomaines" after death. Here the poison is chemical and not bacterial; there is no true infection or period of incubation, although there is sometimes considerable delay in the appearance of the symptoms.

Fish of various kinds, especially tinned fish or shell-fish, are often poisonous. Pork pies also may cause fatal symptoms, and in some of these cases apparently specific poisonous bacteria have been isolated.

The wide-spread epidemic of poisoning in Lancashire by arsenical beer during the year 1901 will be remembered by all.

CHAPTER IX.

CORROSIVE AND IRRITANT POISONS.

The chief are sulphuric acid, nitric acid, hydrochloric acid, carbolic acid, oxalic acid, and the caustic alkalies and their salts, phosphorus, arsenic and antimony.

Symptoms. Strong burning taste on swallowing, pain in gullet and stomach, persistent retching and vomiting of food mixed with mucus and blood. More or less shock and collapse, thirst, diarrhœa; sometimes the larynx may be burnt and death take place from suffocation. If death does not take place immediately, there will be difficulty of swallowing and consequent exhaustion followed possibly by ulceration and perforation of the stomach. If the patient recover, stricture of the gullet may follow the cicatrisation of the sores produced by the action of the poison. Poisoning by corrosives is almost always accidental or suicidal.

Oil of vitriol or sulphuric acid may be fatal within 24 hours. Note that even where large quantities have been taken, no traces may be found in the stomach. (Taylor.)

Aqua fortis or nitric acid is volatile, and hence each respiration carries the fumes into the lungs, so that in addition to the corrosion of the mouth or throat where the liquid has passed, the fumes may set up severe bronchitis, difficulty of breathing, and inflammation of the larynx and lungs. Two drachms have proved fatal.

Spirit of Salts or Hydrochloric Acid causes symptoms and appearances like those of Nitric Acid. One drachm has proved fatal.

The post-mortem appearances are all those of burning and destruction of the parts with which the poison has been in contact.

The absence of injury to the mouth and gullet will distinguish ordinary ulcer of the stomach and post-mortem softening of the stomach from poisoning by corrosive acids.

The caustic alkalies (caustic potash, and caustic soda) corrode the tissues like the acids, but they are not volatile, and hence there is less risk of fatal lung disease being started and less risk of death from asphyxia. Gaseous ammonia may cause asphyxia by being accidentally inhaled.

Oxalic acid is not only corrosive or irritant, according to the form and concentration in which it is swallowed, but also produces important symptoms after it is absorbed into the system. In a large concentrated dose, it poisons like the other corrosives; in a weaker and more diluted form, it causes vomiting, pain and diarrhœa, and after being absorbed into the system, peculiar nervous symptoms, as numbness and tingling of the skin, twitchings of the muscles, sometimes coma and convulsions; 60 grains is the smallest fatal dose, and death may occur within ten minutes or rarely not for days. Oxalate of potash is well known as "essential salt of lemons," and is used for cleaning metals and removing ink-stains, and is often taken for suicidal purposes.

PHOSPHORUS.

Acute poisoning from phosphorus is almost always suicidal or accidental, but chronic poison-

ing, in those who work in the manufacture of matches, is not uncommon, producing necrosis of the lower jaw, a disease well-known amongst workers in matches as "phossy jaw." In the acute form of poisoning, there are the ordinary irritant symptoms, pain, and feeling of oppression, eructation of garlicky vapours (which may be luminous), vomiting, intense thirst. If not fatal within a few hours the patient appears to recover for three or four days, when jaundice sets in with great prostration and distension of the belly, and the patient gets more and more collapsed and usually dies in about six days; sometimes recovery takes place. The secondary symptoms of phosphorus poisoning are identical with those of a very fatal disease called acute yellow atrophy of the liver.

The smallest fatal dose is $1\frac{1}{2}$ grains, but recoveries are recorded after large doses.

CARBOLIC ACID

is a corrosive poison, largely used as a disinfectant. Like oxalic acid it has its primary corrosive effects on the organs with which it comes in contact, and its secondary remoter effects after absorption into the system; these secondary effects are delirium, giddiness, and coma, and there may be convulsions. Death may come on within three minutes and rarely is delayed longer than 24 hours. One drachm is the smallest fatal dose on record. In spite of its nauseous odour and taste carbolic acid is often taken by suicides, and as it has an anæsthetic or numbing effect on the parts with which it comes in contact, there may be little vomiting and possibly not so much pain in the stomach and bowels as in the case of the other corrosives.

ARSENIC

in the form of arsenious acid or white arsenic, is much used in commercial processes, as in manufacturing dyes from aniline, etc. When sold to the public in small quantities, it must by the statute 14 Vict. ch. 13 s. 3 be mixed with soot or indigo. The symptoms in poisonous doses are those of an irritant, but as it is a somewhat insoluble salt, there is often considerable delay after being swallowed before the symptoms set in—usually about half-an-hour; in one case no symptoms appeared until 10 hours had elapsed.

In smaller doses chronic poisoning may occur, shown by milder symptoms of irritation of the stomach and bowels, and also by skin eruptions, local paralyses, tingling of the fingers and toes, and other nervous symptoms. The symptoms of chronic arsenical poisoning closely resemble those of the disease known as peripheral neuritis, a disease often attributed to chronic alcoholism, and it will be remembered that during the year 1900 Dr. Reynolds of Manchester, being struck with the large number of cases of peripheral neuritis he was seeing amongst beer drinkers (not amongst spirit-drinkers, amongst whom peripheral neuritis had hitherto been most common) was led to examine various beers for arsenic, when it was found that enormous quantities of arsenicated beer were being drunk, the glucose used in the brewing of all these beers having been obtained from one firm, who in their turn had been supplied with impure or arsenicated sulphuric acid which had been used in the manufacture of glucose.

Arsenic is rapidly eliminated from the body, and

if the person survive, may all be eliminated within two or three weeks.

On post-mortem examination, the usual appearances of irritant poisoning are found, but in addition arsenic has special affinity for the stomach and mucous membranes generally, and the stomach is found to be inflamed in patches, even in cases where the arsenic has been introduced otherwise than by swallowing.

Two or three grains may destroy life, and death may occur from 18 hours to three days.

Arsenic is easily detected by chemical tests, but as it is widely diffused in nature, great care has to be taken that the reagents used are free from it before proceeding to examine suspected liquids or the organs of the body for this poison. Arsenic is not found naturally in the body and may be detected by chemical tests for months or even years after death.

Reference has been before made to the power of arsenic in preventing and delaying the access of putrefaction after death.

Numerous other compounds of arsenic as well as arsenious acid are used in commerce, thus arsenite of sodium is used as a "Weed-killer," and other salts are used for making fly-papers. Arsenite of copper or Scheele's green is used in the manufacture of wall-papers. Sulphide of arsenic, or orpiment, is used in dyeing and paper-staining.

The usual methods of testing for arsenic in solution are by what are known as Marsh's and Rheinsch's processes.

1. In Marsh's process, hydrogen gas is produced by acting on zinc with hydrochloric acid, and this acts on the arsenic (if any be present in the liquid

to be tested) and forms arseniuretted hydrogen gas, which in its turn may be recognised by a series of chemical reactions.

2. In Rheinsch's process, the suspected liquid is boiled with pure hydrochloric acid and a piece of copper foil is then introduced into the liquid. If arsenic be present, a grey metallic coating of it is deposited on the copper. The arsenic so deposited may be scraped off and examined further by microscopical and chemical tests.

It is of the greatest importance to always make a test experiment in these processes before adding any of the suspected liquid, as the reagents used, such as the copper and the acids frequently themselves contain appreciable quantities of arsenic, and the possibility of this must therefore be eliminated before the actual experiment is made.

ANTIMONY

causes the usual irritant symptoms, viz., those of acute inflammation of the stomach and bowels. The symptoms closely resemble those of arsenical poisoning. The usual fatal dose is 5 to 10 grains, but $1\frac{1}{2}$ grains has been known to be fatal. In the form of tartar emetic (tartrate of antimony and potassium), it is largely used in medicine both as an emetic and for other purposes. Probably a big dose, by exciting more severe vomiting, may prove less fatal than a smaller dose, where there is less vomiting produced. Death does not usually occur within 24 hours. The post-mortem appearances are those common to irritant poisons. Chronic poisoning by antimony has been frequently employed by criminals.

Antimony is easily detected by modifications of

Marsh's and Rheinsch's processes as used in the detection of arsenic.

Although a person may die within nine days of antimony being given, none may be found in the body on examination.

MERCURY.

Perchloride of mercury or corrosive sublimate is now very largely used in surgery as an antiseptic. It is very soluble in water and accidents from drinking it are not uncommon. The fatal dose is about 5 grs. in an adult. The symptoms and post-mortem appearances are those of an irritant poison, but the symptoms come on very quickly, resembling at first those of cholera, or, if the patient survive, those of dysentery. In small doses mercury and its salts are used for long periods in the treatment of syphilis. If the treatment be too long continued or if the drug be given in too large doses the patient becomes salivated, and if the drug be still continued, other serious symptoms appear, viz., tremors and convulsive twitchings, and emaciation. Workmen exposed to the fumes of mercurial vapours, as e.g., looking-glass workers, barometer and thermometer makers, occasionally suffer from chronic poisoning.

LEAD SALTS

are all irritant poisons and are sometimes taken by accident or for the purpose of suicide; they have also been used for the purpose of procuring abortion. The fatal dose of sugar of lead would require to be large.

Chronic poisoning by lead is common amongst workers in lead as painters, plumbers, etc., and in

some cases there has been poisoning on a large scale by the drinking water supplied to towns becoming contaminated during its passage through lead-pipes. The symptoms thus produced are colic or pain in the belly ("painters' colic") followed by the presence of a blue line on the gums, and a sallow tint of the skin. If the cause of the symptoms be not detected and the poisoning still go on, local paralyses occur ("dropped wrist"), great constipation, emaciation, followed by perhaps squinting or blindness, inflammation of the kidneys and death.

COPPER SALTS

are all poisons, but cases are very uncommon. Chronic poisoning is sometimes seen amongst workers in the metal but is rare; according to Dr. Smith, there is no reliable evidence that the long continued introduction of copper into the system can produce any ill effects, and it is said that there is no case on record where the "greening" of vegetables has been proved to be poisonous or injurious to health.

SALTS OF ZINC AND TIN

may cause accidental poisoning, but such cases are very uncommon.

SOME IRON SALTS

in large doses may act as irritant poisons. Tincture of steel is sometimes employed criminally to produce abortion, but there is no reliable evidence that it has any such properties beyond the fact that it acts like any other irritant poison, if given in large doses, in producing vomiting, pain, and diarrhœa.

CANTHARIDES

or the Spanish fly used to be administered for the purpose of inducing criminal abortion or as an aphrodisiac, but does not often cause death. The symptoms of an overdose are difficulty of swallowing, great pain in belly, thirst and dryness of the throat. Later there is great difficulty of passing urine, which is bloody and scanty in quantity, followed by swelling of the genital organs in both sexes. The post-mortem appearances are those of acute inflammation of the stomach, bowels, kidneys, and bladder and uterus in women. The smallest fatal dose was 24 grains, and death resulted in four days.

OPIUM,

or its preparations, is a very common poison. In addition to the ordinary preparations such as laudanum, morphia and its salts, opium is an important constituent of chlorodyne, Godfrey's cordial, Winslow's soothing syrup and other soothing syrups for children (v. table of quack medicines, p. 153). The symptoms after a poisonous dose are gradually increasing stupor and coma with great contraction of the pupils of both eyes; the symptoms come on about half-an-hour after the drug is swallowed. It is important to know that a person may move about for an hour or even two after swallowing a fatal dose of opium, and that a person who has apparently recovered from the effects of an overdose may relapse and die. The post-mortem appearances are those of general venous congestion, especially of the brain, and the blood is often fluid and dark-coloured.

The smallest fatal dose of crude opium for a healthy adult is four grains, and the smallest fatal dose of laudanum or tincture of opium is two fluid drachms. Children are remarkably susceptible to the influence of opium and very minute doses are sufficient to cause death. Persons suffering from Bright's disease are very susceptible, and small doses may be fatal. Deaths usually happen in from six to twelve hours, but may occur much sooner.

Opium poisoning may be confused with drunkenness, apoplexy or uræmic coma. Where the poison is injected under the skin by means of a solution of morphia, its action is much quicker and a much less dose is fatal than when administered by the mouth. Great tolerance may be acquired by constant use, and when the habit is established, a person may take large quantities daily, apparently without injurious effects.

HYDROCYANIC OR PRUSSIC ACID

is a most virulent poison, the symptoms commencing often in the very act of swallowing. The person becomes insensible, the eyes fixed, the pupils dilated, the skin cold and clammy, and the limbs flaccid. The breathing is slow and gasping and the pulse very feeble. Death occurs in three or four minutes or longer. On post-mortem examination there is the strong odour of prussic acid and the venous system is engorged. One drachm of the ordinary acid of the British Pharmacopœia has proved fatal. The cyanides of the alkalies are almost equally poisonous. Poisoning by prussic acid or the cyanides is usually suicidal or accidental.

BELLADONNA

or deadly nightshade sometimes causes accidental poisoning by the berries which yield the poison being eaten. Criminal poisoning is very rare in this country but very common in India. The symptoms of belladonna poisoning are dryness of the throat, impaired and double vision; the face becomes flushed and there is wild delirium and excitement. The pupils are widely dilated. The active principle of the plant is the alkaloid atropia or atropine, which is so largely used in eye-diseases for the purpose of causing dilatation of the pupil. One or two cases of criminal poisoning by atropine by persons acquainted with drugs are recorded.

ACONITE

or Monkshood is very poisonous; the plant may be mistaken for horseradish. The symptoms are nausea and vomiting, pain followed by tingling, numbness, and sense of constriction in the throat. Great collapse with feeble pulse ensues and often death. One drachm of tincture of aconite has proved fatal.

STRYCHNINE

is derived from the *strychnos nux vomica* plant. Strychnine may cause poisoning by accident, but is not often used with criminal intent, as the taste is very bitter and there would be difficulty in getting a person to swallow it; moreover, the symptoms it produces are very marked and easily recognised. Strychnine may be found in the tissues many years after burial.

The characteristic symptoms of poisoning by strychnine are twitchings and jerkings of the body

followed by violent convulsions, affecting all the muscles of the body at the same time, and tetanic in character. The limbs are stretched out and tense and the whole body becomes stiff and hard. As the symptoms progress the body is bent upwards so that the head and heels only touch the ground (Opisthotonos). As soon as one set of convulsions has ceased another set begins, and so on till the fatal termination. Death or recovery usually takes place within two hours; $\frac{3}{4}$ gr has killed a child and $\frac{1}{15}$ gr. has been known to produce convulsions in an adult. Strychnine is a common constituent of vermin killers, and so may cause suicidal or accidental poisoning.

TABLE OF CONSTITUENTS OF COMMON QUACK
MEDICINES.

Battles' Vermin Killer contains strychnine, arsenic and phosphorus.

Fly Papers contain arsenic.

Godfrey's Cordial, Mothers' Friend, Winslow's Soothing Syrup, all contain morphia.

Hair-washes may contain mercury, lead, bismuth, or peroxide of hydrogen.

Headache Remedies often contain phenacetin, antipyrin.

Holloway's Ointment contains cantharides.

St. Jacob's Oil contains aconite.

Siegel's Drugs contain aloes and saline aperients.

Teething Powders often contain calomel (which is a salt of mercury), and opium.

Paregoric contains opium. (Smith.)

CHAPTER X.

ASPHYXIA.

The term asphyxia is applied to those forms of death which occur primarily from interference with the respiration, and they include drowning, hanging, strangulation and suffocation.

DROWNING

primarily causes death by asphyxia, i.e., by suffocation; no air can get to the lungs and the consequence is that only impure blood can circulate through the system; the circulation of the blood gradually ceases, and asphyxia passes into death. If a person who can swim, falls into the water, he swims until he is exhausted and is then in the same position as a person who cannot swim, that is to say, both struggle with the hands and legs, grasping at all objects within reach or struggling and clutching at the water itself. The body keeps alternately rising to the surface and sinking, and each time the body sinks the drowning person is sure to swallow some water and to draw some water into the bronchi and lungs. Gradually more and more water is swallowed, the blood in the lungs is not aërated, coma and convulsions follow, and the body sinks to the bottom. In some cases the terror produced by the idea of sudden death may produce a condition of syncope or fainting before immersion; in such cases death may be due to syncope and not asphyxia. The occurrence of

syncope or fainting has been held to explain the recovery of some persons after prolonged immersion. In some cases where there has been a fall from a height into water, death may be due to syncope or to Apoplexy, but as a matter of fact it is rare to find any effusion of blood in the brain of the drowned, unless it actually took place before immersion, in which case death would not be caused by drowning. After all struggling has ceased the body, being heavier than water, sinks to the bottom, and remains there until it again becomes buoyant owing to the development of the gases of putrefaction. As warmth assists putrefaction, and as shallow water is warmer than deep water, usually a body will come to the surface sooner when drowned in shallow than in deep water.

Where the head is completely submerged, asphyxia comes on in from half a minute to two minutes, but this may not be fatal. Probably there is no hope of recovery after complete submersion for five minutes, but if the person has fallen into the water whilst in a condition of fainting or syncope, recovery is possible after longer periods. It must always be remembered also that in many cases the submersion may not have been complete, and that some amount of air may thus have got to the lungs at intervals for some time after the period of submersion, in which case efforts at resuscitation should be persisted in for a long time. When a person has been resuscitated from drowning, care should still be taken, as he may still die later on from spasm of the windpipe, or exhaustion, or from pneumonia, the result of exposure.

The post-mortem appearances after death from

drowning vary, but generally they are more or less the appearances of asphyxia; of course if death have really been due or partly due, to syncope or heart disease, and not entirely to drowning proper, the appearances will be modified.

If the body have been in the water only a short time, and it is examined soon after removal, the appearances would be:—

The skin will be cold and pallid and in the condition known as "goose-skin." The face and body will be pale and livid, and generally the expression of countenance cold and not distorted; the tongue is swollen but only rarely protruded through the teeth. There may be a fine frothy foam about the mouth and nostrils, which is very characteristic of death from drowning. Post-mortem rigidity comes on quickly, sometimes at the moment of death. The surface of the body may be marked and scarred with abrasions, and gravel; weeds or dirt may be found in the palms of the hand and in the nails. Internally, the appearances are those of asphyxia, the veins engorged with dark fluid blood, and the organs congested, but if death have occurred from syncope these appearances may be absent. The trachea, bronchi, and the air tubes of the lungs are full of watery froth; this is the most characteristic sign of asphyxia from drowning, when it is observed, but as it depends on the fact that there is still some air in the lungs, this sign is often absent, unless the inspection is made soon after death. Usually the right cavities of the heart are full of blood and the left cavities empty, but this is not always the case. The lungs are large in volume and protrude when the chest is opened. Slime or mud may be carried with water into the lungs or stomach. There may be much

or no water if death has been very rapid. According to Obolonsky, it is possible for water to get into the stomach after death.

After a body has been in water for two or three weeks the putrefactive changes are so great that it is impossible to say whether death was due to drowning or to any other cause. Where some of the gases of putrefaction escape, the corpse may sink again for a time, until it again becomes buoyant by the development of fresh confined gases.

Where a body has been found in water, it is often of real importance to be able to decide whether death was due to drowning or not.

1. The condition of goose-skin or *cutis anserina* is not always present in death from drowning, and it may occur in cases of sudden death from other causes. Nevertheless, if present in a body taken out of the water, it would be a strong indication that the body was alive when immersed. It is due to a contraction of numerous small muscles in the skin, which contraction would not occur after death.

2. Substances grasped in the hands afford strong presumption that the person was alive when he went in the water, especially where the substances grasped are weeds, etc., growing in the water where the body is found.

3. Water in the stomach is common, where the person when immersed is sensible; if he be in a condition of coma or syncope, none may be swallowed. Usually the quantity of water found is greatest where the body has come to the surface at intervals, and efforts at respiration and swallow-

ing have been made. Water does not easily enter the stomach when the body is submerged after death, so that if present in quantity there is a presumption in favour of the body being alive when immersed.

4. Excoriations of the limbs, and sand and mud in the nails, are signs of less value.

5. A fine froth on lips and nostrils is very characteristic if present.

5a. Watery froth in the air passages and lungs affords satisfactory evidence of death from drowning, when present, but it may be absent where the body has been in the water for some time.

6. Water and with it dirt, mud and slime, may all be drawn into the lungs, in the efforts of inspiration during drowning; this fact also affords strong presumption of immersion during life.

7. The lungs themselves are usually large and bulge out when the cavity of the chest is opened. Hence generally the signs of death from drowning are:—

1. On turning the corpse just removed from the water face downwards an abundance of water pours from the mouth; there is white watery froth at the mouth and nostrils, and more issues when the chest is compressed. If with these there are rosy redness of the face, goose-skin, and bleaching and corrugation of the hands, drowning is probable in the absence of violent injuries or indications of poison.

2. If a complete examination be made, water, and watery froth may be found in the lungs and stomach. When sand, weeds, etc., are found in the air-tubes, when the lungs are very bulky, and when the blood in the heart is fluid—especially when there are signs of asphyxia in other organs, we may conclude that death was due to drowning.

(Ogston.)

Generally we may say that whilst no one sign is conclusive of death by drowning, there is practical certainty when several signs coincide; if water be found in the bowels, there is a strong presumption that the body was submerged when living.

All the above points are of importance in the determination of the question as to whether a person has been drowned, or whether the body has been thrown into the water after death, and as the reliable signs of death from drowning all disappear after a few days immersion, there will often be great difficulty in coming to a correct conclusion where a considerable period has elapsed before the body is discovered. Where there are wounds or marks of violence on the body, there would be grave cause for suspicion, as there could be no object in throwing the body of a person into water who had died from natural causes. If there were wounds on the body, then the questions discussed in the chapter on wounds would arise, viz. :—

1. Were they inflicted during life or after death?
2. Were they the cause of death?
3. Were they accidental, suicidal or homicidal?

If a person were murdered and then thrown into the water, there would be none of the signs of death by drowning.

If a person were severely injured and then thrown into water, there would be mixed signs of drowning, and of violence, i.e., there would be the marks of violence, but the signs of asphyxia might not be so pronounced.

If the external injuries were slight, we should find all the usual signs of death by drowning.

Bruises and even fractures and dislocations may be caused by the body being floated in a rapid stream against hard obstacles. On the contrary, if there are marks of severe violence on a body found in shallow still water, there would be a strong presumption of homicide, especially where the injuries found were not such as would probably be accidental in origin. It is of course possible for persons to be drowned in very shallow water either by accident or suicide, especially in the case of children, who may fall into, and drown in, a few inches of water; it is also quite unnecessary for the whole of the body to be immersed; if the face or head only are under water, death from drowning will rapidly ensue.

If death were due to drowning, was it accidental, suicidal or homicidal? By far the largest number of cases of drowning are accidental, many are suicidal, and a few are homicidal; of the last nearly all occur in children. Obviously if death were due to drowning, there would be special indications as to the manner in which it came about; in accidental and suicidal drowning it would not be usual to find marks of violence, except such as are apparently of accidental origin,

and which generally have been produced after death.

When a body has been immersed for a long period, the putrefactive changes it undergoes are of a peculiar nature, and result in the formation of a fatty substance named adipocere. These changes have been already described.

It is important to remember that the mucous membrane of the stomach is often red after death from drowning, and so may give rise to suspicion of irritant poisoning.

IN DEATH FROM HANGING

the body is suspended from the neck partially or entirely, and the constriction is produced by the weight of the body. More than 99 per cent. of the deaths from hanging are suicidal (Dixon-Mann).

Whether death results from asphyxia or apoplexy and cerebral congestion, or all combined, will depend on the manner in which the cord or other ligature is applied to the neck, and whether it interferes chiefly with the windpipe or with the blood-vessels. Where the act of hanging is not violent, and where there is no fracture or dislocation of the spine, death takes place rapidly and without suffering. Persons who have been cut down and resuscitated sometimes die a few hours later or even longer because the pressure on the neck has caused congestion of the brain or lungs, which is too severe to be recovered from. Even when the body is in great part supported the phenomena of asphyxia or cerebral congestion come on very insidiously and painlessly, and in many cases of suicidal hanging only a small portion of the weight of the body is on the con-

stricting ligature. Numerous cases of suicidal hanging are recorded, where the feet have been touching the floor.

The post-mortem appearances after violent or judicial hanging are lividity and swelling of the face, swollen eyelids, projecting eye-balls, the tongue swollen and purple and sometimes protruding between the teeth, the mark of the cord on the neck, lacerations, abrasions or fracture of the windpipe. The extent of protrusion of the tongue depends entirely on the amount of congestion.

In violent hanging the clenched state of the hands is very characteristic. Internally we find engorgement of the venous system and the lungs, and the right side of the heart full of blood. Usually also there is much greater cerebral congestion than in other cases of asphyxia, on account of the much greater interference with the cerebral circulation exerted by the pressure of the cord on the large veins of the neck.

The mark of the cord or ligature on the neck may be wide and superficial if the ligature be wide, or narrow and deep with laceration and effusion beneath the skin if the ligature be small and narrow. The skin under the cord itself may be free from discoloration, and if so is hard and consistent like parchment. The mark of the cord is usually oblique and lower in front than behind, and it may be interrupted.

Where there has been no violence, as in many cases of suicidal hanging, the post-mortem appearances will be modified accordingly. One must always remember that when a person is found hanging the heart goes on beating for a few minutes after respiration has entirely ceased, and

hence there is often a good chance of resuscitation if the body be promptly cut down and artificial respiration be commenced and persevered with for a considerable time. It is needless to do more here than refer to the popular delusion that a hanging person should not be cut down until the arrival of the police.

WAS DEATH CAUSED BY HANGING?

As hanging is in the great majority of cases suicidal or judicial, there is a strong presumption that if a body be found hanging, death has resulted from hanging; still in some cases a body may be suspended after death to conceal the real cause thereof, and it may be necessary to enquire what are the circumstances which point to suspension during life; obviously a body would only be suspended after death by a murderer. Only the external appearances give any indications and amongst these are:—

1. The mark of the cord. If there be ecchymosis or bruising along the track of the cord, it may be possible to say whether this was produced during life or immediately after death (see chapter on bruises); but remember that ecchymoses are often absent—they are in fact absent in at least half the cases of hanging. If there are also abrasions and effusion of blood along the mark of the cord in the neck the same inferences would arise. If a person be murdered and then the body be suspended to conceal the real cause of death, careful examination should be made for all other marks of violence, such as punctured wounds, etc. Some marks of violence may be accidental, as where suicides have kicked away a table or chair after placing the

noose round the neck, and then knocked their limbs in struggling.

In all cases of hanging, there will probably be enough circumstantial evidence to decide the nature of the hanging, whether suicidal, homicidal, or, as is rarely the case, accidental. Thus in one case of murder, it was found that the rope, which had been put round the neck of the deceased, was not strong enough to support the body. There may be evidences of struggling, of disorder of the dress, or of the furniture in the room, or the size and shape of the rope found may not correspond with the mark on the neck.

It must also be noted that the presence of other wounds in a person found hanging does not absolutely negative the idea of suicide, as many suicides make several attempts before they succeed in effecting their purpose.

Cases of suicide by hanging are also recorded where both hands have been securely tied together, and one case where both hands and ankles were tied and yet the suicide was able to accomplish his object.

STRANGULATION

may be induced (1) by a ligature round the neck without suspension of the body, and (2) by pressure by the fingers on the windpipe. In either case death is due to asphyxia, and generally a great degree of violence is used. Whereas death from hanging is strongly presumptive of suicide, death from strangulation is strongly presumptive of homicide. Owing to the great violence used, there are more marks of injury or bruising of the neck, and often there are other bruises on the body; the mark made by the cord if a cord be used, is usually

circular, but it may be oblique, as in hanging; but remember that in rare cases the mark of the cord may be circular in suicidal hanging also.

On post-mortem examination, the appearances are somewhat different to those in death from hanging. The windpipe and the whole of the neck will probably be much bruised and lacerated, the face livid, the tongue swollen and protruded through the teeth, bloody froth at the mouth and nose, great lividity, ecchymosis and abrasions in the course of the cord. As in other cases of asphyxia, the blood remains fluid for a long time, and may continue to flow from any wounded vessel for some time after death.

The internal appearances after strangulation are very variable; they are generally those of asphyxia in addition to the actual injuries from violence round the trachea and neck; the chief diagnostic sign is a peculiar emphysema of the lungs due to rupture of some of the superficial air-cells, caused by intense venous congestion in the futile efforts at respiration. As death from strangulation is usually homicidal, there is not much probability that the marks of strangulation would be inflicted after death. If the body be putrefied before examination, it would not be possible from the protruding tongue or swollen eyes to say that death had been caused by strangulation, as such appearances might be due to putrefaction, but where the marks of the cord were still visible, and there were indications of laceration and bruising of the tracheal muscles or hyoid bone, an opinion that death was due to strangulation might be justified (Taylor). It is just possible that strangulation may take place without any mark being left on the neck, but it is practically impossible that a

murderer could thus cause death without leaving the marks of his fingers or the cord used. Sometimes strangulation has been resorted to after rape, so that in all cases of death from strangulation in females the genital organs should be examined.

Occasionally strangulation may be accidental; this will be proved by other evidence. If the cord or ligature has been removed from the neck, there would be a strong presumption of homicide.

Garotte robberies depend on partial strangulation, the victim being seized from behind, and rendered insensible by pressure on the throat in order that robbery may be committed. A person so attacked may recover or may die with all the signs of strangulation. Such crimes are now made statutory offences by the 24 and 25 Vict., ch. 100 s. 14 and 21.

Lastly, we may say that although death from strangulation is usually homicidal, murder by this means is not frequent, it is very rare in adults, and is not common in children.

SUFFOCATION

means the effect produced in a person where air cannot reach the lungs, owing to some mechanical obstacle in the mouth, throat or air-passages. Obviously drowning, which has been already discussed, is one form of suffocation.

Suffocation may arise in many ways:—

1. There may be no air supplied.
2. The air breathed may not be purified.
3. The air may be mixed with poisonous gases, and the symptoms, etc., will vary accordingly.

The chief medico-legal kinds of suffocation occur from :—

1. Pressure on the chest whilst the mouth and nose are kept covered.
2. Covering the head and face with clothing or bed-clothes, so that no fresh air reaches the lungs.
3. Forcing foreign bodies into the throat.
4. Where the windpipe gets filled with blood from accident or disease.
5. Spasm of the glottis after swallowing corrosive substances or liquids. The glottis is a little valve or curtain at the top of the windpipe which is open during respiration, but falls over the end of the trachea during swallowing, and so prevents food and drink passing into the lungs.
6. Plunging the face into sand, mud, etc.

Suffocation often occurs as the end of many diseases, from effusion of blood or matter into the windpipe, from growths pressing on the windpipe, or from bursting of aneurisms. The post-mortem appearances seldom show any marks of violence. The signs generally are those of asphyxia, but they are so inconstant and so variable, and the examination shows so little that is characteristic that in the absence of other suspicious circumstances, death would be put down to natural causes; as for example in children to convulsions.

Suicidal suffocation is very rare, but accidental suffocation is quite common, especially in the case of children of the poorer classes, where they are put to sleep in the same bed with their parents.

Children also may be suffocated in swallowing pieces of meat or by drinking scalding liquids, which cause œdema, or swelling of the glottis. Homicidal suffocation is uncommon except in the case of children.

Smothering is a form of suffocation by covering the mouth and nostrils so as to prevent access of air. It produces death from asphyxia and is not uncommon in newly-born children either from accident or design. Thus a newly-born child is easily smothered in the discharges of the mother or even by being wrapped too closely in clothes. Remember that in all deaths from asphyxia, it does not necessarily follow that congestion of the lungs will be found after death; perhaps the only really constant sign on post-mortem examination is an abnormally fluid state of the blood, which, one should add, may be observed in other diseased conditions as well.

Remember that in all legal post-mortem examinations the larynx and trachea should be examined for foreign bodies.

SUFFOCATION BY GASES

as by carbonic acid, or carbonic oxide, is either accidental or in some cases suicidal, rarely if ever homicidal. These gases suffocate by preventing the access of proper air to the lungs, but they have in addition poisonous properties of their own, and may hence be called gaseous poisons. Carbonic acid is the "after-damp" which destroys so many lives after explosions in collieries, whilst carbonic oxide is the gas given off from coke-fires, and is even more deadly than carbonic acid. The vapours from furnaces are mixtures of several gases, and

many cases have happened where workmen have succumbed to an overdose. The effects of all these gases are very insidious, so that persons affected become gradually more and more prostrate and never make any effort to escape until too late, or often they fall into a deep sleep from which they never awaken. The vapours of limekilns or brick or cement-kilns are all poisonous in the same way owing to the production of carbonic oxide, carbonic acid, and other gases. Coal-gas acts directly as a poison. In one case on record a woman was murdered by her husband by means of opium, and to avert suspicion of the cause of death the murderer had burst the gas-pipe in the bedroom and endeavoured thus to account for the death of his wife. Sulphuretted hydrogen gas is very poisonous; it and its compounds the sulphides occur largely in the putrefaction of animal matters, and hence accidental poisoning is not uncommon in men who remove night-soil, or clean cesspools, or who work in sewers and drains which are not thoroughly ventilated.

CHAPTER XI.

DEATHS FROM LIGHTNING

are of importance to the medical jurist, because frequently the appearances on the body of a person struck by lightning resemble those produced by severe mechanical injuries. As a rule, the fact that the body is found after a thunderstorm in such a situation as would be consistent with a stroke from lightning would be sufficient to put one on one's guard. Usually a person so struck either dies immediately or recovers, i.e., after the first danger is past there is not much risk of relapse. The symptoms generally are those of shock or concussion of the brain.

If the person die, the post-mortem appearances are :—

1. Death may be so sudden that the body retains its attitude when struck.
2. There may be marks of laceration or bruising where the current has passed.
3. The clothes may be rent or singed, and there may be a smell of burning.
4. There are often lacerated punctured wounds, or there may be red arborescent streaks on the skin.
5. There may be actual burns.

All the above appearances may be produced, where death has occurred from touching electric wires in connection with the electric light or electric tramcars.

COLD

may destroy life, if intense and prolonged, and even without these factors if accompanied by poverty and want of proper food. The effects of severe cold are generally numbing of all the faculties, followed by deep sleep, coma and death. Infants are very susceptible to cold and easily perish from this cause, as do the aged, the infirm and the intemperate.

The most common appearances found after death from cold are pallor of skin, or a kind of blushing redness on the skin, a florid condition of the blood, and fulness of all the cavities of the heart, but such appearances only afford a presumption of the cause of death and must be judged in connection with all the surrounding circumstances.

STARVATION

may be the result of criminal neglect on the part of parents or other persons having charge of young children, and many cases of this kind have been brought to light of late years by means of the efforts of the National Society for the Prevention of Cruelty to Children. In the case of children starvation may occur not only from the deprivation of food, but also where the food given is of an improper kind, so that the unfortunate child is unable to digest or assimilate what is given to it. In adults the symptoms of starvation are, progressive emaciation, prominence of the bones,

fœtid odour of the skin and breath, sometimes delirium and death. In all charges of death from homicidal starvation, the defence is sure to be that death was due to some coexistent natural disease, which has either directly caused death or has indirectly caused death by preventing the person from being able to take or to assimilate any or sufficient food. Hence the great importance of examining every organ and every cavity when making a post-mortem examination.

According to Dr. Stevenson, the only diagnostic marks of death from starvation are emaciation, absence of fat in the body, distension of the gall bladder, and a peculiar thinning of the walls of the intestines, which may become extremely translucent. It has been asserted that death could not have been due to starvation, where there was also delirium, but this does not follow, as this symptom may appear, in the absence of any disease to account for it, in any case where there is great bodily exhaustion arising from any cause whatever. In homicidal starvation, it is sufficient to prove that the food given is too small in quantity or improper in quality, but in all cases it is a question to decide as to whether the father or mother or both should be indicted. In cases of very young children, probably the mother would be held responsible, in older children probably the father or both.

There is however no specific sign of death from criminal starvation on post-mortem examination. Similar signs may occur in all cases where death has resulted from wasting organic disease, and also from some nervous disorders which leave no post-mortem indications; and where a medical

witness swears death is due to starvation, he should be cross-examined specifically as to whether he has searched for (1) cancer of any part of body, (2) stricture of the gullet, (3) tubercle, (4) diabetes, (5) chronic diarrhœa, (6) Addison's disease, all of which diseases do in a manner cause death by starvation, i.e., the food taken is either insufficient in quantity or is never properly digested; usually of course both conditions are present.

CHAPTER XII.

PREGNANCY, DELIVERY, ETC.

Before entering on the medico-legal questions involved in pregnancy, delivery and abortion, a short account of the anatomy and physiology of the reproductive organs may be useful.

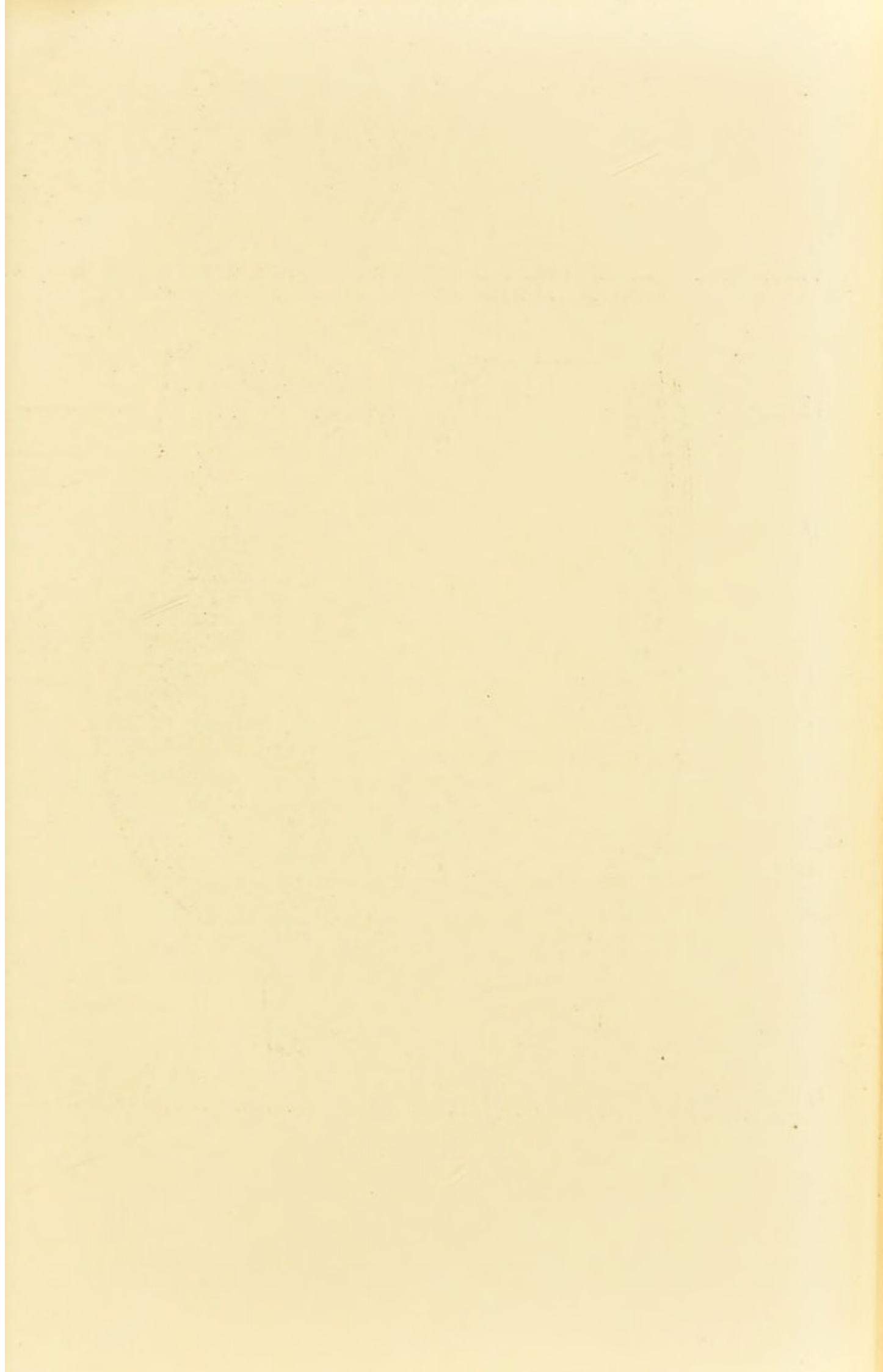
The organs of generation in the male are:—

1. The penis.
2. The testicles, which secrete the semen or seed emitted in the act of intercourse. The potentiality of the semen as regards procreation depends on the presence of characteristic microscopic filaments termed the spermatozoa. The semen is carried from the testicles into the penis by two tubes, one for each side known as the vasa deferentia.

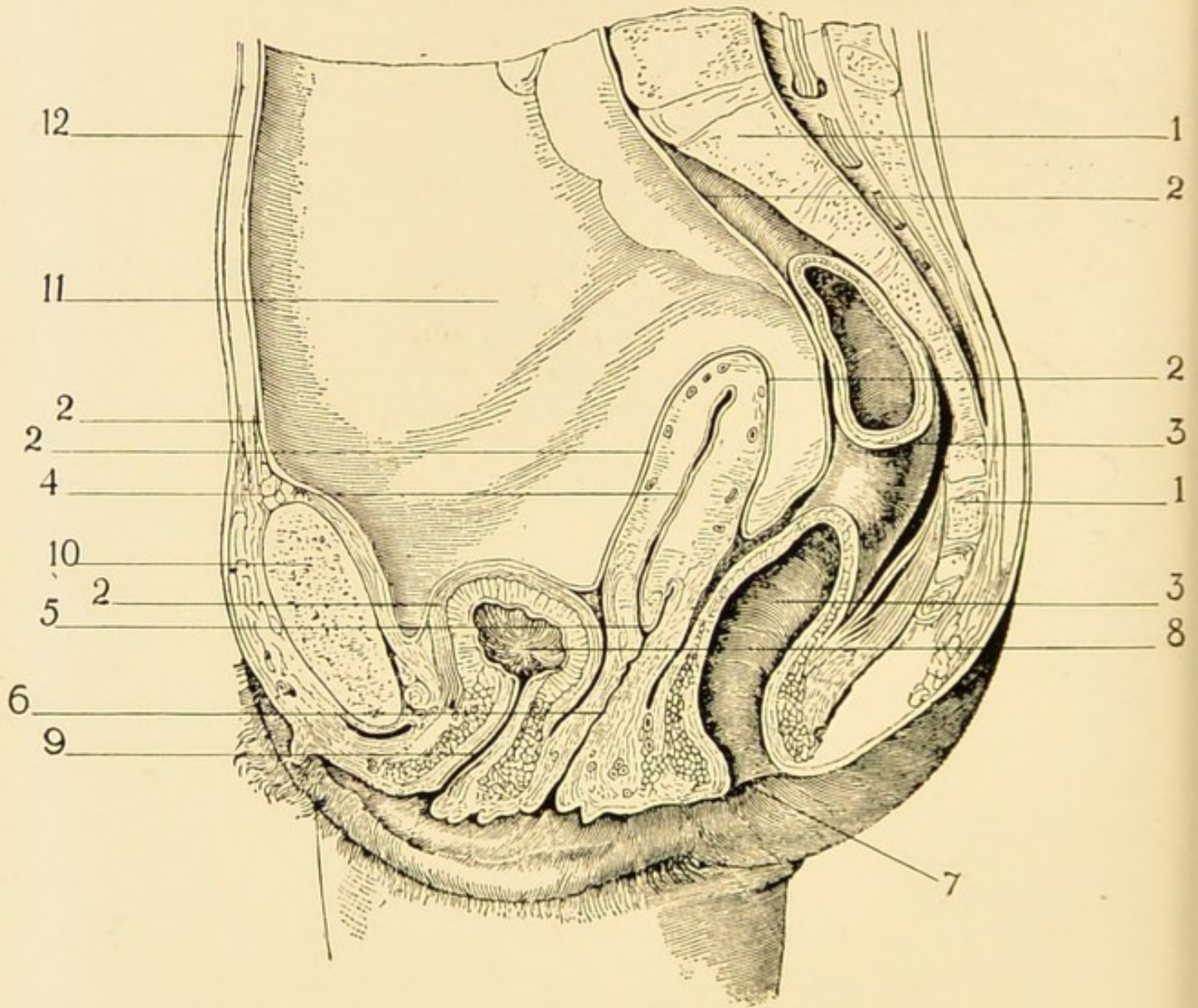
The organs of generation in the female are:—

1. The external organs, chiefly concerned in the act of copulation; these include (*a*) the vulva or external parts, and (*b*) the vagina, the passage leading from the vulva to the uterus.

In virgins the entrance to the vagina is more or less obstructed by a crescentic fold of membrane known as the hymen. The presence of a firm, unruptured hymen, is regarded as an important sign of virginity, but as the membrane may be ruptured



VERTICAL SECTION THROUGH FEMALE PELVIS SHEWING RELATIVE POSITIONS OF
BLADDER, BOWEL, AND ORGANS OF GENERATION.



1, Sacrum ; 2, Peritoneum ; 3 Rectum ; 4, Uterus ; 5, Os Uteri ; 6, Vagina ; 7, Anus ;
8, Bladder ; 9, Urethra ; 10, Os Pubis ; 11, Abdominal Cavity ; 12, Skin, etc.

not only by sexual intercourse, but also by accidental injuries, or even, it is said, sometimes by mere stretching of the limbs, its absence is not a sure sign of unchastity. In front of the vagina are the bladder and urethra, which is the channel for carrying away the urine from the bladder; behind is the rectum, the end of the large bowel.

The uterus or womb is deeply situated in the pelvis between the bladder and rectum; in the adult virgin state it is a small muscular organ about $2\frac{1}{2}$ inches long, but its size varies greatly during menstruation and pregnancy; it is supported in the pelvis by a mass of fibrous and connective tissue called the broad ligaments.

Coming off from the uterus, one on each side are the Fallopian tubes, which are of like function in the female to the vasa deferentia in the male, i.e., they carry the ovule to the uterus; in addition they also carry the semen to the ovary. At the outer end the Fallopian tubes are close to the ovaries.

The ovaries are two small organs situated on each side of the uterus, and in them the eggs or ovules are formed. They are connected with the uterus by the Fallopian tubes, and their function is to supply the ovule or female generative element, which when ready for impregnation, is forced into the Fallopian tube and so into the uterus. This process of discharge of the ovule takes place periodically, usually at an interval of 28 days; it is accompanied by a discharge of blood from the womb and the external generative organs, giving rise to menstruation. This process of ovulation and menstruation goes on during all the child-bearing period, viz., from 15 to 50 years of age roughly, and only is stopped, as a rule, during

gestation and suckling. If the ovule or egg, on its passage through the Fallopian tubes and the uterus comes in contact with the spermatozoa of the male, then impregnation may occur, and from the small minute speck of organised matter thus impregnated, the fœtus is gradually formed in the uterus. It is not necessary to go closely into the subject of the development of the fœtus in the womb, but eventually the new life, the fœtus, comes to assume more or less the shape of a child, and is floating in a closed sac, called the amnion, which is filled with a clear fluid, the liquor amnii. It is connected by the navel-string, or umbilical cord, with a large fleshy mass which has in the meantime formed on the internal surface of the uterus, called the placenta. Through the navel-string, large blood-vessels pass from the fœtus to the placenta, which is itself in close connection with the blood-vessels of the uterus. All the blood circulating in the body of the fœtus passes into the placenta by the umbilical arteries, which split up into capillaries. The blood is then returned by the umbilical veins, having in its progress through the capillaries given up its waste products and having absorbed from the maternal parts the nourishment necessary for the fœtus. The blood thus purified eventually returns to the right auricle of the fœtal heart by the ductus venosus and thence directly into the left auricle, thence to the left ventricle, and so to the aorta. The blood which comes to the right auricle from the upper parts of the body passes directly to the right ventricle, and thence into the pulmonary artery, and so by the ductus arteriosus into the aorta. Until birth and the occurrence of respiration very little blood passes through the pulmonary arteries

to the lungs. Up to the end of the third month of gestation, the foetal and maternal parts are in one mass, and if an abortion takes place, they all come away together. After the third month the foetus itself comes away, but often the placenta and membranes remain behind and set up the hæmorrhages and blood-poisonings which are so commonly serious and fatal even after natural abortions. In the normal process of parturition, the head is born first and the body easily follows. As soon as the body is completely born the umbilical cord is securely tied by those in attendance, and then divided by scissors. In the chapter on infanticide it will be found that the cord in such cases has been torn across and not tied and divided in the usual way. In abnormal cases the body of the child may be born before the head, in which case great difficulty may be experienced in effecting delivery of the head and even with skilled attention many children will be still-born.

Pregnancy may be a matter of medico-legal importance, as for example in criminal cases when a woman has been convicted of murder and pleads pregnancy in stay of execution, or (2) in civil cases, as where a widow after the death of her husband believes herself to be pregnant and the devolution of property may thereby be altered. Negatively also a woman may require to disprove an allegation of pregnancy in relation to libels and slanders imputing unchastity. Where a woman pleads pregnancy in bar of execution by the law of England she must prove not only that she is pregnant but also that she is quick with child, i.e., that the foetus is alive in the womb. The legal procedure in such cases was formerly by the issue of a writ de ventre inspiciendo and a jury of

matrons was empanelled; skilled medical advice is now always obtained in addition to the jury of matrons. Beyond the above points the subject of pregnancy is not of much medico-legal importance, and a very short description of the signs and symptoms will suffice.

These signs may be (1) uncertain, (2) certain.

I. Uncertain signs.

(a) Cessation of menstruation is usually the first symptom which causes suspicion of pregnancy, but sometimes the menstrual discharge may go on for two or three months after pregnancy has begun, and in some cases, it is said, during the whole period; on the other hand menstruation may be arrested by many diseases and irregularity is very common without actual disease or illness. Pregnancy also may take place in young girls before the menstrual flow has been established, or in elderly women after it has long ceased.

(b) Changes in the breasts are amongst the earlier symptoms; they become larger and firmer and a dark border forms round the nipple. These changes are much less marked in later pregnancies than in the first. Very early in the pregnancy, pressure on the breasts will cause a drop of thin watery milk to flow from the nipple; in the case of a first pregnancy this is, I believe, a certain sign, and one that can be easily and decently applied in the class of case where it is necessary to detect the existence of pregnancy without giving any clue to the suspicion the examiner has formed. In women who have already borne children this sign is of no practical value, as milk may remain in the breasts long after lactation has ceased.

(c) The belly begins to enlarge about the third month as the foetus increases in size, and gradually grows bigger until the full time. This increase of size may be simulated by accumulation of dropsical fluid or by tumours either of the womb itself or of other abdominal organs.

(d) Usually the movements of the child may be detected from the fourth to the fifth months, when quickening, as it is termed, takes place. By "quickening" we mean the peculiar symptoms described by the mother when the movements of the limbs of the foetus become perceptible to her; those sensations are obvious to the mother for some time before the foetal movements are perceptible on external examination. Nervous women often fancy they have quickened long before they have done so, or even in some cases of imaginary pregnancy, when they are not pregnant at all.

II. Certain signs.

(a) Ballotment, by which is meant the feeling imparted to the finger applied to the neck of the uterus per vaginam and suddenly pressed upwards, when the foetus so jerked up in the bag of fluid (the liquor amnii) in which it floats, falls back on the finger. This sign, owing to the small quantity of liquor amnii or other causes, may not be available.

(b) Uterine souffle is an intermittent sound, varying in character, heard on listening over the lower part of the womb, and can only be heard by a skilled observer. It is a blowing sound, synchronous with the maternal pulse, and is produced in the maternal arteries.

(c) The sounds of the foetal heart, which can be heard of course only when the child is living.

The foetal heart sounds are rarely heard before the fifth or sixth month of pregnancy, and sometimes are difficult to hear, or may be altogether absent for variable intervals.

(d) A peculiar softening in the neck of the womb and an alternate contraction and relaxation of the womb, to be felt when the hand is placed on the abdomen, are also significant, but need not be further mentioned here.

Pregnancy may be feigned to extort money or for other purposes; if feigned, a proper examination would at once detect the fraud.

Pregnancy may not only be feigned, but imaginary. Sometimes women of neurotic temperament imagine they are pregnant, and their imagination may have such influence that many of the uncertain signs of pregnancy may be produced, especially the enlargement of the abdomen, which may increase to a great size through gaseous distension.

Where pregnancy is pleaded in bar of execution, there is a jury of twelve married women "de circumstantibus" to be impanelled, and to decide if the prisoner be quick with child; if so sentence is respited. As the foetus is alive from the moment it reaches the uterus, it is absurd that quickening should be made the test for a respite, and at the present time a proper examination by skilled physicians would be made; if they swore that there was a live foetus in the womb, sentence would probably be respited, although quickening had not taken place. As a rule, no opinion is required for legal purposes on the question of pregnancy, until it has become so far advanced that there can be no doubt on the subject.

In Scotland the mere concealment of PREGNANCY, if the child be found dead, or is missing, is a crime, on the principle that all women should prepare for the coming child, and that if it be born dead, or is missing, or is born secretly, its death is due to want of proper preparation for the birth.

There can be no question that a woman may become pregnant without knowing it, when connection has taken place whilst she was stupefied with drugs or alcohol; it is even said that connection may take place during ordinary sleep without waking the woman, but such a circumstance would be highly improbable in a virgin or one unaccustomed to regular sexual intercourse; in every case such a story should be viewed with the greatest suspicion.

Married women sometimes go on to advanced periods of pregnancy without knowing they have conceived, and unmarried girls, when charged with being pregnant, often profess to have been quite unaware of their condition, but the motives for falsehood in these cases render all such assertions quite untrustworthy.

We must remember that the presence of the hymen—a ring of fibrous tissue situated at the entrance to the vagina, and usually ruptured on the first attempt at sexual intercourse—is not an absolute sign of virginity, this membrane sometimes not being destroyed by sexual intercourse, and cases are recorded where it has been present up to the time of delivery. Generally, however, where the hymen remains intact and there are no other signs of injury or laceration, one would be justified in saying there had never been any penetration of the male organ into the vagina.

The period of child-bearing varies in different

countries; in England it may begin as early as twelve or thirteen years, but the usual age is from fifteen to sixteen. The power of conception ceases usually at from 45 to 50 years of age, but cases of pregnancy beyond 50 are, it is said, not very uncommon. Personally I do not remember having seen a woman of that age pregnant. There is apparently no limit to the power of procreation in the male, many very old men having married and become the fathers of children.

Proof of delivery is much more important, medico-legally, than pregnancy, as the proof that a woman has been recently delivered of a child may be of the greatest importance in questions of infanticide and abortion and concealment of birth.

What then are the signs of recent delivery in the living?

1. The woman is weak, tired-looking and pale, the breasts probably full of milk, and the nipples enlarged.

2. The skin of the belly is relaxed, and there are often brownish streaks passing up from the pubes to the umbilicus or navel, produced by the manner in which the skin has been stretched by the gradually enlarging uterus. These brownish streaks may, of course, occur in abdominal enlargements from other causes than pregnancy.

3. The uterus itself may be felt enlarged and hard ("like a cricket-ball") towards the bottom of the belly just above the pubes.

4. Externally the vulva or external parts of generation is swollen, and often bruised and torn. On examination per vaginam the enlarged uterus can be felt by the fingers.

5. Presence of the bloody discharge, called the lochia. This discharge is at first bloody, but after a varying time, usually a few days after delivery, it becomes greenish or brown, and has a peculiar smell. All the above signs may disappear by the tenth day, and a decided opinion that the woman has been recently delivered may be impossible after that period. Remember also that to examine a woman against her will, or without her permission, is an indecent assault.

If the person be dead, the signs of recent delivery would be:—

1. The external parts would have the same appearances as in the case of the living person, viz., the relaxed skin of the belly, the hard uterus, the bruised, swollen state of the external genitals, etc. If death occurred soon after delivery, the mouth of the womb (*os uteri*) would be wide and gaping, and the cavities of the uterus and vagina continuous; if death occurred later the womb would be correspondingly smaller and more contracted, and the *os uteri* more or less closed.

The signs showing that there has been a previous delivery some time in the past are:—

1. Silvery lines or streaks on the belly, or on the breasts, indicating slight lacerations, the result of previous distension.

2. An injured or fagged *os uteri* is a very important sign of previous delivery, as it is common for the *os uteri* to suffer more or less laceration during delivery; probably the *os uteri* never regains absolutely its normal virgin condition after parturition has once taken place. On the other hand all the signs of previous delivery may fail, even to the extent of the hymen being still

present. The question of previous delivery can only be raised in reference to delivery of a child at the full time, for early abortions take place constantly without leaving any trace whatever on the generative parts of the mother.

Delivery may be feigned to extort money, etc., and as it is only recent delivery that is feigned, the imposture will be at once detected on a competent examination.

Where a woman is charged with infanticide, i.e., with the murder of a NEWLY-BORN child, the plea is often made by the mother that she was delivered unconsciously and without knowledge on her part. Such a thing is possible, especially in *multiparæ*, i.e., those who have borne children before, or in those under the influence of diseases or drugs causing stupor, as apoplexy or alcohol respectively; in a *primipara* in natural health (and it is chiefly against *primiparæ* that charges of infanticide are made) such an occurrence is very improbable. The acuteness of the pain, or the hæmorrhage accompanying parturition, however, may both cause syncope, from which the mother might not recover until the child was dead. Some women also suffer from convulsions and delirium during the period of parturition, which entirely deprive them of consciousness for the time. Another plea often urged on behalf of the woman in such cases is that delivery took place unexpectedly whilst defæcating or passing water, and that she did not know what had happened until too late to save the life of the child. Such an event is quite possible, but careful enquiry should be made into all the surrounding circumstances in order to see if the whole story be consistent. After such an accident, of course, no

woman could remain ignorant that she had been delivered, but as a matter of fact in many cases where this plea has been raised, the women have asserted that they did not know they were pregnant, and had never therefore made the requisite preparations for parturition.

Peculiar changes take place in the ovaries in connection with menstruation and pregnancy, resulting in the formation of what is called a corpus luteum. It was formerly supposed that the character of the corpus luteum afforded a certain indication of pregnancy or otherwise, but it is now recognised that the difference in the character of the corpus luteum in pregnancy and in menstruation is one of degree only, and this subject is therefore now of no importance.

In some cases pregnancy may take an abnormal course, and the ovum and placenta may mass together and form a fleshy mass known as a "mole." This is a result of conception having taken place, but in the absence of skilled microscopic examination it may easily be mistaken for polypi or other morbid growths of the uterus which have nothing to do with conception, and which are common in virgins.

Where the ovum or foetus has been expelled and found, the medical witness may be able to determine from the degree of development at which it has arrived to what stage the pregnancy had advanced, as in the following table copied from Husband's Forensic Medicine.

<i>Month.</i>	<i>Length.</i>	<i>Weight.</i>	<i>Observations.</i>
1st	6 lines	20 grs.	Curved embryo, eyes seen.
2nd	19 ,,	2 to 5 dr.	Head large, nose visible, sex doubtful, abdomen closes in.
3rd	2—2½ in.	1 to 2 oz.	Eyes and mouth closed, fingers seen, nails, sex detected, placenta separate.
4th	5—6 ,,	1—3 ,,	Skin distinct, sex ditto, mouth large, meconium in bowels.
5th	10—11 ,,	7—10 ,,	Nails distinct, head, liver, heart large, hair appears.
6th	12—13 ,,	1—2 lb.	Hair on body, meconium present, testes in belly, pupillary membrane present.
7th	13—15 ,,	3—4 oz.	Hair long, meconium, pupillary membrane going, eyelids not adherent, vulva open.
8th	15—16 ,,	3—5 ,,	Skin rosy, hairy, pupillary membrane gone, testicles in scrotum, long nails.
9th	16—18 ,,	6 ,,	Head hairy, scrotum corrugated, vulva closing.
10th	17—20 ,,	7—9 ,,	Maturity, hair on head, testes in scrotum, point of ossification in end of femur.

Concealment of birth is made a misdemeanour by 24 and 25 Vict. ch. 100, s. 60. "If any woman shall be delivered of a child, every person who shall by any secret disposition of the dead body of the said child, whether such child died before at or after its birth, endeavour to conceal the birth thereof, shall be guilty of a misdemeanour."

Also any person tried for murder of her child and acquitted may be convicted of concealment of birth, if it appears that a child had been recently born, and that such person did endeavour to conceal the birth by some secret disposition of the body.

As to what constitutes a "secret disposition" of the body see Archbold Crim. Plead., 22nd ed., p. 791. Conviction under this section usually depends on medical examination of the mother showing she has been recently delivered; if there be proper evidence of death of child, its body need not be necessarily produced for a conviction, as it may have been secretly burnt or buried. Note that the child must be dead; it is no offence to conceal the birth of a living child, unless it die before its birth is known to others. Probably the concealment of an aborted foetus which has not reached the viable age (i.e., the time at which the development has reached such a stage that there is a possibility of rearing the child, although born prematurely), would not be held an offence under this section. and hence many difficulties occurring in the proof of an alleged infanticide (q.v.) are avoided.

Abortion means in law the expulsion of the foetus from the womb anytime after the occurrence of conception before the full period of gestation is completed. Criminal abortion is made an offence

by 24 and 25 Vict. ch. 100, s. 58, 59. In medicine but not in law the term abortion is usually confined to cases where the ovum is expelled not later than the sixth month of pregnancy; if expelled between the end of the 6th and the 9th month, it is called premature labour. The practical distinction is that an abortion means an expulsion of the fœtus before it has arrived at such maturity that it is possible to be reared. Generally a child born before the sixth month of gestation will not long survive birth. It is a felony to procure, or attempt to procure, the miscarriage of a woman, whether pregnant or not, and it is a felony for a woman to attempt to procure HER OWN miscarriage, but only if she be in fact pregnant (see 24 and 25 Vict. ch. 100, s. 58, 59).

Criminal abortion is said to be rare before the third month and usually takes place between the fourth and fifth month, but it would probably be more true at the present day to say that criminal abortion is most commonly resorted to much earlier, viz., as soon as the missing of a menstrual period makes the woman suspect she is pregnant. Abortion in the great majority of cases is the result of natural causes, such as acute diseases, syphilis, etc., or of local displacements of the womb interfering with the growth of the fœtus, and so causing its death. As a rule in a natural abortion the actual exciting cause of the expulsion is the irritation set up by the death of the fœtus, and the commonest time for natural abortion to occur is near the end of three months' gestation.

In other cases abortion may be caused by:—

1. Accidental injuries, which would probably be recognised by consideration of the kind of violence

used and the adequacy of such violence to cause abortion as alleged.

2. Criminal abortion may take place:—

- (a) From irritating medicines, which, however, are far from certain in their ecbohic effects, and often, without producing the abortion desired, cause dangerous diarrhœa and vomiting or inflammation of the bowels. Corrosive sublimate, arsenic, strong purgatives, have all been used for this purpose. According to Dr. Stevenson large doses of aloes with ferric chloride are much used in the earlier stages, and ergot in the later stages. If both fail then mechanical means are used. In medicine an ecbohic is a drug which forces out the contents of the womb, whereas an emmenagogue is a drug which directly or indirectly helps to assist in promoting the menstrual flow. Amongst other drugs which have been used are rue, pennyroyal and savin, tansy, and saffron. In all charges of attempting to procure criminal abortion by drugs, it is a question of fact, whether the drug is "noxious," i.e., whether it is capable in the case in question of acting as an ecbohic. Probably the only unequivocal ecbohic known is ergot of rye (Stevenson). All the other substances mentioned may produce dangerous or fatal inflammation without causing abortion at all. Ergot has the power not only of increasing the uterine contractions during actual labour, but also of initiating contractions and so

acting as a proper ecboic. It does not cause severe irritant symptoms like the drugs previously mentioned, and hence there would be few post-mortem changes after a fatal dose. Ergot is not readily fatal in a large dose, but is poisonous in small doses long continued. In one case where the only evidence of administering ergot was given by the patient herself, the prisoner was acquitted on the ground that by taking the ergot, the woman was an accomplice, and that there ought not to be a conviction where the evidence of an accomplice was uncorroborated.

Injections into the vagina have also been used for the purpose of procuring abortion, and the words in the statute "other means whatsoever" are possibly wide enough to include cases where abortions have been criminally brought on by the injection of liquids not primâ-facie injurious, as e.g., very hot water.

- (b) By mechanical violence. Blows, pressure on the belly, violent exercises have all been used, but practically criminal abortion in this country is always performed by persons, male or female, qualified or unqualified, by the introduction of an instrument into the uterus and consequent rupture of the membranes (or bag in which the child lies in the womb) and escape of the liquor amnii (the fluid in which the child floats in the membranes), when expulsion of the foetus usually follows in a very short time. There is reason to believe that the practice of

criminal abortion is very common in this country, especially in large towns, and that many persons obtain their living in this way. When performed with ordinary skill and care, the risk of a fatal issue is very small, and where one case is brought to light, hundreds are concealed. Practically the only danger with proper skill is that of causing injury to the womb and the parts around, and consequent peritonitis or septicæmia, i.e., blood-poisoning. The generative organs of women both during pregnancy or abortion, or after delivery, are very susceptible to blood-poisoning, which is often fatal—in fact it is probably true to say that almost all deaths from so-called puerperal fever are deaths from blood poisoning. In deaths from mechanical violence, the womb may be found to have been perforated or the peritoneal cavity opened, but in the absence of obvious injuries (which would almost always be the case where the operation has been skilfully done), there is nothing to distinguish the fatal septicæmia of a natural abortion from that of a criminal abortion. It is important to remember also that criminal abortion is common in the married as well as the unmarried.

Although the accused, in bringing on an abortion does not mean to cause death, the crime is murder if death result. "If a man for an unlawful purpose use a dangerous instrument or drug, or other means and death ensued, that is murder,

although he might not have intended to cause death, although the person dead might have consented to the act, and although the accused might very much regret the result" (Bramwell B.). "But if the instrument used were not a dangerous one," although used for an unlawful purpose, the crime might be manslaughter." In a recent case also Bigham J. told the jury that if they were of opinion that the deceased died as a result of the prisoner's unlawful operation, he was guilty of murder, but added that if they should be of opinion that the prisoner could not as a reasonable man have expected death to result, they might find a verdict of manslaughter (see Archbold, p. 765). A similar direction was given by Grantham J. in a recent case tried at Manchester Assizes.

In the examination of a medical witness in reference to the supposed power of any drug to cause abortion:—

1. Get to know if the drug is really noxious in any dose, or at all events that it is noxious in the doses administered, and whether it really has any ecboic or emmenagogue properties.
2. Does the witness base his opinion on actual experience or on statements in books he has read, and if so,
3. Who is the authority for the statements made.

The signs of abortion having taken place as regards the woman are those of recent delivery (q. v.) whether the woman be living or dead, but of course the earlier the period at which the abortion occurs the less marked will be the signs. Even where the pregnancy is considerably advanced

before abortion takes place, all the signs will have disappeared if the woman be not examined within about ten days of the abortion. Where death is alleged to have been caused by the use of instruments, which have caused peritonitis or septicæmia, great care must be taken to find out on what facts the medical man has formed his opinion that instruments had been used, whether, e.g., he is relying on statements made by the woman herself or by friends or relatives, or whether he has himself found by post-mortem examination unequivocal indications of such mechanical violence as can leave no doubt that the fatal illness was due to such violence and not to the natural peritonitis or septicæmia so common in pregnant and parturient women. It is important also to bear in mind that in addition to the fact that peritonitis frequently follows a natural abortion, the same disease may occur from other abdominal causes independently of pregnancy, and may then be itself the cause instead of the result of an abortion, i.e., the irritation of the peritonitis may have produced the abortion; in this case probably the cause of the peritonitis would be recognised on post-mortem examination.

Sometimes the substance expelled from the womb may be discovered and examined, and when the embryo has reached a certain stage of development, no difficulty or doubt can arise. In the early months, however, the products of conception are usually cast off in one fleshy mass, and may be mistaken for moles or other uterine growths, the result of disease and not of conception; in such cases it is not safe to swear that any substance so thrown off is an abortion, unless by microscopic or other examination it has been made clear what is

the nature of the substance expelled. In such a case probably only the evidence of a skilled microscopist would be reliable.

Cases have been recorded where women have feigned abortion. If not examined immediately after the alleged abortion, there will be no evidence of an abortion having taken place, and if it were the fact that the statement had been long delayed, there would be a strong presumption that it was untrue.

Criminal abortion is a statutory offence by 24 and 25 Vict. ch. 100, s. 58 and 59, see ante p. 188. Remember, whoever attempts to cause another to abort, is guilty even if no pregnancy exist. A woman attempting to cause herself to abort herself must be pregnant at the time or there is no offence. S. 59 deals with administration of poisons or "noxious things" for the same purpose. If a drug be a poison there is no difficulty, but where the drug is non-poisonous (v. definition of a poison p. 118.) it seems to be a question of fact in each particular case as to what constitutes a "noxious thing." A thing innocuous in small doses, or in a single dose, may be "noxious" if given in large doses, or continuously, or at improper times. One must remember also that the intent is the important thing to prove, and when the intent is proved, it makes no difference that the substance administered was not likely or probable to produce the desired effect. Further, a substance which might be not only harmless but even a good medicine for a non-pregnant woman, might be very noxious or dangerous indeed to a pregnant woman.

Note also that although a woman herself is only liable under S. 58 of the statute if she be with child, she may yet be convicted of conspiring with

others to procure her own miscarriage, even although she be not with child (see R. Whitchurch 24 Q.B.D., p. 420 59, L.J.M.C. 77, 16 Cox, C.C. p. 743).

It is suggested that now there ought to be no difficulty as regards what is a noxious substance, as the words in S. 59 "or any instrument or 'thing' whatsoever," ought strictly to include all substances, and so do away with the necessity of proving a thing to be noxious or poisonous (see Taylor, p. 207). On the other hand, nothing is said in Archbold's Criminal Pleading in reference to the wide meaning given to the word "thing."

Under these sections it is unnecessary to prove that the woman was injured or that as a matter of fact any abortion did follow.

Where the child is already dead in the womb, this fact clearly would make no difference as regards the crime of procuring abortion, as the offence is complete regardless of the life or death of the foetus. In the case of a monster, i.e., a foetus, as the expression goes, "without human shape," the question has arisen and in one case of this kind the girl was acquitted. Now, of course, proof of pregnancy is not required, and in consequence it can now be no defence that the substance expelled was not a product of conception.

In cases of so-called extra-uterine foetation, i.e., where the development of the ovum is going on outside the uterus, in the Fallopian tubes, the statute would equally apply.

Where bloody stains are found on the clothing of a woman who is charged with having aborted, it will probably be alleged that such stains are the result of menstruation. It has been said that there is a difference between ordinary blood, as

e.g., the blood escaping during and after an abortion and the menstrual blood, but the differences, if any, chemical and microscopical, are so slight and uncertain that no reliance at all can be placed thereon.

Premature labour or abortion may of course be designedly brought on in proper cases, where it may be necessary, in order to save the life of the mother, that the uterus should be emptied. Thus where a dwarf-woman has become pregnant and it is certain that delivery is impossible in the ordinary way, owing to the small size of the parts, one would be justified in bringing on an abortion in order to save the mother the perils attendant on delivery at the full time by the Cæsarean section or other hazardous operation. As a rule, however, a medical man before inducing a miscarriage would act wisely in always being fortified by a previous consultation with another medical man. If both are agreed as to the necessity for operation, and as to the fact that greater danger would result from natural delivery than from the proposed induction of labour, than such a procedure is quite justifiable. In the absence of such precautions, it is possible that a practitioner might find himself charged with manslaughter, if the woman were to die after the operation. But with the above obvious proper precautions, the production of a miscarriage would not be "unlawful" as required by the section.

Live birth is "the entire delivery of the child." It may, or may not, be separated from the body of its mother, i.e., the cord may or may not be divided, the afterbirth may or may not be expelled. So long as the child is in the womb it is "en ventre sa mere"; even so it may have rights, as of inherit-

ance, or a right to damages for the death of the father through injury, but in such a case the damages would only be assessed on the birth of a living child. The exact date and time of birth are often important questions in relation to succession to property, and it is important to remember that the child must show signs of life after it is entirely delivered, otherwise it acquires no civil rights; the navel string, however, need not be divided. The exact time may be of great importance in regard to the question when the legal time of infancy ceases.

The rule of law that the child must be entirely separated from the mother before it is considered to be born is very unreasonable in criminal law, as it would seem that the killing of partially-born children is therefore no murder. On the other hand, if respiration were held to be the specific sign of live birth, difficulties may again arise, as many children are said to have been born alive which have never breathed.

What then are the unequivocal signs of live birth? Of course if the child after complete separation from the mother breathe or cry out, there is no doubt; but even if there be no sign of breathing, other sufficient signs may be present. Thus the foetal heart may be felt or may be heard to pulsate, or there may be spasmodic twitching of the muscles; such manifestations, even if only momentary, are sufficient signs of life to enable a child to acquire civil rights. Mere warmth of the body, in the absence of any other sign of vital action, is not sufficient to prove live birth.

In Scotch law, for the proof of live birth, there must be both breathing and crying, but this test is unsatisfactory, as children may be born alive, as stated above, without breathing, and may breathe

whilst partially born and be yet dead before complete separation from the mother. In cases of doubt, the medical witness should always be asked if he listened to the chest with his ear or stethoscope, as the pulsation of the heart is an absolute sign of life in English law. The child may cry out before it is completely born, and in some very rare cases it is said the child may cry out whilst in the uterus after the rupture of the membranes and evacuation of the liquor amnii (*vagitus uterinus*). Such cases are very rare and other surrounding circumstances would probably prevent any difficulty arising.

CHAPTER XIII.

TENANCY BY THE COURTESY.

Where a married woman dies intestate, subject to the provisions of some recent statutes, the husband acquires a life interest in the property, if there has been a child of the marriage born alive. Hence proof of even a momentary existence of the child may be of great importance to the husband. In order to establish his claim, the husband must prove

1. That the child was born alive, in accordance with the evidence of live birth required by English Law, and the onus of proof that the child was born alive is on the husband.

2. The child must be born whilst the mother is still alive. Where the child is removed by Cæsarean section after the death of the mother, there is no tenancy by courtesy. Formerly the Cæsarean operation was only performed after the death of the mother, but at the present time it is often performed, and moreover performed successfully, whilst the mother is living, and both mother and child often recover. The old law never contemplated the operation being performed on a living woman, and it might be an interesting question as to whether a child extracted by Cæsarean section could be said to be born at all.

In some cases of deformed pelvis, delivery is possible without abdominal incision by means of crushing the bones of the child's skull, whilst it

is still in the uterus (Craniotomy); in such cases it is possible the child might not be completely dead before birth, and might be born showing signs of life, as e.g., twitching of the muscles or pulsation of the heart.

3. The child must be born capable of inheriting, i.e., it must not be a "monster," which is not allowed to inherit. No precise definition exists of what is and what is not a monster; from the description given in each particular case the Court would draw its own inference, and it is difficult to say what degree of monstrosity would be necessary to do away with legal rights. According to Coke, a monster is one "which hath not the shape of mankind." If the body have human shape probably it would be held not to be a monster. Of the different kinds of monsters, some are born without heads, some with two heads to one body, some with two bodies to one head, etc. The question as to monster or no monster relates only to external shape and not to internal configuration, as internal malformations do not bar civil rights.

We must also remember that in English law the question is never as to whether a child is "viable," i.e., capable of life, but whether there has been any distinct sign of life after complete birth. What these signs are has already been described.

PLURAL BIRTHS only come into medical jurisprudence in relation to primogeniture; such a question would be settled by the evidence of those present at the birth. The points to notice are the order of birth and whether any or all the infants show signs of life after complete birth.

The first-born male child succeeds to the inheritance according to the Common Law.

SUPERFŒTATION means a second conception following the first conception at any time before delivery, and gestation goes on to the full period in each case independently of the other. In ordinary cases of plural births, as twins, conception takes place at the same time. Thus a woman may conceive in January and again in March; one child would be born about October, the other about December. According to Taylor only one case involving this question has been met with in the legal records of England, so that we need not discuss it further. In some cases where there are twins in utero, one may be aborted, whilst the other goes on to full time.

What is the earliest period after conception at which a child born can be reared? Probably one born about 180 days after connection, if well developed and healthy, may live and be reared, but there are other cases related by Taylor where children born much earlier than this have been born alive and lived some years.

SUPPOSITIOUS CHILDREN.

In relation to legitimacy, women have been known to feign delivery and represent the child of another woman as their own; in other cases they have substituted a male for a female child, or a live child for one born dead. Obviously in all such cases considerable dexterity and skill will have been employed, and where a medical man is not called in until some time after the birth he may easily be imposed upon, unless he has his suspicions aroused by some unexplained circum-

stance or mystery; in any case he should enquire into all the circumstances for himself, and not trust to what he is told by a midwife, or perhaps even to the presence of blood in the room or on the bed or bedclothes, which may easily have been put there for purposes of deceit.

RESPONSIBILITY.

An infant is a person under twenty-one years of age. Minors may be witnesses, but cannot make a will or serve on a jury. There is no age fixed as to the capacity for a minor to give evidence or take an oath; but it is a matter for the Court to decide whether the witness is incapacitated by age from understanding the nature of an oath. Where a child is of tender years, and in the opinion of the Court does not understand the nature of an oath and is tendered as a witness, and the Court is satisfied that the child is sufficiently intelligent to justify the reception of the evidence and understands the duty of speaking the truth, and provided also such evidence is materially corroborated, then such evidence may be admitted under the following circumstances and under these circumstances only:—

1. The Criminal Law Amendment Act 1885, S. 4.
2. The Prevention of Cruelty to Children Act 1894, S. 15.
3. Offences against the Person Act 1861, S. 27, 55 and 56.
4. The Dangerous Performances Act 1879.
5. Any other offence involving bodily injury to a child under sixteen (Archbold, p. 359).

Under seven years of age, an infant is presumed to be incapable of committing a crime. From seven to fourteen years of age the law makes no presumption, but guilty knowledge may be proved by evidence—*malitia supplet oetatem*; the younger the child, generally speaking, the stronger the evidence required for conviction. Under fourteen years of age a boy cannot be convicted of rape, but if shown to be of a mischievous disposition, he may be convicted as a principal in the second degree for indecent assault. A female under thirteen cannot consent to sexual intercourse. At fourteen years of age a male infant becomes responsible for his actions, and may marry with the consent of his parents or guardians. A girl of twelve may marry with the consent of parents, etc.; note the anomaly, that a girl up to thirteen cannot make sexual intercourse lawful by consent, yet a girl of twelve may marry.

Remember that a person becomes of age on the first moment of the day before the twenty-first anniversary of his birthday, and that this principle of age dating from the first moment of the day before the birthday also applies to all cases of assaults on girls and all other cases, and thus sometimes a good defence may arise where the exact age is a material point.

LEGITIMACY.

Every child of a lawful marriage born within the ordinary period of gestation is presumed to be legitimate, but the presumption may be rebutted by medical or moral evidence. Where the medical evidence is that it is impossible that the husband should be the father, the child is illegitimate. Impossibility may arise:—

1. The alleged father may be under the age of fourteen years.
2. The alleged father may be impotent from disease or infirmity.
3. By reason of absence or death too long a period may have elapsed between the intercourse and the birth.
4. Child may be suppositious—the alleged mother may be sterile.

But in cases of voluntary separation, the husband is still considered the father unless he can prove that he had no opportunity for access to his wife. In Scotland, but not in England, children may be legitimised by the marriage of their parents after the birth of the children. English law disregards the date of conception in questions of legitimacy, the date of conception being uncertain, whilst the date of birth is fixed.

Note that although marriage is dissolved by death, yet a child born naturally or by Cæsarean section after the death of the mother would be regarded as legitimate, but that such children do not entitle the husband to inherit as tenant by courtesy; for this purpose the child must be born whilst the mother is still alive. Where the child is conceived during wedlock, but not born until after the death of the father, it is presumed to be legitimate, as it is also where the conception is previous to, but the birth after, marriage.

The natural period of gestation varies from 38 to 40 weeks after conception; it is usually about 280 days. It may vary without surprise from 260 to 290 days, but variation beyond these extremes is rare. Usually the first indication of pregnancy is the cessation of menstruation; as it

is impossible to say whether conception dates from the cessation of the last menstrual period or from the one which fails to appear after conception, there is always room for a difference of two or three weeks in calculating the duration of pregnancy. Even in cases where they has only been a single intercourse, impregnation may not take place at the time of connection. Spermatozoa retain their vitality in the female organs for many days, during which period they may fecundate the ovule. Cases of gestation going on for 325 days are recorded, but after a single intercourse the duration of gestation is usually about 270 days. In English law the question of legitimacy is left entirely open as a question of fact to be decided upon the merits in each particular case, but in France the duration of legitimate gestation is 300 days and in Prussia 301 days (Taylor). In all these cases the question for the jury is not by whom was the child begotten, but whether it could by any possibility be the child of the husband. Protracted gestation does not alter in any way the character of the child nor does it necessarily increase its size or weight. In some cases of supposed protracted gestation the cessation of the menses for the first two or three months may have been due to other causes than pregnancy, and hence the duration of the true pregnancy may have been no more than usual.

PREMATURE BIRTHS

are those which take place before the 38th week of gestation, and this question of prematurity of birth may be of importance in reference to the chastity of a woman. If a woman after being

married six months give birth to a fully developed child, it must have been conceived before marriage. A child born at eight months cannot be distinguished with certainty from one born at the full time. For a table of the different stages of development and of the growth and appearances of the fœtus at various periods see page 177 ante.

Few children born before seven calendar months live to manhood, but they may be born alive at six months; one is recorded born alive at the fourth month and many at the fifth month; all these only survive their birth a very short time. Still, as the question of legal rights depends not on capability of living but only on the presence of signs of life after complete birth, it is important to know that certain signs of life may exist at these early periods. The signs of live birth have been already described.

Children born at the full time may be small, but they will have all the appearances of mature development; if fœtal peculiarities remain, there is a stronger presumption that the child was not born at the full time (see table, p. 177). After birth it is always very difficult to give a reliable opinion as to whether a child was a seven or a eight or a nine months child, some experts in fact holding it to be impossible. If the child be a male and the testicles are found in the scrotum, the child must be at least an eight months child. On the other hand, if a child be born mature, which if legitimate could only be a six months child, then it must have been begotten before marriage.

Where the husband alleges that there has been no access to the wife, he must actually prove there has been no intercourse, either from the fact that he has been living at such a distance that inter-

course was impossible or possibly by the fact that the wife was living with another man on such terms that it would be ridiculous to suggest that the husband was also having sexual connection with herself; mere non-probability of intercourse will not suffice.

DISPUTED PATERNITY.

Questions as to the importance of parental likeness may occur in relation to bastardy, but even if there be resemblance such evidence is only useful for the purpose of corroborating other evidence. The likeness may be of feature, complexion, voice, attitude and action; the colour of the hair is not distinctive, but colour of skin may be of importance, as where one reputed father was a white man and the other a black man. In some cases personal deformities may be transmitted, and if so would afford corroborative evidence. Where two men are having constant intercourse with the same woman the only way of helping to settle a disputed paternity would be by likeness.

The question of paternity may also be contested on the ground of the physical incapacity of the parent by reason of impotence or sterility. A common cause of impotence or sterility is malformation of the generative organs. Up to the fourth month of foetal development it is impossible to distinguish the male from the female organs. After the fourth month these organs usually take on their distinctive characters, but in some cases there is an abnormality of development so that when the child is born the generative organs are found to be a sort of combination of the ordinary male and female organs, in some cases resembling

more the male organs, in other cases resembling rather the female. As a rule if the sexual organs resemble generally the ordinary male organs, so will the general mental character be that of the male type, and vice versâ. The organs themselves are usually unfitted for the functions of either sex. Such persons are called "hermaphrodites," and the question may arise as to whether such malformations afford ground for divorce, or may raise questions of illegitimacy on the children of whom such hermaphrodites are supposed to be the parents. In these cases also the question of sex may be of importance in relation to questions of inheritance. "An hermaphrodite may be either male or female, and it shall succeed according to the kind of sex which shall prevail" (Coke). It is often very difficult to say which sex does prevail; usually the presence of testicle would indicate a male, uterus and ovaries a female, but one case is recorded where a person with testicles and scrotum passed for a woman for 25 years. Sometimes on post-mortem neither testicles nor ovaries are found, whilst very rarely both testicles and ovaries may be present.

Sexual monstrosity does not deprive the person of rights of inheritance, but the question of sex is important as regards heirship, tenancy by courtesy, etc.

Sex may be concealed for many purposes, men having passed as women and women as men for years without detection.

IMPOTENCY

means incapacity for sexual intercourse, and may depend on moral or physical causes. The question of impotency arises in suits for divorce, contested

legitimacy, and in accusation for rape. The term impotency refers to males; the like condition in females is termed sterility.

Physical impotency arises from:—

1. Age. Under fourteen years of age, a boy in law cannot commit rape. Fecundity may continue to extreme old age, where the other bodily and mental functions are still active.
2. Malformation or diseases of the penis and testicles.
3. Constitutional disease or debility.

Pregnancy may occur even where the penis is mutilated, or where connection takes place whilst the woman is unconscious, the one thing necessary is that the spermatozoa should reach the uterus; no malformation or disease which does not bar this result can cause impotence. A man with one testicle is not impotent, nor is a man with undescended testicles, nor is a man who has a hernia or rupture, although this belief is common among the lower classes. Some nervous diseases cause impotence, especially in their later stages.

The term sterility is usually applied to women, and means incapacity to procreate, or inability to conceive.

Usually the power of procreation comes on in women at the time when menstruation begins, i.e., in this country from thirteen to sixteen years of age. At this period girls change greatly in their mental characteristics, and it is important to remember that at this time they may become temporarily insane, and do acts which may be unlawful under the influence of delusions present at this period. At this period girls are often very

hysterical and neurotic, and may make serious and absolutely unfounded accusations of criminal assault. Premature puberty, as shown by the commencement of menstruation, growth of the breasts, change of character, etc., is commoner in women than men, and girls may conceive before menstruation has ever appeared at all. Menstruation usually ceases from forty to fifty years of age, rarely later than fifty; it is still possible that a woman may become pregnant after menstruation has apparently ceased. Menstruation for the last few years is often very irregular, and conception might quite well occur and so cause the stoppage of a period which would in the ordinary course have shown itself. As regards the latest age at which a woman may become pregnant, cases of pregnancy even up to fifty years of age are not common, and must be very rare after that age. The causes of sterility are similar to those of impotency in the male:—

1. Age.
2. Disease of the sexual organs.
3. Constitutional diseases.
4. Psychological causes. In some cases women will conceive to one man and be sterile to another.

Impotency is a ground for divorce, but the impotency or impediment to intercourse or procreation must be strictly proved, and it must be evident and irremediable; it must further have existed before marriage, and must have been unknown at the time of marriage to the person suing for the divorce.

CHAPTER XIV.

INFANTICIDE

means in law the murder of newly-born children; the crime is generally committed at the time of birth or very soon afterwards. In almost all cases the children are illegitimate, and the crime is said to be commonest amongst domestic servants, who fear the exposure and consequent loss of occupation. Of course the crime of infanticide is only attempted where both the pregnancy and the delivery have been concealed. After the discussion of the difficult medical questions arising in this crime as regards proof that the child was born alive (see p. 196), and taking into consideration that the sympathy of the jury is tolerably certain to be on the side of the prisoner in the dock, it will be easy to understand that a verdict of murder is rarely recorded in these cases. As a rule the prosecution falls back on the lesser charge of concealment of birth, although in some cases the prisoner has been convicted of manslaughter. The crime of infanticide is really one of ordinary murder, but in order to guard against the risk of wrong conviction with its consequences, it is a presumption of law that every child born into the world is born dead, and the onus of proving, by medical or other means, that it was born alive lies on the prosecution.

Hence the prosecution must prove:—

1. The birth of a child.
2. That it was born alive.
3. That it has been murdered.

A woman may be found guilty of infanticide, even though the body is never discovered, provided that the other evidence is decisive. Where a medical man is attending a woman charged with or suspected of this crime, he should be very cautious what questions he puts to her, as any statements made to him by his patient will have to be divulged in court, there being no privilege in regard to statements made by a person to his or her medical attendant. But of course any statements elicited which were not absolutely voluntary would be inadmissible.

As to 1. It must be proved that the child has actually been born alive, and it will be remembered that the fact of the child not having breathed is not conclusive that it was born dead, whilst the fact that it has breathed is not conclusive that it was born alive. As to what constitutes murder in a new-born child see Archbold Crim. Pract., 22nd ed., p. 752.

MATURITY OF THE CHILD. VIABILITY.

In order that a child may become the subject of a charge of murder, it is not necessary that it should have reached a stage of development at which it is viable, i.e., capable of continuing to live; it is only necessary to prove that the child was born alive, but obviously the more prematurely the child has been born the more likely it is to have been born dead or to have died a natural death, even if born alive. As a matter of fact, most cases of infanticide occur in children born between the eighth and ninth month, but cases may occur in children born at the seventh month, provided that the proof of the child having been born alive is clear and distinct. As we have seen,

a child may be born alive at the sixth month, and the law is clear that the question of infanticide depends not on the period of gestation when birth takes place, but on the facts that the child was completely born, i.e., entirely outside the maternal parts, and alive, when it was done to death. Hence the question "was the child viable" is only important in helping to show that a slight and unintended amount of neglect or violence might be fatal.

The subjoined table contains all that is necessary as to the growth and development of the fœtus at different stages of gestation, and hence also shows the points to be noted in investigating the degree of development of a fœtus in order to determine if it might have been born alive. (See also the other table on p. 177).

Three to four weeks. Head distinct from body. Size of an ant.

Two months. Rudiments of nose, lips and eyeballs. Organs of generation visible. Arms and legs distinct from trunk. Length 2 inches.

Three months. Head big, fingers separate. Sex to be distinguished by a lens. Ventricles of heart distinct.

Four months. Length six inches. Nails appearing. Mouth large and open. Sex distinct.

Five months. Skin rosy and dense. Hairy down on head; heart and kidneys bulky. Meconium in bowels.

Sixth to seventh month. Length 10 to 12 inches. Weight 1 to 3 lbs.. Head still large. Eyelids adherent; pupils of eyes

covered by a thin membrane (*membrana pupillaris*). Nails slightly formed. Brain smooth and no convolutions. Bones of chest begin to ossify. Testicles in abdomen.

Between seventh and eighth month. Length 12 to 14 inches. Weight 3 to 4 lbs. Skin covered with sebaceous matter. Hair long and thick. Body fatter. Bones ossify. Fæcal matter in large bowel. Testicles move towards scrotum, usually in abdominal ring. But note absence of testicle from scrotum is not a certain sign of immaturity.

Between eighth and ninth month. Length 15 to 16 inches. Weight 4 to 5 lbs. Eyelids open. *Membrana pupillaris* gone. Fat and hair increased. Brain surface grooved. No convolutions. Testicles out of abdomen.

Ninth month. Length 18 inches. Weight 6 to 7 lbs., but great deviation, one child being 24 inches long at birth, and another 17 lbs. in weight. Point of ossification in the end of the femur. Head large, fat. Hair plentiful, nails fully developed. Testicles in scrotum. Brain has convolutions. No importance is to be attached to the position of the navel, as has been asserted. (Taylor.)

All the above appearances are subject to great variations, and as a matter of fact it is often impossible to distinguish a seven months child from a nine months child. It is important to remember also that, although the legal presumption is that

the child is born dead, and that consequently the prosecution must prove it was born alive, yet the medical presumption will be that if the child were born under seven months of gestation it would be born dead, but if born at the full time that it was born alive. A charge of infanticide will not lie where the child be born at the fourth or fifth month of gestation because the fœtus could not be born alive, yet a charge of concealment of birth will still lie, provided the offspring have human form and shape; such cases, however, are generally dealt with by the law relating to procuring abortion. In almost all cases of infanticide the child will have passed the seventh month. It may be here noted that a child in health ought to gain weight rapidly after birth; a child weighing 8 lbs. at birth should weigh 15 or 16 lbs. at six months of age, and 22 or 23 lbs. at a year.

In examining the body of a newly-born child:

1. Determine what period of gestation it had reached.
2. Has it lived to breathe.
3. Was it born alive.
4. What time has elapsed since death.
5. What was the cause of death, violent or natural. (Taylor.)

Taylor also gives the following points for notice before commencing the actual internal examination:—

1. Notice the length and weight and any peculiar marks of deformity, which may be useful in determining identity.

2. All marks of violence or injuries, as wounds bruises and the kind of weapon with which they were probably produced.
3. Whether the umbilical cord had been tied in the usual manner, or whether it had been torn across; notice the appearance of the divided vessels in the cord and the length of the portion attached to the body.
4. Presence of the greasy substance known as the vernix caseosa on the skin, especially about the groins, armpit, or neck; its presence shows that the child has not been washed.
5. Notice if there are any marks of putrefaction, and if so whether the characters were those of putrefaction in utero and before birth, or the ordinary signs of putrefaction in air.

Where there are witnesses to prove that the child was alive after birth, the ordinary evidence will be applicable, but as a general rule there is nobody present at the birth, and the onus of proving that the child was born alive will depend on the medical evidence; in the absence of clear indications, therefore, on post-mortem examination that the child was born alive, there will probably be an acquittal, in spite of strong moral probability of guilt.

As before described (p. 196), in order to have been "born alive," the child must be alive after complete separation from the maternal parts, but the umbilical cord need not have been divided. Fatal violence may be done to a child before it is completely born, and in this case there is no crime

if the child be dead before birth. But if violence be done before birth, and the child survives birth, and dies afterwards from the effects of the violence inflicted before birth, the crime is murder.

EVIDENCE OF LIFE BEFORE RESPIRATION.

It is only rarely that there is any evidence of live birth before respiration; in almost all cases, where the blood circulates, there is some attempt at respiration. Formerly it was considered if there were no air found in the lungs on post-mortem examination the child must have been born dead, but this is incorrect, as children may breathe feebly and live for some time without filling the air-cells; after severe parturition children are often born when the only sign of live birth is the pulsation of the heart, and it may be many minutes before breathing begins at all.

The first thing then to prove is that the child was recently living. If the body be highly putrefied, either from having been dead in the womb for some time before expulsion, or from the body not having been discovered for some time after death generally no conclusion can be drawn. Obviously, however, if the child shows signs of intra-uterine putrefaction, it cannot have been born alive, and as these signs are quite different from the ordinary signs of putrefaction in air, it will be well to summarise them.

Signs of intra-uterine putrefaction :—

1. The body is very flaccid and soft.
2. The skin is reddish-brown and not green.
3. The cuticle of the hands and feet is white and often blistered.

4. The bones are movable and easily detached from the soft parts.
5. The odour is quite distinct from the odour of ordinary putrefaction.
6. If the foetus remains in the uterus longer than about a week after its death, which is not usual, it either macerates and softens as it putrefies, or it may dry up into a sort of mummified condition.

EVIDENCE FROM MARKS OF VIOLENCE

is uncertain, as the bodies of still-born children are often covered with lividities and apparent bruises. Often, however, the injuries inflicted are such as to indicate design and not accident, and hence they may give rise to a presumption that the child was living when they were inflicted, but this is entirely a question for the jury and not for the medical witness. Generally, however, where the signs of respiration are absent or indistinct, the case does not go beyond the Coroner's Court, as it is usual to find that the child must have been born dead. Where the respiration of a child is wilfully prevented by the mother it would probably be considered murder.

EVIDENCE OF LIFE AFTER RESPIRATION.

Proof of respiration having taken place affords the very best evidence that the child was alive at or about the time it was born, but it does not absolutely prove that it must have been born alive, i.e., completely separated from the mother. As before stated, feeble attempts at respiration may take place whilst the child is still in the maternal

passages, but the more complete the respiratory changes in the lungs the more probable it is that the child was actually and completely born alive. On the other hand, the lungs may remain unexpanded and in the fœtal condition, even if the child is born alive; the few gasping efforts at respiration which may be made whilst the child is in the maternal passages are not likely to produce the same changes in the lungs as the full and unrestrained movements of respiration after the child is born.

When then are the changes in the lungs produced by respiration?

If a child has not breathed the lungs are small and packed up at the back of the chest; the heart is exposed and the lungs are covered in front by the thymus gland. They are solid to the touch, chocolate in colour and do not crepitate when squeezed by the fingers.

Lungs full of gases from PUTREFACTION will also crepitate, but other obvious signs of putrefaction ought to prevent mistakes. If the lungs are squeezed under water any gases due to putrefaction will escape in large and uneven bubbles. Again, if there has been no respiration there is very little blood in the lungs, and such blood as is squeezed out is not frothy, unless putrefaction is present, which would be recognised by the characteristic odour.

Where there has been respiration the volume of each lung is larger, and they more or less fill the chest and cover the heart; their margins are rounded, the colour lighter and mottled, and they crepitate on pressure. If squeezed under water the bubbles of gas which escape are small and of

even size. They are full of frothy blood. Lastly, the specific gravity of the lungs is greater when they are solid, i.e., before respiration has taken place, than after respiration, when they are full of air; consequently lungs which have not respired sink in water, those which have respired float. On this difference is founded what is well known as the hydrostatic test of respiration.

THE HYDROSTATIC TEST

is properly performed as follows:—

1. Remove the heart and lungs together in one mass and put it into water; see if it floats.
2. Remove the heart and see if the lungs float alone.
3. Cut lungs up into small pieces and notice how many float and how many sink.
4. Wrap each piece in cloth and squeeze it firmly; place all the pieces in water again and see how many float and how many sink.

From the above experiments the following general conclusions may be drawn:—

If the lungs, entire or divided, float freely, there is a presumption that complete respiration has taken place; if some pieces float and some sink there is a presumption of partial respiration having taken place.

Objections. 1. The lungs may float, although no voluntary respiration has taken place:—

(a) From putrefaction. If putrefaction were present, there would be other signs of it; possibly

one might have a suspicion of putrefaction in cases where the date of the birth of the child was known and was some days earlier than the examination. Probably also there would be the foul smell of putrefaction. If the separate pieces of lung are well squeezed and then placed in water, if previously buoyant from putrefaction the pieces will then sink; if buoyant from respiration, the pieces float as freely after squeezing as before.

(b) Because artificial respiration has been attempted. This is extremely improbable amongst the class of persons who commit the crime of child murder; as the motive is to kill the child and not to keep it alive, it is not likely that artificial respiration would be attempted. Secondly, in almost all cases of infanticide, the only person who knows of, and is present at, the birth is the mother, who would be too ill and excited to adopt such a procedure even if she were aware of it.

Artificial inflation by the mouth or by blowing down a tube inserted into the mouth may give rise to the appearances of imperfect respiration, which it is not possible to distinguish from those of feeble natural respiration. The medical witness can only say that the child has either breathed or the lungs have been inflated artificially, but the same objections apply to suggestions of artificial inflation as to those of artificial respiration, and the jury will form their judgment on all the circumstances presented to them in evidence. It has been stated that the air forced in by artificial inflation may be squeezed out by pressure on the pieces of lung, which will then sink in water, in the same way that pieces of putrefied lung sink; this test is, however, not free from doubt, and is not to be relied on.

2. The lungs may sink, although the child has breathed:—

(a) From disease present before birth, as inflammation (pneumonia). This would not be common, and if it were so would be recognised by the ordinary post-mortem appearances of the disease in question.

(b) From imperfect respiration. This is a true objection; in numerous cases where children are weakly at birth the expansion of the lungs occurs with great difficulty and slowness, the lungs being sometimes found almost solid where the child has survived as long as twenty-four hours. Where the lungs do not expand owing to imperfect respiration the condition is called Atelectasis. Sometimes portions of the lungs in delicate children remain unexpanded for months, and are very liable to set up attacks of inflammation of the lung and to render the child liable to fall a victim to consumption in later years.

One must constantly bear in mind that even where evidences of full and free respiration are present there is still no proof that the child's feet had emerged from the maternal passages before death, and that it had therefore the separate existence required by the law.. For the reasons previously given it is not safe to say that a child was born dead merely because the lungs in bulk or in parts have sunk in water, and hence there can be no doubt that the guilty may sometimes escape owing to this uncertainty of evidence. On the other hand, the same uncertainty renders it impossible to inculcate an innocent person. A medical witness, therefore, should not say that because the lungs sink the child was born dead;

he can only say there is no evidence that it was born alive, but as the presumption of law in infanticide is that the child was born dead until proved otherwise, the practical result is the same. It is, however, safer for the medical witness to say that there was no evidence that the child was born alive, as it may turn out afterwards, by the mother or the testimony of others, that the child was as a matter of fact alive when born. This point is of even more importance in civil than in criminal cases, where evidence of respiration is not necessary to prove live birth in cases of heirship, etc. (see p. 199 ante). One must not forget also that a woman would not be charged with child murder on the mere evidence that the lungs floated in water; there would be in addition evidence of injuries sufficient to cause death or other moral presumption of guilt. If there are no proofs of violence or injury, yet a child may have died through the wilful neglect of the mother, in which case she might be indicted for manslaughter. (See Archbold, p. 751, 22nd ed.)

What information then do we derive from pulmonary tests?

1. If the child has fully and perfectly breathed, as shown by the fact that the lungs float both in bulk and in separate pieces, and there is no evidence of putrefactive changes having taken place, there is a very strong presumption that it was born alive.

2. Where the respiratory changes are only slight, as where some portions of the lung sink whilst others float, it is certain that the child has breathed or that the lungs have been artificially inflated, but there is no presumption that the child was completely born alive. "If in the body of a

healthy full-grown child, which has only been dead a short time, the lungs fill the cavity of the chest, and are of a light-red colour, crepitate under the finger, weigh at least two ounces, and after being divided into separate pieces each piece floats after being well squeezed, there can be no doubt that respiration has been performed" (Taylor).

No tests can show that the body was *born alive* at the time the act of breathing was performed. It is undoubtedly true that a child may breathe more or less freely before being completely born under the following circumstances:—

1. Whilst still in the womb after the rupture of the membranes. This is very rare, but undoubtedly may occur. It is called *vagitus uterinus*.
2. Whilst the head is still in the vagina of the mother. This is not very uncommon, and is termed *vagitus vaginalis*.
3. After the head is born, but whilst the body or limbs or both are still in the passages. This is quite common, but in this case it would only very rarely happen that a child alive at this stage of parturition would not have the body delivered before death, and that there would not be at all events some gasps after complete severance; such a result, however, is possible in rare cases where the child is very large or there is some swelling of the maternal parts preventing the delivery of the body. Most cases, too, of secret delivery are cases where delivery has been rapid and there is not likely to have been long delay after the birth of the head. (Caspar).

In normal cases the head is born first, but in abnormal cases where the head is born after the body and limbs, still-birth is very common, even where the woman has skilled assistance at the time of delivery.

It appears, further, to be a legal presumption not only that the child was born dead, but that even if there be proof of respiration having occurred, that such respiration took place before complete birth, and that the onus of proving the contrary lies on the prosecution; the fact being that both the Court and juries out of sympathy with the mother, and having regard to her probable mental and physical condition at the time and to the circumstances under which the crime was committed, jump at any solution which will avoid the infliction of the capital sentence.

In addition to the hydrostatic test there may be other methods by which we may be able to prove that the child was born alive:—

1. Warmth of the body. The body of the child may still be warm, and cadaveric rigidity may be present. Both these conditions are inconclusive, as they might equally be present if the child had died just before or during birth.
2. If the hydrostatic test shows that respiration has been perfectly established it is very probable that respiration must have continued for some time after birth, especially if the child be prematurely born and immature, as is often the case in secret births; such weakly immature children require some hours in order to completely ærate the lungs.

3. Air in the stomach and intestines forms some presumption of live birth, as if the child can breathe it can also swallow air.
4. Marks of violence, if extensive and at widely separated parts and bearing the character of wounds inflicted during life, afford strong probability of live birth, but marks on the head or breech only might be produced during the progress of parturition either naturally or by the efforts of the mother to deliver herself. In natural cases where the child is large and the maternal parts small, labour is usually protracted, and a large swelling frequently forms in consequence of the pressure on the head of the child (*caput succedaneum*); the presence of a large *caput succedaneum* would point to such a protracted labour as would account for the child being still-born.
5. Absence of food in the stomach, as milk, sugar or starch granules would not prove the child was dead-born, but presence of food would prove live birth. Sometimes the presence of foreign bodies in the stomach, if not accidentally swallowed at birth may be important, as in one case where the air-passages were found stuffed with sand which had caused suffocation.
6. Sometimes the condition of the umbilical cord may be of importance, e.g., as to whether it was tied or torn across, but generally there is little information to be gained in this way; the point is usually

to determine whether the child has lived a few minutes or a few hours at the most, and for this purpose the condition of the cord is no help. If the child do survive longer the cord begins to shrivel and dry up, and in from three days to a week it separates. A line of redness appears at the navel about the third day where the cord is going to separate, and as this redness is a sign of inflammation, which is a vital process, it is an absolute sign of live birth; the more if the cord has separated naturally and left a cicatrix or scar.

7. The changes in the blood-vessels in connection with the alterations in the circulation of the blood after birth only enable one to form a general estimate of how long life has continued since birth.

The results shortly are:—

(a) The lungs and pulmonary artery become rapidly filled with blood when respiration is established.

(b) The umbilical arteries and vein become obliterated by the third day. These are the vessels which carry the foetal blood into the placenta of the mother. In the placenta the foetal blood comes into close relationship with the maternal blood, and hence picks up nourishment for the foetus.

(c) The foramen ovale closes gradually, but the actual time is very variable. The foramen ovale is an opening existing in the foetal condition between the right and left auricles of the heart.

(d) The ductus arteriosus closes gradually, beginning at the aorta. (Smith, p. 234.)

8. Evidence from mode of birth. If it were proved that the child was born by the breech first, evidence of respiration would practically amount to proof of live birth.
9. The presence of blood or the contents of the bowels (meconium) in the stomach and air-passages does not prove the child has been legally born alive.

Sometimes it may be necessary to know how long the child survived its birth; this can only be approximately stated.

1. For the first twenty-four hours after death there are practically no changes at ordinary temperatures in the bodily appearances.

2. After the first twenty-four hours there will be gradual change in the umbilical cord, as already described, and the skin will show the ordinary signs of putrefaction. Newly-born children cool very rapidly, and cadaveric rigidity may come on very early and disappear quickly. As a rule putrefaction takes place quicker in children than in adults, especially where the dead body has been thrown into water or a wet ashpit, as is often the case, and is then taken out and exposed to the air. (See chapter on putrefaction.)

The causes of death in new-born children may be :—

1. Natural.
2. Violent (a) Accidental.
(b) Criminal.

Remember once more what are the presumptions in law in regard to infanticide, viz. :—

1. That the child was born dead. It is for the prosecution to prove the child was born alive.
2. That if the child were born alive it died a natural death. It is for the prosecution to prove the contrary.

As to deaths from natural causes, it is said that amongst legitimate children the proportion of still-born children is about 1 to 20 births. Among immature children—and illegitimate children are often weakly and immature—the proportion is much higher. As the male child is generally larger than the female, there are more still-born males than females.

There are more still-born children amongst primiparæ, i.e., women bearing a child for the first time, than multiparæ, i.e., women who have borne children before, owing to the greater difficulty of parturition in the first class; we must note that cases of infanticide almost invariably occur in primiparæ, and that the children are usually illegitimate, both of which causes favour a presumption of natural death in the absence of clear proof to the contrary. Many children also are born alive, but only give a few gasps or attempts at breathing and then die from natural

causes. All such cases must be distinguished, as a charge of child murder is only made usually if there are evidences of mortal injury on the body of the child.

The commonest causes of natural death in new-born children are:—

1. Protracted labour. Children often die after long pressure in the maternal passages, especially if the maternal parts are small and the child large. In such cases death may result from congestion of the brain or other injury to the head or from pressure on the cord interfering with the fœtal circulation; the first cause may be suspected if a large caput succedaneum be found on the child's head after birth (v. ante, p. 226). Even in primiparæ with the pelvis of ordinary size delivery is often protracted.

2. Congenital debility. Many children are born delicate and immature and feeble, and such children die after a very short existence. The general condition and want of development of the body would point to this cause of death.

3. Where the umbilical cord has been torn or lacerated, and even in some cases where it has been properly tied, fatal bleeding sometimes takes place from the divided end; on the other hand, there is often no serious bleeding where no attempt has been made to tie the cord.

4. Compression of the cord during delivery may cause the child to be still-born, or if not still-born may cause such interference with the circulation that death speedily follows birth.

5. Malformation of fœtus, which renders extra-uterine life impossible, although intra-uterine

life could go on, as, for example, absence of the gullet, so that no food could be swallowed. There is said to be a popular impression that it is no crime for a person to destroy a monster which is living after birth, but this is not correct.

6. Congenital diseases. There are many diseases which not uncommonly affect the fœtus in utero, and which may all cause death, e.g., tubercle, cancer, pneumonia, etc.

7. It has already been noted that in cases where the body is delivered before the head still-births are very common.

The violent causes of death may be (*a*) accidental or (*b*) criminal; whether the one or the other, will have to be determined by considering all the circumstances in each individual case. It is important to bear in mind that in some cases there may be no external marks of injury, as where children have been destroyed by suffocation, drowning, exposure or starvation.

SUFFOCATION

in new-born children is very common; it may be accidental, as in many cases of overlaying, or it may be homicidal. It is important to note that in cases of death from over laying the post-mortem appearances in the lungs and elsewhere are very often not sufficiently distinct to excite suspicion in the absence of other marks of violence. Sometimes children are suffocated by foreign bodies, as by sand or dirt being pushed down their throats, or they may be accidentally suffocated by the passage of food into the air-tubes. In a newly-born child a very slight interference with the breathing is sufficient to cause death without

bringing on convulsions or other marked symptoms which might call attention to the danger during life, or without leaving any definite signs on examination after death. Where, however, there is evidence of gross neglect or reckless indifference as where drunken people get into bed with their children and owing to their drunken condition overlay and kill them, the jury may be directed by the Judge that there is such evidence of gross neglect that it is competent for them to return a verdict of manslaughter.

It is not uncommon for the death of new-born children to be caused by drowning. If the child has never breathed, there will be no evidence of drowning on post-mortem examination; if the child be thrown into the water alive there will be the usual appearances after death from drowning (see ante, p. 154). As a general rule the question to be decided is whether the child was alive or dead when thrown into the water, as in most cases the child is first destroyed by suffocation or other means, and then thrown into the water to get rid of the body. Hence in all cases of examination of bodies found in water careful attention should be paid to all marks of injury or signs of suffocation or strangulation, to the presence of foreign bodies in the throat, etc. Newly-born children may be, and often are, drowned or suffocated by being thrown into liquid mud or semi-liquid privies.

Where the dead body of a new-born child is found in water or a privy or any other place, the usual defences set up are:—

1. That the child was born dead, and that the body was thrown away for the purpose of concealing

the birth and preventing the exposure of the mother. In such cases evidences of live birth must be carefully looked for.

2. That the child breathed a few times after birth and then died, and that then, for similar reasons, the mother threw the dead body out. There is no doubt that in many cases a mother has been able to get up within a very short time of being delivered and go about her duties, and even walk a considerable distance. If the child have only gasped a few times as alleged the results of the hydrostatic test properly applied will not be those of full and complete respiration.

3. The usual defence is that the woman felt a desire to go to stool, and was there and then suddenly delivered of a child unexpectedly or even unconsciously, and that the death occurred before the mother recovered her presence of mind sufficiently early in order to prevent the death of the child. On the other hand, it is not usual for primiparæ, in whom the crime is commonest, to be so speedily delivered, and often other signs may be found not consistent with the woman's story, as, e.g., marks of violence on the body, marks of a ligature on the throat or the umbilical cord may be found tied instead of torn as would be the case if the story were true. In all these cases the question of guilt or innocence or of accident or homicide will always be a question for the jury on a consideration of all and not merely the medical circumstances of the case.

COLD AND EXPOSURE

easily kill new-born children; in such cases there will be no marks of violence or only slight marks

quite consistent with accidental causes and practically no reliable post-mortem changes, the only appearance met with, and that only at times, having been congestion of the brain or effusion into the ventricles of the brain. These cases must be proved by ordinary evidence, but a medical witness might probably be asked if he could say from the circumstances in which the body was found that death was probably due to cold and exposure. If wilful malice be proved a prisoner might be convicted of murder, but failing this there might be such gross and culpable indifference or negligence as would sustain an indictment for manslaughter.

STARVATION

gives rise to no post-mortem changes indicative of the cause of death. This is a very rare form of murder; in order to get a conviction, the prosecution would need to show that the child had been wilfully kept without food for the purpose of destroying it; but here again a charge of manslaughter might be sustained. The fact that the alimentary canal was found completely empty on post-mortem examination would be corroborative evidence of death from starvation. Where a person is convicted under S. 1 of the Prevention of Cruelty to Children Act, 1894, of ill-treating or neglecting a child, and the said child afterwards dies, the person convicted may still be put on his trial for manslaughter. See Archbold, p. 162 and 841, 22nd ed.

It is said that if by bringing on premature labour a child is born alive, but so immature that it can not be reared, and that it afterwards dies by reason of such immaturity only, the crime is

murder; clearly in such a case very distinct proof would be required that the child had actually lived after being completely born, and that the only cause of its death was its immaturity.

WOUNDS IN THE NEWLY-BORN

are amongst the commonest causes of death, and the chief points to enquire into are:—

1. Were the wounds inflicted before or after the child was completely born, as if the child were destroyed before entire separation, the law says it is no murder. But if on the contrary a child be born alive, but afterwards die from injuries inflicted before death, then the crime is murder. Obviously it is only possible to say that the wounds were inflicted when the child was living; whether the child was completely born or not, the appearances would be the same.
2. Whether the wounds were inflicted before or after death.
3. Were the wounds sufficient to account for death.
4. From the character of the wounds, were they accidental or homicidal (see chapter on wounds).

In some cases it has been suggested that wounds found on the body of the child have been accidentally inflicted by the mother in her efforts to divide the umbilical cord herself; minor marks of violence may correspond to serious internal injuries and should all be carefully examined, and it is import-

ant not to mistake the natural caput succedaneum formed during protracted labour for the result of a severe contusion; in the former case the scalp may be livid and red, but is itself uninjured; in the latter the scalp itself will show signs of bruising.

Fractures of the skull may be accidental or criminal; it is impossible to say whether a fracture of the skull was inflicted during life or immediately after death. A fracture of the skull may in rare cases be caused by the pressure of the head against the pelvic bones of the mother during parturition, but in such a case the fractures only affect the frontal or parietal bones, and are slight and fissured in character. Criminal fractures may affect any bone and would generally be extensive; the same violence which caused the fracture would cause other lacerations and contusions easy to be seen. A defence often set up, and with success, is that fractures, etc., were caused by the woman being delivered unexpectedly when at stool, the fracture being caused by the head striking the floor. This is quite possible, in fact sometimes a woman may be delivered unexpectedly whilst in the erect position, so that the cord is torn across and the child falls to the ground and is killed. Such cases, one must admit, do sometimes occur even in primiparæ, but much more commonly in multiparæ, where the passages are enlarged and less resistant owing to previous confinements.

Injuries may also be sustained by the fœtus in utero owing to accidental or other injuries to the woman before birth by falls or blows. The neck of a child also is very short and very movable, and sometimes in the act of birth the neck may get twisted and cause death by compression of the

spinal cord in the neck; such an accident might easily happen where a woman is alone at the time and is trying to help herself to get the child born. Where there are numerous signs of violence on the body, however, and it is suggested that they were inflicted by efforts of self-help on the part of the mother, the truth can only be surmised by a consideration of all the accompanying circumstances in each individual case. A further defence, which is often true, is that the pain and excitement and mental stress were such as to render the woman quite unconscious of what she was doing, and that she destroyed the child whilst in this condition of mental stress—a condition negating the wilful intent necessary for a conviction. It is a principle of law that mere appearances of violence on the body are not sufficient to convict; there must be evidence to show that the injuries were inflicted knowingly and intentionally.

STRANGULATION

may be accidentally produced by the umbilical cord being twisted round the neck whilst the child is still in utero or during labour, but it is not an infrequent form of child-murder. Where death is thus accidentally produced by pressure of the cord the child is usually dead before being born, and consequently where death happens from accidental constriction the lungs remain in the foetal condition. After the child is born and the child has begun to breathe and cry out, it would be very unusual to find the cord round the neck, or if so found that it was so tight as to constrict the neck seriously. In order to produce the great lividity of the features and internal

congestions in the lungs and other organs associated with death from strangulation after birth, the pressure would need to be so great as to leave distinct marks of pressure on the neck. Where, therefore, the mark of the cord on the neck is broad and deep, and there is much bruising under the skin with effusion of blood amongst the muscles and injury to the windpipe, it is very improbable that the injuries were the result of accident. One caution is necessary, however, in that bruises are very easily produced on the skin of new-born children, and marks of fingers and thumbs on the child's neck might be quite well due to the efforts on the part of the mother to deliver herself. Marks of very suspicious appearance may also be produced naturally by forcible bending of the head during labour or from accidental constriction by the string of a cap tied on the child's head after death, as it is not possible to tell whether the marks of strangulation were produced before or immediately after death. Where, however, such a defence is set up, viz., that the ligature was applied after death for some purpose or other, it will be for the jury to decide as to the credibility of such a theory. A medical witness may also be asked, supposing the child were living and had breathed, whether the ligature was applied before or after it had an "independent circulation," meaning by an independent circulation that breathing was established and the child was no longer nourished or kept alive by the blood of the mother. According to *R. v. Enoch* (5 C. and P. 539, see Archbold, 22nd ed., p. 753), "there must be an independent circulation in the child before it can be accounted alive." This, however, is in conflict with other cases, as it makes breathing

the only absolute proof of life, whereas, as before stated, a child may be born alive and yet not breathe for some time after birth. A child also may breathe and so have an "independent circulation" before the body is completely born alive; as before stated, it must be proved that the child was completely born alive before there can be a conviction for child murder.

The body may be "entirely born," although the navel-string has not been divided and the marks of strangulation on the neck of the child would be the same whether the cord had been divided or not. It is possible that sufficient constriction to produce death might be applied without causing any ecchymosis under the skin or any marks of a cord, but this is very improbable where the strangulation was homicidal, and the absence of any mark on the neck would be strongly in favour of a person charged.

POISONING

of new-born infants is rare, but some cases are recorded. There is often great difficulty in tracing the administration to the guilty, as the food prepared for the child may be prepared by so many different persons. In the cases recorded, arsenic has been the usual poison employed. Where poisoning is suspected, the poison must, of course, be searched for in the usual way.

The person charged with child murder is usually the mother, and consequently it is necessary to know:—

1. Whether the person suspected has been recently delivered.

For the signs of recent delivery see p. 182.

2. If the date of delivery correspond with the age of the child.
3. In some cases an examination of the size of the pelvis might be important, as pointing to the probability or otherwise of rapid or unexpected delivery.

But it is most important to remember that no person has the right to compel a woman to submit herself to be examined, either in cases of suspected child-murder, abortion, concealment of birth, or in fact in any case whatsoever. Moreover, if the consent of the woman to be examined be extorted by threats or intimidation, such consent will afford no defence to an action for indecent assault. Such a procedure in fact would amount to compelling a woman to help to incriminate herself. As no person has the right to order such an examination, a coroner, therefore, in so doing would be going beyond his powers and would be acting in a grossly illegal manner, and both the coroner and the medical man examining by the coroner's order would be liable to heavy damages. The only point is that if one woman only out of a number declined to be examined she would thereby perhaps be prejudiced.

Taking into consideration all the foregoing points, it is clear why convictions for child-murder are so rarely recorded. In order to convict there must be proof on the part of the prosecution that

1. The child was entirely born alive. As there is nobody present at the birth usually but the mother, this cannot be done.
2. Death was due to violence and to no other cause.

3. The violence must be criminal and not accidental.

Hence as all these points may be urged in defence and as probably the judge and jury regard the woman as more "sinned against than sinning" they hesitate to consign her to death. Formerly the only alternative to a verdict for murder was a verdict of concealment of birth, but several cases are now on record where a verdict of manslaughter has been returned and allowed.

As a final summary of the subject of infanticide the following, taken from Guy and Ferrier on Forensic Medicine, may be useful:—

1. Examine the body of the child to ascertain the degree of maturity; weigh and measure it, and note the several points comprised in the description of the growth and development of the fœtus. Note any malformation present.

2. Ascertain the time which has elapsed since the death of the child, by the presence or absence of heat or cadaveric rigidity, the presence of putrefaction, and, if present, the degree to which it has advanced.

3. Examine the body carefully for marks of violence, and if found determine whether they might be produced accidentally during birth or afterwards. Examine the mouth for foreign bodies, the fontanelles (the openings at the junction of the different bones of the vault of the skull), orbits, heart and spine in search of puncture wounds. Note the state of the umbilical cord, measure it, and note whether torn or not. Note the condition of the skin.

4. Open the chest and notice if the lungs fill the chest, or whether they lie contracted at the

back of the cavity; notice the condition of the heart in situ. Remove heart, lungs and thymus gland. Separate the lungs and inspect their surface. See if they are compact, and liver-coloured throughout, or uniformly spongy like an adult lung, or mottled with developed air cells, as in imperfect respiration. If parts of the lung are lighter than the rest, see whether the texture of the lung is developed in those parts, and distinguish the developed cells from air, the product of incipient or advanced putrefaction, by applying gentle pressure with the finger. Do the hydrostatic test properly, as described on p. 220.

5. Examine the heart and foramen ovale, ductus arteriosus and ductus venosus, the umbilical arteries and vein. See if they are contracted or obliterated, and whether they contain much or little blood.

6. Examine the stomach; see if it is collapsed or contains air or saliva, whether the child has been fed, testing for sugar, starch and milk; if the alimentary canal is inflamed test its contents for poison. See if intestines contain air or meconium (the excrement produced and retained in the bowels during foetal life), and whether there is urine in the bladder.

7. Examine all the bones of the skull, both at the top and the base, for fractures. Inspect the brain and its membranes, and note any effusion of blood or serum. Examine the middle ear. Examine the spine to look for fracture or dislocation of the vertebræ.

8. If she permits, examine the suspected female to see if she has been recently delivered, and if so how long. Take careful note of any mental peculiarities.

CHAPTER XV.

RAPE

is the carnal knowledge of a woman against her will, and is a felony punishable with penal servitude for life. It is also a rape to have carnal knowledge of a girl under 13 years of age even if she consent. To have carnal knowledge of a girl between 13 and 16 is a misdemeanour (see Archbold, p. 869) punishable with imprisonment for not longer than two years. If a charge of rape or of attempt to commit a rape fail, the prisoner may still be convicted of an indecent assault. (See Archbold, p. 875.) In order to commit a rape, penetration only of the male organ need be proved; there may be no emission of semen and the hymen may not be ruptured. As before stated, the hymen is a fold of fibrous tissue at the entrance to the vagina, which is usually ruptured during the first acts of sexual intercourse, but as the rupture may occur from other causes, absence of the hymen is not a certain proof of want of virginity. To carnally know or attempt to know a lunatic is a misdemeanour.

Usually in charges of rape the medical evidence for the prosecution is merely corroborative of other testimony; but it is often of the greatest importance for the defence for the purpose of rebutting false charges of this crime, as mothers have often been known to injure the genital organs of their

children, and so make false accusations for the purpose of extorting money.

When called to examine a person for this purpose, a careful note of the exact time and date of the visit, and of the time of the alleged assault, should be made in view of an alibi being set up in defence by the prisoner or to show that the woman had not made a prompt complaint. Remember that neither man nor woman can be compelled to submit to examination against their will.

EVIDENCE OF RAPE ON CHILDREN.

1. If the crime be completed, there will be marks of injury more or less severe on the sexual organs of the child, viz., inflammation, redness or lacerations, and discharge of blood or matter from the vagina. Absence of marks of violence on the sexual organs of a child would be a strong presumption that no rape had been committed, and even where there are injuries to, or dilatation of the vagina, one must be on one's guard that they were not produced by the child herself or others for purposes of extortion and blackmail. In some cases the injuries and lacerations have been so severe as to cause the death of the child.

Purulent discharges (Infantile leucorrhœa) from the vagina are very common in children, arising from dentition or scrofula or merely from dirty habits. It is important to bear in mind these morbid discharges, as it is often asserted that the discharge is really a gonorrhœa or clap which has been produced by intercourse with a male suffering from the disease. At the present time, the question as to whether a discharge was gonorrhœal

could probably be definitely settled by bacteriological examination, which would demonstrate the presence or absence of the gonococcus, a small bacterium supposed to be specific to gonorrhœa. Where there is a purulent discharge in a supposed case of rape, however, it may be corroborative:—

1. Where the accused person is known to be suffering from gonorrhœa.
2. Where it is proved that the child was free from discharge before being violated.
3. Where the discharge comes on two or three or four days after the alleged connection.
4. The discharge of gonorrhœa is usually much more profuse and more yellow than in ordinary leucorrhœa or "whites," but generally one may say that the deductions from vaginal discharges are unreliable and of doubtful value.

EVIDENCE OF RAPE ON YOUNG FEMALES AND ADULTS.

1. Probably there will be much less local injury than in the case of children, but the girl will complain of soreness and pain on walking. In cases of false charges, notice whether the bruises on the girl are in such a situation as to have been probably produced by the male. Leucorrhœal discharges are very common in girls and women, as in children, and are known as "the whites"; these discharges are often purulent and yellow, and may be mistaken for gonorrhœa, just as described above in children; they are to be distinguished in the same way by bacteriological examination.

2. As the local signs of injury are so much less than in children, so, owing to the greater strength and resistance of the girl or woman, there will be more marks of violence and injury on the body produced by struggling with the man.

The question of rape may arise even in a prostitute, but as the question of rape turns on that of consent, the evidence would have to be very clear to convict.

1. What are the signs of virginity in a woman? The hymen should be intact and the vaginal orifice small. The hymen is a crescentic piece of membrane at the entrance of the vagina, which is usually ruptured at the first attempts at intercourse. But remember, on the one hand, there may be intercourse more or less complete and the woman may conceive, and that a rape may be committed without rupture of the hymen; it is even said that the hymen may remain intact during pregnancy and delivery. On the other hand, the hymen may be ruptured from other causes than sexual connection, as by ulceration from disease or from accidental laceration by the fingers. Nevertheless, a perfect hymen, with the other parts of generation and the breasts of a virgin type, is strong evidence of chastity.

Can a man alone commit a rape on a healthy strong woman? This is said to be very improbable, except in cases where narcotics or drink have been given, and even in cases where it is alleged that the woman was drugged or drunk, there are usually such inconsistencies and contradictions in the woman's evidence that there is little reliance to be placed on her story. When women are under the influence of anæsthetics, the

sexual instinct is sometimes much excited, and quite modest women may make serious charges that they have been indecently assaulted or raped whilst semi-conscious. Obviously no wise man will administer an anæsthetic to a woman unless there be a third person present.

It is a rape if a man have connection with a woman when she is half asleep and she believes the man to be her husband, as also where a woman is unconscious from natural infirmity, as in idiocy or insanity. (48 & 49 Vict., ch. 69, s. 5.) If a woman be attacked until she faints or is rendered powerless by exhaustion or terror, so that she cannot resist longer, the man is guilty of rape. (See also other sections of the same Act.)

If a man in committing a rape or in committing an assault with intent to do grievous bodily harm, suffocates the woman, the crime would be murder; if, on the other hand, the man were guilty only of an attempt to rape or of a common assault, and in so doing suffocates the woman, he would be guilty of manslaughter only. If the woman consented and submitted to the man's rough violence and then is suffocated accidentally, there would of course be no offence at all.

Pregnancy may follow a rape or a connection whilst the woman is unconscious.

Remember that the local signs of rape soon disappear; there may be no traces on the genital organs after three or four days, or less where the woman is an adult, and always be very careful where the woman has made a delay either in complaining or in being examined.

Microscopical evidence of seminal stains on the linen or clothing may be useful as corroborative

evidence, but is not essential, as the crime is complete without emission. There are no reliable chemical tests for the detection of seminal stains, except possibly the seminal odour when the linen is moistened and warmed; microscopical examination, especially when the stained linen is dry and dirty and bloody, as is often the case, is attended with many difficulties. Microscopical examination in such cases for spermatozoa can only be relied upon if conducted by an acknowledged expert, and requires a microscope of a power of 300 to 500 diameters. Stains of blood, mucus, pus, urine, gonorrhœal discharge, may all be mistaken for spermatozoa by the inexperienced. In some cases spermatozoa may be detected by an examination of the vaginal mucus of the woman. Marks of blood on the linen are only of value when considered with other circumstances, and remember that there is no reliable distinction between menstrual and other bloody discharges. Just as evidence of blood or semen may be found on the person and linen of the woman, so the person and linen of the accused may all be examined and afford similar evidence for or against him if he do not object to the examination.

In some cases an organism known as the *trichomonas vaginæ* may be found in the vaginal mucus and may simulate spermatozoa to a non-skilled observer.

Where then a medical man is called to a supposed case of rape, he should

1. Go immediately, so that the parties visited may have no time for preparations.
2. Note the exact time and date of his visit, and the exact time of the alleged assault.

3. Note the age, strength, and the state of health, mental and bodily, of the complainant.
 4. By consent, examine the body for bruises, etc., alleged to have been inflicted, and examine the genital parts for swelling, laceration, bruises, discharge of blood, pus or semen. See if the hymen be injured, and if so, whether the injury was recent. Note the date and origin of the marks of alleged violence.
 5. Examine all discharges or stains under microscope. It is said that spermatozoa may be recognised for years on dried seminal stains.
 6. If there be a discharge on linen, cut out a small portion, moisten and warm, and note if seminal odour is present.
- The above procedure is equally applicable where sent for to examine a man suspected of the crime.
7. If the girl or woman be dead, make a complete post-mortem examination, searching for bruises, or fractures, or for foreign bodies which may have been stuffed into the throat to prevent screaming.
 8. Examine the place where the alleged crime was committed.

SODOMY

is the unnatural connection of a man per anum with another man, or with a woman, or with an animal.

The evidence required will be the same as in cases of rape, but consent is no excuse and the crime is equal in both parties, except that in boys under 14, and girls under 12, it is a felony only in the active perpetrator. The crime is not uncommon, especially in Lancashire and amongst seamen, but proof should always be very clear, as the accusation is often made for purposes of extortion.

It is said that constant indulgence in sodomy produces certain characteristic appearances in the anus of the passive agent, especially a funnel-shaped condition of the parts between the buttocks; such appearances, however, are not invariable and are often absent.

The remarks previously made, as to the necessity for obtaining the consent of a person accused of any crime to such examination before making it apply equally here. An examination made under the influence of threats or terror is not an examination made by consent. If the accused person consent he may be represented by his own medical adviser, and he ought also to be cautioned before examination that the result thereof may be given in evidence for or against him. See also the Police Order issued to Metropolitan Police as to the Medical Examination of Prisoners (Taylor, p. 472), showing the importance attached to consent being given before a prisoner is examined medically, and that for his own protection a prisoner may at such examination be represented by his own medical man.

CHAPTER XVI.

INSANITY.

The question of insanity, or unsoundness of mind, has often to be considered:—

1. In criminal cases:—
 - (a) Is the prisoner fit to plead?
 - (b) If fit to plead, is he guilty though insane at the time (Trial of Lunatics Act 1883, 46 and 47 Vict. ch. 38, s. 2).
2. In determining the validity of a Will.
3. In disputes as to whether a person is competent to manage his affairs, or to marry, or whether it is necessary he should be confined for his own safety or that of the public.
4. If a man has made a confession, was he of sound mind when he made it?

In criminal cases every person is presumed to be sane until he is proved to be otherwise, but in probate cases those propounding the will must prove the competency of the testator at the time he made it.

Insanity or unsoundness of mind is a very wide vague term, and is very difficult to define. "The minds of all persons are of different degrees and kinds, and there is no recognised standard of sanity; hence we have to make use of our own mental experiences and knowledge as a standard

for the study of the minds of others, the true test of insanity being not the existence of delusions, but whether a person has lost the power to control his will, and therefore the power to control his actions, or to put it in another form; has he the mental power to choose between doing and not doing an act he knows to be wrong." (Taylor.)

There are only two classes of legal insanity:—

1. Those insane from birth—Idiots, *Dementia Naturalis*.
2. Those who were once sane but are now insane, *Dementia Adventitia* or *Accidentalis*.

The following remarks of Mr. Justice Kay at the Leeds Spring Assizes, 1883, quoted by Dr. Luff at p. 318 are to the point:—

"Were they dealing with a sane man? Judges had said over and over again that a man could not be considered insane because he did a criminal act, and the importance of that view could not be over-estimated. Nevertheless, he did not agree with the learned Counsel who put it that it was necessary to prove that a man did not know the difference between right and wrong in order to show that he was insane. . . . What the jury had to ask themselves was—Was the prisoner's mind subject to an uncontrollable impulse over which his will had no power? If so they must acquit him on the ground of insanity." But surely after all the jury would have to find as a fact whether the impulse was uncontrollable, or merely a wicked impulse which the prisoner did not attempt or wish to control.

On another occasion *Bartin Martin* said—"What the law meant by an insane man was a man who acted under a delusion, and supposed a state of things to exist which did not exist, and acted

thereon." The answers of the judges to the questions put to them in Macnaughten's case in relation to insane persons and their legal responsibilities are quoted in full in Archbold, p. 24.

Dr. Sibbald thus expresses his views as to the meaning of the answers of the Judges in Macnaughten's case:—"To entitle an accused person to acquittal on the ground of insanity, it is necessary that he be of diseased mind, and at the time he committed the act not conscious of right and wrong, or that he be under some delusion which made him regard the act as right." (See article on "Irresponsibility for Crime," by Dr. Sibbald, in "Quain's Dictionary of Medicine," 3rd edition, page 253, seq.).

Speaking generally, we may say that Insanity means disorder of the functions of thought, feeling and will, and that the function most often and chiefly affected is the controlling power of the will. (Taylor.) In all cases of real insanity the intellect is more or less affected. "Sanity exists when the brain and nervous system are in such a condition that the mental functions of feeling and knowing, emotion and willing can be performed in their regular and usual manner. Insanity means a state in which one or more of the above functions is performed abnormally or not at all." Stephens: "Hist. Crim. Law," Vol. III., p. 138.

Medical writers have also described moral insanity shown by a perverted state of the feelings, passions and emotions, without any apparent intellectual disorder and without any delusions; the law, however, does not recognise moral insanity as an independent state, and does not allow it as a bar to civil and criminal responsibility, where

it is not accompanied by intellectual disturbance. As a matter of fact, the term moral insanity has often been applied by medical writers to what would be termed by the ordinary mind moral depravity, and if this were once allowed as a good defence, a large proportion of persons charged with various crimes might be acquitted on this ground.

Lunacy includes:—

(a) Mania or Acute madness.

(b) Dementia or Chronic madness.

Both (a) and (b) are often accompanied by lucid intervals. The term “unsoundness of mind” is a legal phrase and indicates an incapacity of a person to manage his affairs; it is practically synonymous with insanity.

The most important symptom for the determination of lunacy or unsoundness of mind for legal purposes is the existence of delusions, i.e., “that a person should believe something to exist which does not exist and to act on such belief.” A delusion is a disorder of the mind or judgment, whilst an illusion, which is a sensation produced by a false perception of objects, is a disorder of the senses.

A hallucination again is a sensation supposed to be produced by external impressions, although no material objects act upon the senses at the time. Thus a person may hear voices speaking when in reality nobody is speaking; such is a hallucination; or a hard metallic scratching, as of a pen or paper, may be taken to be beautiful music; that is an illusion. Hence both hallucinations and illusions are disorders of the senses and the distinctions

between the two are trivial and might be allowed to fall into disuse.

On the other hand, if a person believes he is the King of England, and he attempts to act up to such belief, that is a delusion, *i.e.*, a disorder of the mind. The real distinction is of course between illusions and delusions. Many sane people suffer from sensory illusions, which their sound intellects can correct; thus a sane person is able to bring his judgment to bear on the question and to convince himself and to recognise that his senses are playing him false, just as the illusions of dreams become corrected at the moment of waking. If illusions, however, go on for a long period, they often become delusions and the sufferer becomes actually insane. Voices are heard which do not exist, but the individual can no longer be convinced of their non-existence. In the same way there may be illusions of the other senses, as of sight, taste, or touch. Usually the acts of insane people are connected with their delusions, and insane people often reason correctly to some extent, but they start from false premises.

The early symptoms of Insanity are very vague and general. Often there is great sleeplessness and great tendency to talk, and great difficulty in keeping the mind occupied with any train of thought, often great depression or great self-conceit, often great suspicion of other people, especially of those nearest and dearest and the ones there is the least reason to be suspicious of. Then illusions, hallucinations, and delusions follow, but it is important to remember that in the early stages of insanity there may be no delusions. Illusions in the insane, *i.e.*, where the judgment

is also affected, often occur suddenly on waking from sleep, and under their influence serious crimes may be committed. Thus an insane person on waking may hear voices prompting him to commit suicide, or the illusion that a person in the room is the devil may prompt him to murder. One case is recorded where a man suddenly wakened, saw a frightful phantom in his room, which he promptly attacked with a hatchet. It was found that he had killed his wife.

Lunatics may have lucid intervals, i.e., temporary restoration to reason and understanding, but we must be careful to distinguish true lucid intervals from mere remission of symptoms. All lunatics vary in their mental condition from time to time, but we cannot call it a lucid interval, unless the person acts rationally and talks coherently. Even if a lunatic appear to be perfectly rational and should act accordingly, yet a crime committed at that period or shortly afterwards would probably be found by a jury to have been committed whilst the accused was of unsound mind.

Dreams are closely allied to unsound states of mind; the intellect and judgment being inactive, illusions and delusions are apparently real and are uncontrolled. In dreams the senses are closed to external objects, whilst in insanity the evidence of the senses is disregarded or misinterpreted. "The madman is in a waking dream, from which he cannot be roused." (Guy and Ferrier.)

Sleep-walking is a form of dreaming, where the senses and voluntary muscles have full play. It is said that there may be a moral somnambulism in some cases, i.e., that a person who when awake is pious and in every way good, may in his sleep-

walking become a thief or a murderer or become suicidal.

On the border-line of insanity also are the temporary mental disorders, associated with delirium, which occurs in many diseases and also from the effect of drugs, as alcohol and other poisons.

Delirium is common in many diseases, especially in fevers and other infectious diseases, and also as a result of severe accidents and after surgical operations, especially where the sufferer has been a person of intemperate habits previously. It is also a constant symptom of poisoning by belladonna and an occasional symptom of poisoning by other drugs; it is often produced by the excessive indulgence in alcoholic liquids. It usually takes at first the form of increased excitement with incoherence of thought and language, but if the case be going to end fatally it often passes into a condition of stupor and coma.

All acts performed during the delirium of disease entail no responsibility, civil or criminal, but it is said that as regards wills made during this condition, their validity depends usually on the character of the will itself as regards reasonableness and as regards the testator's known intentions previous to illness. As regards the delirium of drunkenness, this being produced by the individual himself, he remains responsible for everything done whilst under the influence of alcohol, except that intoxication may be taken into consideration as a circumstance to show that the act was not premeditated. But on the subject of drunkenness as a defence to crime see "Archbold," 22nd ed., pp. 27, 28.

Delirium Tremens is a disease produced by the long-continued use or excessive abuse of alcoholic

liquors. The proximate cause of an attack may be a bout of excessive drinking, or the occurrence of some slight accident or injury to one who has long indulged in alcoholic stimulants. An attack may also come on in such a person who has got any acute disease, as, e.g., pneumonia. The chief characteristics of this disease are the loathsome illusions of sight; the patient sees rats or toads or vermin all crawling about his room or bed.

Delirium Tremens is a recognised disease, of which the delirium is a symptom; there is no legal responsibility for acts done whilst a person is so suffering, the disease being a true insanity as long as it lasts.

For medical purposes the conditions of unsound mind may be said to divide themselves into four forms:—

1. Amentia.

1. Idiocy.

2. Imbecility, want of mind.

3. Cretinism.

2. Dementia.

Depression of mind.

3. Mania.

Exaltation of mind.

4. Melancholia.

Depression of mind.

(Guy and Ferrier.)

Idiocy is a disease dating from birth, accompanied with an absence or serious defect of all the mental powers. In the extreme form there is mere existence, combined with great bodily deformity, even sensation being absent, and the idiot would die if not closely cared for. In the higher forms

idiots have sensation and consciousness, recognise people, have some affection for those who tend them, and they can be taught to be cleanly and to do simple things.

Idiots are quite irresponsible for their actions.

Imbecility is only distinguished from idiocy by the fact that it shows itself during childhood, and does not date from birth. Imbeciles have limited powers of understanding and acquiring knowledge; they cannot appreciate customs or laws, and they cannot control their desires or passions. Imbecility in the medical, but not the legal, sense may be intellectual, moral or general. Moral imbeciles have no distinct delusions and no deficiency of understanding, and hence do not come within the legal definition of insane persons. These moral imbeciles form a considerable proportion of the criminal classes. As, however, they are influenced by, and understand the nature of, punishment, there is no reason why they should not suffer for their misdeeds. As regards the responsibility of imbeciles and as to their competency to enter into contracts, they must be judged by the history of their conduct during the whole of life and not from isolated facts.

Imbecility, combined with undue influence, may upset a will, but if there be no undue influence, it is only necessary to prove that the testator knew the nature and the effect of what he was doing at the time he made the will in order to have the will established.

Cretinism is a disease prevalent chiefly in Switzerland; there is great mental deficiency and bodily deformity associated with enlargement of the thyroid gland in the neck. The disease may exist in all the degrees of imbecility, and occurs

in rare cases all over the world. The slighter cases, if properly trained, often improve greatly, and persons affected may be able to perform their ordinary duties in the position in which they live.

The other forms of unsound mind, viz., Dementia, Mania and Melancholia, do not form such absolutely distinct classes as the preceding subdivisions of Class I., viz., Amentia. On the contrary, the three latter states often intermix and pass and re-pass into one another. Still they do represent clearly-marked clinical types, and it is only necessary to remember that a maniacal patient may have attacks of depression, and a melancholic patient may have at times attacks of maniacal frenzy.

DEMENTIA

differs from idiocy or imbecility in that it comes on slowly or suddenly in a mind already developed, whereas in the other two there has never been any mental development. Dementia may come on in childhood, adult life or old age; generally speaking, however, it is attended by torpor and depression of the mental faculties instead of exhilaration and excitement, and is usually a disease of adult life and old age and is not common in childhood or youth.

Dementia may be:—

1. Acute. This is very rare, almost all forms of insanity which come on suddenly being attended with excitement.
2. Chronic. This is the usual form, and is very common in old age.
3. Associated with the disease known as General Paralysis of the Insane.

Just as in the case of imbecility, dementia may be present in varying degrees. At first there may be noticed perhaps only a little loss of memory or confusion of thought, then later on inability to reason, later still inability to understand, and, lastly, abolition of the common instincts of volition. As before stated, demented persons are often liable to attacks of maniacal excitement, and there may, or may not, be delusions as well. In the disease known as General Paralysis of the Insane there are generally in the early stages wonderful delusions of wealth and power and social importance, attended with and followed by progressive mental and bodily decay. This is a disease of early and middle life; it is common in men, but rare in women, and often affects persons in good position and of good ability. Such persons often impoverish themselves in giving effect to their desires, before it is discovered that the unfortunate person is really the victim of a serious disease. It is usually fatal within a few months to two or three years.

The legal relations of the different degrees and forms of dementia give rise to great difficulties, as the persons affected differ so much from time to time; a patient who appears to be hopelessly insane on one day, may appear on another day to be practically well or to show only such slight mental peculiarities as may cause the examiner to be quite unable to come to a decision, which may possibly involve the deprivation of the personal liberty of the patient on the one hand, or on the other perhaps lead to an early case of homicide or suicide.

MANIA

includes all forms of insanity attended by undue excitement. There is general derangement of the mental faculties, accompanied by more or less excitement, attended at times by dangerous fury. Mania affects the intellect, the emotions, and the passions. It may come on suddenly or may begin insidiously with headache, sleeplessness, or excitement. It may come on in childhood, adult life, or old age, but is commonest by far in adult life. After the first period of incubation, the symptoms become more marked and soon there are distinct delusions, under the influence of which the person afflicted may show great violence. Murder perpetrated in such cases may often be traced to delusions connected with the devil (Taylor). In some cases the patient, instead of being violent to others, is terrified and afraid of everybody near him, and tries to keep himself in hiding. Such a condition is termed panophilia. The excitement of mania is paroxysmal, and there are variations in the severity of the symptoms from time to time. There is often blunted sensibility, so that maniacs do not notice or apparently do not suffer from local pain or injuries. Hence severe injuries may be inflicted on maniacs in the efforts made to restrain them from injuring themselves or others without causing the patient to make any complaints; many cases are recorded where inmates of asylums who were supposed to have died from natural causes, have in reality died from fractured ribs or other kinds of apparent ill-treatment. On the other hand it must be remembered also that in many cases of insanity the bones become remarkably brittle and fracture very easily, so that it is quite possible to find

fractured bones in a lunatic where no undue violence has been used; this would, however, only be found in chronic lunatics, where maniacal symptoms are not so common. Persons suffering from mania are also able to go without food for long periods, influenced by the common delusion in such cases that the food has been poisoned. The delirium of disease does not differ markedly from that of insanity except that it is temporary, and usually there is at first more indication of bodily disease than in cases of insanity proper, where the symptoms from the beginning are chiefly mental.

Instead of being generally disordered, the mind may be chiefly affected as regards one class of subjects. This is monomania. In such cases the sufferers have false ideas on certain points, out of which they cannot be persuaded. "They start from false principles, but setting this aside, their inferences and deductions often possess logical accuracy" (Taylor). There are many varieties of monomania, such as are indicated by the following names:—Kleptomania, Erotomania, Dipsomania, Suicidal Mania, Homicidal Mania, etc. Persons who suffer at first from monomania usually sooner or later become gradually worse, until they end in a condition of general mania or dementia.

It is sometimes difficult to say where eccentricity ends and monomania begins, but one important distinction is that an eccentric man knows he is peculiar and persists in his peculiarities intentionally, although he is well aware of them, whereas the monomaniac has no knowledge that there is anything peculiar or anything calling for remark in his conduct.

Melancholia is merely one form of dementia and is common in adult life and advancing years.

Melancholics will sit for hours or days without speaking in a state of the greatest depression; they require very close watching as they are often suicidal or homicidal.

Moral Insanity and Moral Mania are described in Medical works, where the intellect is at first quite unaffected, and the instances of monomania enumerated above may be instances of this kind. In all these cases it is not easy to say what is due to insanity and what to natural wickedness, and if one regard these forms of vice as insanity it seems as before stated that one might well regard all crimes as a form of insanity on the part of the perpetrator. Fortunately the law does not admit the existence of purely moral insanity.

Of the forms of monomania enumerated it is only necessary to specially consider two, viz.:—

1. Suicidal Mania.
2. Homicidal Mania.

SUICIDAL MANIA

is that form of insanity where self-destruction is the all-absorbing idea. An attempt at suicide may be the result of a sudden impulse or the result of long deliberation; there may or may not be an apparent motive, as, e.g., a real or imaginary dread of poverty or of some impending calamity. A person so afflicted may go to bed quite calm and collected and waken up suddenly in the night and destroy himself. As to the question whether suicide necessarily indicates insanity, although many medical writers are of opinion that there is such indication, yet the more general opinion

appears to be that allowing that suicide may be an indication of insanity in the absence of a real or apparent motive, where there *is* a real motive, such as impending ruin or impending disgrace, it is impossible not to regard suicide otherwise than as the act of a sane person. And so the law regards it, for those who have attempted suicide and failed are regarded as guilty of a misdemeanour, and are held to be sane and responsible unless other indications can be given of true legal, *i.e.*, intellectual, insanity. Any person aiding and abetting another to commit suicide is guilty of murder, even if the two persons have really agreed to commit suicide together.

In some cases policies of life assurance become void if the assured commit suicide, but "If the suicide were really an act of insanity, it has been doubted whether the policy would be legally forfeited, as the condition implies that the assured kills himself deliberately and not unconsciously through a delusion as the result of a fit of delirium or of insanity." (Taylor, p. 498.)

In one case it was clearly held that to bring the case within the terms of the exception, the assured at the time of committing suicide must have been at the time of the act an accountable moral agent and able to distinguish right from wrong. But other judges have differed much on the point, some considering that the suicide clause includes all cases of suicide, whether the person be sane or insane. (See "Law Times," 1846, p. 342; also L.R., 1904, 1 K.B., p. 832; affirmed L. R., 1905, 1 K.B., p. 31, C. A.)

The tendency to suicide may be hereditary; but in regarding suicide as an indication of insanity

it is curious to find that suicide is comparatively uncommon in asylums, even allowing for the care with which the inmates are watched and looked after. For further information on this point see "Porter on the Laws of Insurance," 2nd edition, p. 130, et seq.

Suicide "whilst insane" has been for a long time the verdict of coroners' juries in almost all cases of self-destruction, a mere scintilla of evidence being sufficient for a jury to find the deceased unaccountable for his act, and therefore to give a verdict avoiding the indignities which formerly attached to the corpse of one who had made a felon of himself, viz., the indignity of being buried without burial service in unconsecrated ground with a stake driven through the body. It is still unlawful, according to a rubric of the Church of England, for a clergyman of the Established Church to read the burial service over the bodies of those "who have laid violent hands upon themselves." Where there is an apparently adequate motive for suicide, such as overwhelming trouble or pecuniary distress, it is difficult to imagine why this should be taken as an indication of insanity, but where a person kills himself in the absence of any motive one might well consider that the mind was unsound. In some countries, as in China, it is said that suicide is common and is not regarded as a crime; on the contrary, it is often the carrying-out of a high moral duty. But in our own country, the insane nature of suicide is often confirmed by the fact of the neurotic tendency of other members of the same family. Thus it will often be found that other members of the family have attempted

or actually committed suicide, or perhaps have been epileptics, or hysterical, or weak-minded, as shown by habits of drunkenness or sexual excess.

According to Dr. Tuke, Insane suicide may be—

- | | | | | | | | | | | | |
|-----------------|---|---|-----------------|---|---|----------------|---|--|-----------------|---|---|
| 1. Impulsive | { | Neurotic.
Hysterical.
Maniacal.
Alcoholic.
Epileptic. | | | | | | | | | |
| 2. Deliberate | { | <table border="0"> <tr> <td style="vertical-align: middle;">(a) Egotistical</td> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="vertical-align: middle;"> Gain.
 Worry.
 Sleeplessness.
 Ruin.
 Shame.
 To avoid persecution. </td> </tr> <tr> <td style="vertical-align: middle;">(b) Altruistic</td> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="vertical-align: middle;"> To save others from suffering.
 To benefit others. </td> </tr> <tr> <td style="vertical-align: middle;">(c) Indifferent</td> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="vertical-align: middle;"> As a result of "voices."
 As a result of frequent delivery
 As a result of weak mind. </td> </tr> </table> | (a) Egotistical | { | Gain.
Worry.
Sleeplessness.
Ruin.
Shame.
To avoid persecution. | (b) Altruistic | { | To save others from suffering.
To benefit others. | (c) Indifferent | { | As a result of "voices."
As a result of frequent delivery
As a result of weak mind. |
| (a) Egotistical | { | Gain.
Worry.
Sleeplessness.
Ruin.
Shame.
To avoid persecution. | | | | | | | | | |
| (b) Altruistic | { | To save others from suffering.
To benefit others. | | | | | | | | | |
| (c) Indifferent | { | As a result of "voices."
As a result of frequent delivery
As a result of weak mind. | | | | | | | | | |

Recently some coroners have been more strict and more careful as to the directions given to the jury regarding the question of the sanity or otherwise of the suicide, and have suggested that in the absence of clear evidence of mental unsoundness,

such as would be satisfactory in other courts of law, the proper duty of the jury is to return a verdict of *felo de se*.

HOMICIDAL MANIA

is recognised as existing independently of delusion. Women are more liable to this form of insanity than men, especially when weakened by constant toil, by profuse menstruation, or by recent delivery, and especially, in the last case, where the lying-in period has been attended with blood-poisoning or fever. Homicidal acts may occur in all forms of insanity, but the term is here applied to those cases of so-called "moral insanity" where the intellect is not affected; fortunately at the present time these cases are not recognised by the law—"for otherwise it would be almost impossible to draw the line between moral insanity and moral depravity." (Taylor.)

The causes of homicidal mania are excessive nervous excitement, bodily exhaustion, and vicious habits and the influence of irritation on depraved minds. It may occur at all ages, even in children, and in all such cases the great problem to solve is "what are the plain practical distinctions between defective reasoning power and perverted moral sense, for the latter condition should not absolve from punishment." (Taylor.)

According to Esquirol, there are three degrees of homicidal mania:—

1. The murder is connected with irrational motives or actual delusions. Here the insanity is undoubted.

2. The desire to kill is connected with no known motive—no motive can be discovered, and it is difficult to imagine any, but “it is generally possible to form an opinion whether a given act was done from an unknown mad motive, or from some unknown sane motive.” (Stephen.)
3. The impulse to kill comes on suddenly, and is uncontrollable, without interest or motive, and often those killed are those most loved by the murderers. These are the cases of so-called “impulsive insanity,” in which the defence of insanity is so often set up, and upon which Stephen (J.) comments as follows: “It is said that on particular occasions men are seized with irrational or irresistible impulses to kill, steal or burn, and under the influence of such impulses they sometimes commit acts which would otherwise be most atrocious crimes. It would be absurd to deny the possibility that such impulses may occur, or the fact that they have occurred and been acted upon. Instances are given in which the impulse was felt and resisted. The only question which the existence of such impulses can raise in the administration of criminal justice is whether the particular impulse was irresistible as well as unresisted. If irresistible, the accused is entitled to acquittal, because the act would not then be voluntary and not properly his act. If the impulse was resistible, the fact that it proceeded from

disease would be no excuse at all. If a man's nerves were so irritated by a baby's crying that he instantly killed it, his act would be murder; it would be not the less murder if the same irritation and result were produced by some internal disease. The great object of the criminal law is to induce people to control their impulses; and there is no reason why, if they can, they should not control insane as well as sane impulses. The proof that an impulse was irresistible depends on the circumstances of each individual case."

"No hideousness of depravity can amount to proof of insanity unsupported by evidence of perverted judgment or morbid will." (Jamieson.)

There are some general distinctions to be drawn between the acts of sane and insane criminals, which may sometimes be of some assistance in coming to a conclusion:—

Sane Criminal.	Insane Criminal.
1. Often has accomplices.	Has no accomplices.
2. Always a motive, even although it may be undiscoverable.	Often no motive at all or an unsubstantial one.
3. He kills his enemies and opponents.	Often kills those he loves best.
4. Conceals and denies his guilt.	Usually admits at once, and makes no efforts to escape.

All recent judgments on the criminal responsibility of persons said to be insane are still founded on the answers given to the questions propounded by the House of Lords in Macnaughton's case

(v. Archbold, p. 24 seq.), which answers, in the opinion of Stephen (J.), leave the main questions untouched. The judges decided that every man is presumed to be sane and responsible for his crimes, until the contrary be proved, and for such proof to be sufficient it must establish that at the time of committing the act the accused was labouring under such a defect of reason from mental disease as not to know the nature and quality of the act he was doing, or if he did know what he was doing that he did not know what he was doing was wrong.

The plea of insanity may of course be set up in defence of other crimes than murder, but this is rarely done, as if the prisoner be found insane and ordered to be detained as a criminal lunatic, the punishment would probably be greater than if the accused underwent his punishment in the ordinary way. For the defence of insanity to be successful it must be clearly proved that the person was insane at the time he committed the crime, and it is inadmissible or useless to prove that there was hereditary tendency to insanity as shown by the family history of the prisoner.

For a full discussion of the legal view of insanity in its relation to responsibility for crimes see Stephen's "Hist. Crim. Law," Vol. 2, p. 145, and Vol. 3, ch. xv., and for a statement of the medical view see "Quain's Dict. of Medicine," 3rd ed., p. 353.

Taylor enumerates the following tests, which have been proposed by medical jurists for the detection of cases of homicidal mania:—

1. Insane homicidal acts are usually preceded by peculiarities of conduct or great change of character. This test often

fails, as many cases occur quite instantaneously. It is said one man who was undoubtedly insane when he committed a murder, was quite sane two days afterwards.

2. Another vague idea is that many persons accused have previously attempted suicide.
3. The deed is often without motive or in opposition to all apparent human motives. But one knows that there may be a motive, even if one cannot detect what it is, and "it would be a fatal error to infer insanity from inadequacy of motive." And generally it is true that the insane do acts from motives, but their motives are based on delusions.
4. The criminal often gives himself up and confesses his crime. But often a sane person commits a crime in a thirst for the notoriety it brings.
5. No accomplices. Generally a sane criminal has no accomplices in murder, although he has plenty of accomplices in vice and in lesser crimes.
6. The presence of delusion in the act. But this is not sufficient to prove insanity, unless the delusion was the cause of the act. The existence of a partial delusion on some other subject would not be sufficient to excuse him. If a man commit an act which he knows to be contrary to law he is responsible in spite of his delusion, unless what he does is done under the direct influence of his delusion.

7. Premeditation, precaution, concealment and flight are all strong indications of sanity, but even these tests may fail.
8. Where several murders are perpetrated at once, this affords a strong presumption of insanity.

SUMMARY.

According to Taylor, there are no certain tests, legal or medical, to show the existence of homicidal mania. Each case must be tried on its own merits, and the true test is whether at the time of committing the deed the accused had or had not a sufficient power of control to govern his actions, or whether, knowing the act to be wrong, he could not avoid doing it.

This involves two points:—

1. Did insanity exist at all.
2. Had it reached a degree to destroy the volition—the will to do or not to do the act.

The want of the power of self-control is one of the most important symptoms of insanity, and it is a symptom which often precedes delusions.

Stephen (J.) puts the question thus:—(1) Was it his act? (2) Could he help it? (3) Did he know it was wrong?

The question of insanity may come before the court in two ways: Is the prisoner fit to plead? He may be so hopelessly insane as to be unable to understand what he is charged with, and so be unfit to plead. On the other hand, he may be fit to plead, and if found guilty a special verdict will

be returned that "he was insane at the time." (See Archbold, 22nd ed., p. 199.)

The civil responsibilities of insane persons require discussion under several heads.

The imposition of restraint. It is not a sufficient ground for imposing restraint on a person merely that he is insane; his delusions must influence his conduct, and there must be a risk that he will injure himself or others in person or property before taking this serious step. The conduct of a person is the important criterion from which to judge whether a person is sane or insane; the less power of self-control a madman has the more danger is to be feared. Medical men are often placed in very anxious and difficult positions in the determination as to whether an insane person should be confined in an asylum or not. If the attack prove merely temporary and the patient is soon recovered, he may have to undergo the worry of an action for damages at the hands of the patient; if, on the other hand, the patient is kept in his own home and commits murder or suicide unexpectedly, he is equally blamed. He must generally use his judgment to the best of his ability, and, provided he can show that he acted bona-fide and on reasonable grounds, he is now exempted from the worry of an action for damages. (See the Lunacy Act, 1890, 53 Vict. ch. 5, s. 330.) Obviously where the patient is well-to-do and can afford to have skilled attendants to take care of him at his own home there is not the same necessity for prompt removal to an asylum as in the case of a poor person, who would have to be left in charge of inexperienced and careless neighbours and relatives, who would not be sufficiently alert and on the watch for dangerous

symptoms. On the other hand, probably one of the greatest aids to recovery is the removal of the patient from all home surroundings and influences, and this applies to rich and poor alike. Cases of temporary delirium from delirium tremens are particularly difficult to manage in regard to an asylum, as they may be violent and suicidal in the early stages, whereas with the removal of the alcohol the delirium rapidly passes away, and the patient is soon well again.

The whole procedure as to the removal of insane persons to asylums, and the precautions to be observed as regards following out very strictly the line of procedure enjoined will be found in Wood-Renton on Lunacy.

As regards the capacity of an insane person to give evidence in a Court of Law, if he understand the nature of an oath, and the nature of the proceedings in which he appears, then he is competent to give evidence, but what amount of credibility will be given to his evidence will depend upon what the jury think of the witness in each particular case. As a rule we may say that no jury would convict on the uncorroborated testimony of a person known to be insane.

In cases where a person suffers from mental diseases to a degree that he is unable to manage himself and his affairs a writ "de lunatico inquirendo" is issued, and if on examination it is found that he is unfit to attend to his duties, then a commission will be appointed to take care of his affairs, with or without the imposition of such personal restraint on the lunatic as may be required. In all these enquiries evidence of the person's conduct of life will be the important factor in guiding the Court to a correct decision.

Insanity is a bar to marriage, as there cannot be the rational consent necessary to form the contract. If a lunatic do marry, the marriage is void ab initio, but clear proof of insanity at or near the time of the marriage will be required.

Civil Contracts made by lunatics are valid, provided the other party did not know and had no reason to believe he was dealing with a lunatic.

As regards testamentary capacity, the law always tries to find if the testator had a "disposing mind" at the time he made the will, and the best test of capacity, it is said, is that a man should know the nature and amount of his property and the claims of those nearly related to him. Where an insane person makes a will, the burden of proof lies on those who wish to establish it, and it must be clearly shown that there were no delusions present at the time influencing the testator in his dispositions. Where, on the contrary, a will is made during the temporary delirium of illness, the onus of proving that the will did not represent the real intentions of the testator would lie on those opposing the probate of the will. As regards the testamentary capacity of lunatics see "Times Law Reports," December 10th, 1892.

A monomaniac may make a valid will, provided that the delusion from which he suffers does not affect the substance of the will, and valid wills have been made by persons confined in asylums. Personally, I should regard any will so made with the greatest suspicion. If a person be so insane as to require detention in an asylum, it is impossible for anyone to conjecture what motives are influencing him, or what kind of reasoning is affecting him.

After attacks of cerebral apoplexy or embolism,

i.e., the rupture of, or stoppage of circulation through one of the blood-vessels of the brain, the patient often suffers from aphasia, *i.e.*, he is unable to utter articulate sounds. There are various forms and degrees of aphasia, into which it is needless to enquire, but in some forms a patient, although unable to speak, is quite able to understand, and in some cases is able to write or to express his desires by signs; in such cases the patient may be able to make a will or do other legal acts. In other cases no ideas can be conveyed to the brain or mind of the patient, he can understand nothing; in these cases of course there is complete legal incompetence.

In cases of mere eccentricity without actual insanity, the law never interferes, and if moral insanity, as it is called, is no legal excuse for crime, and if persons so suffering are responsible for their crimes, then clearly their wills ought to be held to be valid. In old age the mental powers may become very feeble and persons may become the subject of strange likes and dislikes, but whether these facts go to the length of showing that the testator had not the disposing mind needed must be a fact to be considered on its merits in each individual case.

Great care should be taken in reference to wills made by persons who are moribund at the time they sign the will, and medical men, who are often called to witness wills under this and other circumstances, should always remember that they are not only witnessing a will, but practically they are testifying to the competency of the testator to make it.

EPILEPSY

is a disease attended by recurring convulsions, and is due to disorder of the brain. It varies greatly in degree; in some cases the attacks interfere little or not at all with the duties of life, in others they are so severe and frequent as to gradually lead to complete dementia. In some cases the sufferer is wildly maniacal or very homicidal just previous to and just after an attack, but a plea of epileptic insanity as a defence to murder would probably not prevail where the crime was not immediately succeeded by or preceded by a proper convulsive attack.

PUERPERAL MANIA

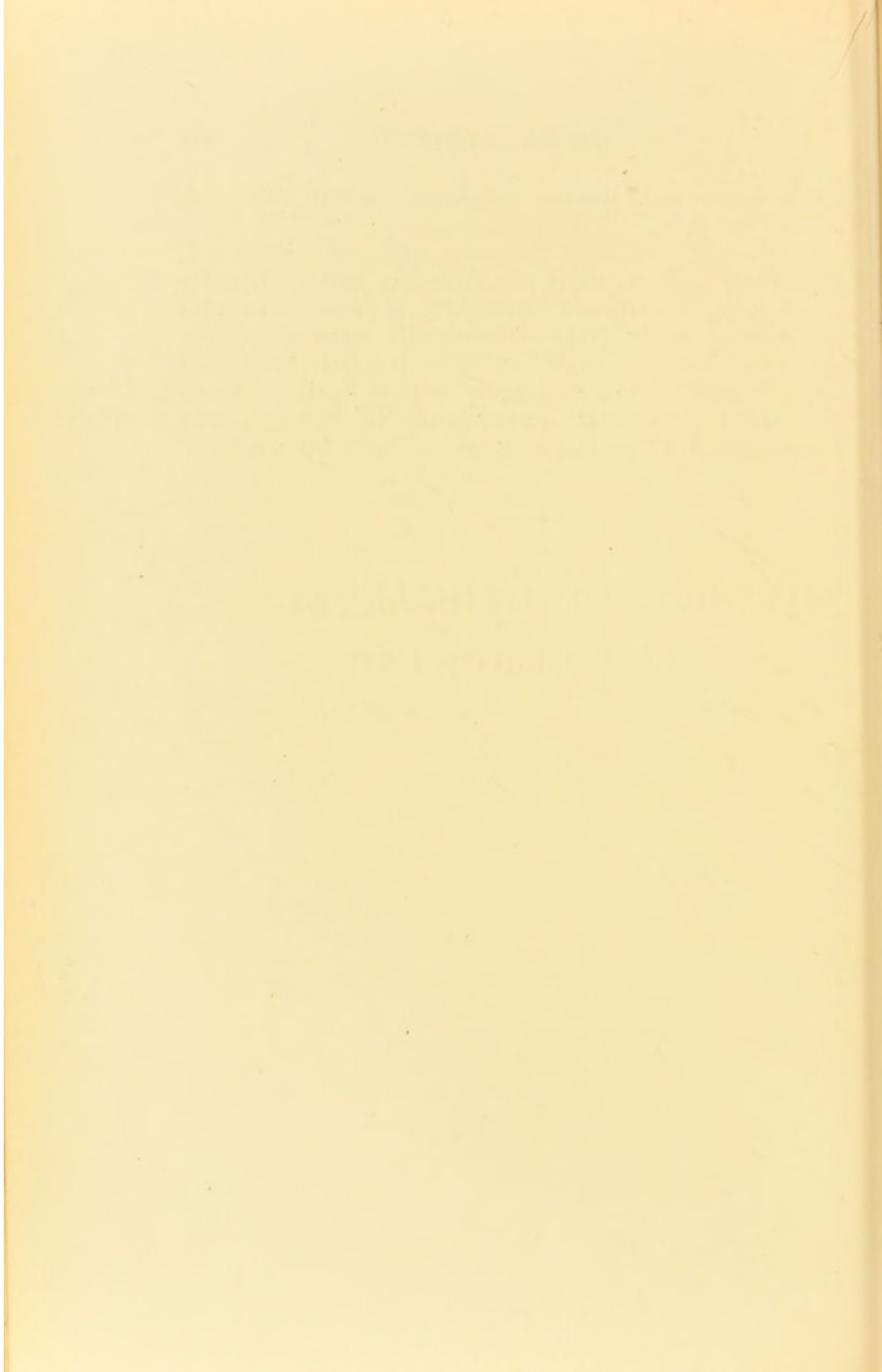
is the form of insanity occurring in women who have been recently confined. It is divided into—

1. An acute form, coming on usually a few days after the child is born and usually of a maniacal character.
2. A chronic form, usually of melancholic character, coming on later and often apparently produced by the weakening influence of lactation.

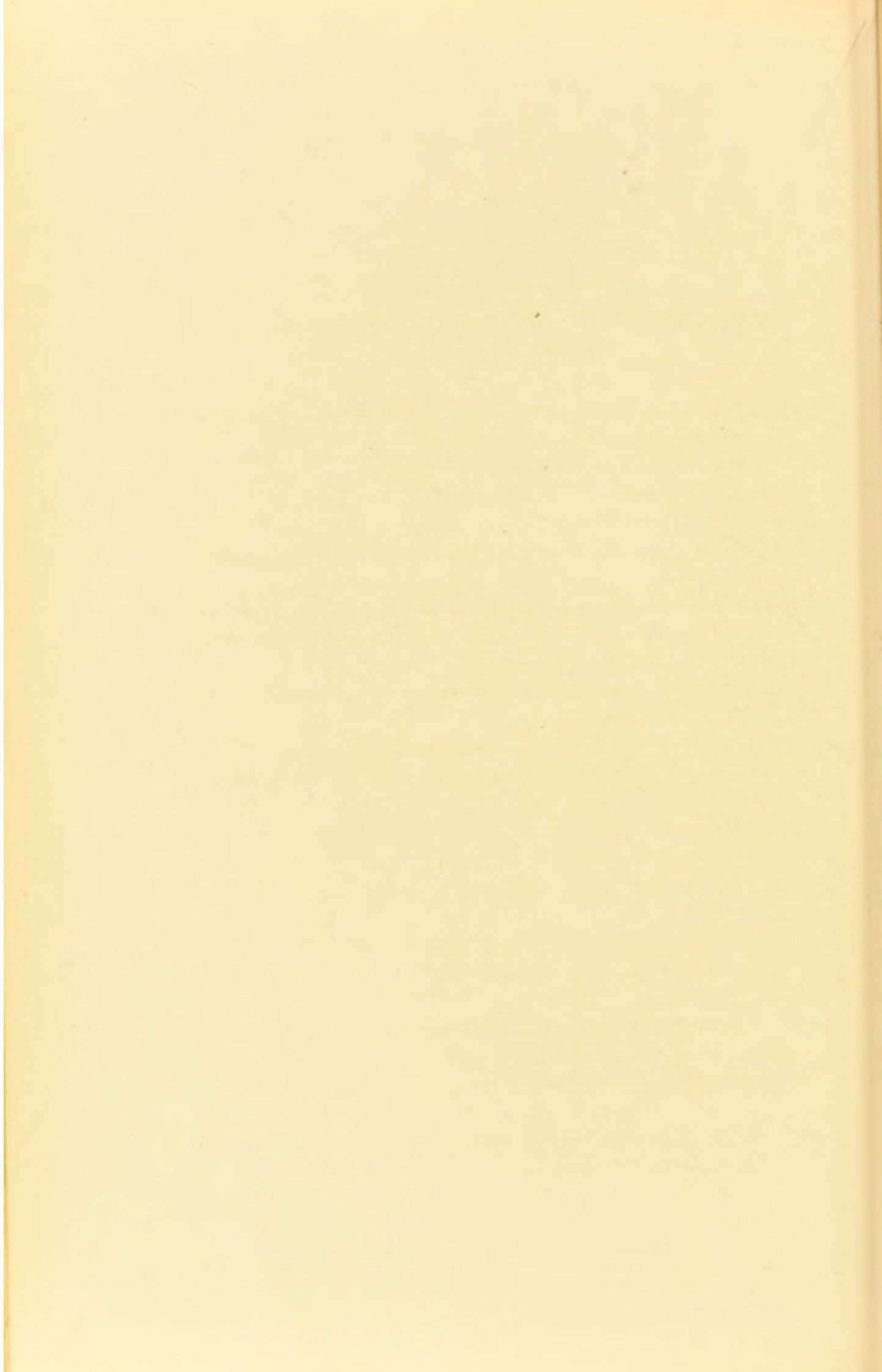
This disease is the most markedly hereditary and the most curable of all forms of insanity. Women in this state are often suicidal or homicidal, and often kill their children without apparent motive or premeditation; the greatest precautions are always required to prevent such misfortunes, as the homicidal impulse may be quite sudden. Sometimes melancholia or mania

may come on during pregnancy before the birth of the child.

Feigned Insanity. Insanity is sometimes feigned; usually the imposter overdoes his part, and there is always some motive for his acts, as nobody would pretend to be insane merely to avert suspicion. As a rule, he cannot maintain his part long, and whereas the real madman usually believes he is sane, the imposter is always afraid, if he says he is sane, that people may take him at his word.



MEANING OF MEDICAL WORDS
IN COMMON USE.



MEANING OF MEDICAL WORDS IN COMMON USE.

ABSCCESS—a collection of pus or matter, resulting from an acute local inflammation.

ASCITES—dropsy of the belly.

ALOPECIA—falling-off of the hair.

AMAUROSIS—blindness.

AMNESIA—loss of memory of words without loss of power of utterance.

ANÆMIA—deficiency of quality of blood.

ANÆSTHESIA—loss of sensation of touch, common in many nervous diseases.

ANASARCA—general dropsy, common in many diseases of the heart and kidneys.

ANEURISM—a tumour or swelling of an artery.

ANGINA PECTORIS—a disease characterised by spasm of the heart; a common cause of sudden death.

ANTHRAX—a form of acute fever, caused by infection from wool in those who work therein.

AORTA—the large artery springing from the left ventricle of the heart.

APHASIA—loss of the power of speech, a common symptom of apoplexy or cerebral hæmorrhage.

APHONIA—loss of voice.

APOPLEXY—means rupture of a blood vessel, generally in the brain, causing paralysis or death.

ARTHRITIS—inflammation of a joint.

BILE—the fluid secreted by the liver and poured into the bowel for the purposes of digestion of food.

BRIGHT'S DISEASE—an acute or chronic disease attended at first by inflammation of the kidneys and often in later stages by general dropsy and other constitutional symptoms.

BRONCHITIS—Inflammation of the bronchial tubes.

BUBO—a swelling of a lymphatic gland.

CARIES—chronic inflammation of bone, with absorption of bony elements and tendency to break down and suppurate.

CALCULI or stones form as a result of some diseases or alterations in the blood or other secretions. Thus stones are found in the liver (*gall stones*) and in the kidneys and bladder.

CANCER (CARCINOMA)—a malignant constitutional disease, characterised by the growth of tumours in various parts of the body with progressive wasting and usually by death.

CARBUNCLE—a local intense inflammation of the skin, attended with formation of matter and formation of dead tissue.

CAROTID ARTERIES—the large arteries of the neck (*see diagram.*)

CHANCRE—a sore resulting from sexual intercourse with a person suffering from venereal disease. A chancre may be (1) *soft*, in which case the disease is local, or (2) *hard*, in which case the sore is an indication of syphilis.

CHICKEN-POX—a specific contagious disease, often mistaken for small-pox and *vice-versâ*.

CHOREA or St. Vitus's Dance—a disease usually of early life, attended by disorderly convulsive movements of the limbs and head.

CIRRHOSIS—means generally a *hardening*, the ordinary tissue of an organ being replaced by hard, fibrous tissue, and the functions of the organ thus being diminished or destroyed.

CIRRHOSIS OF THE LIVER—is a common result of chronic alcoholism.

COLIC—acute pain due to spasm; thus hepatic colic is often caused by passage of a gall-stone, urinary colic by passage of a kidney or bladder-stone, or abdominal colic by obstruction in the bowels.

CONGESTION—accumulation of blood in the vessels of a part of the body, may be (1) *active*, usually commencing in small arteries and often the beginning of inflammation, or (2) *passive*, affecting usually the capillaries and veins, the result of long-continued over-distension of vessels.

CONTAGIA—the minute organisms which cause the infective fevers as scarlet-fever, measles, small-pox, etc.

CONVULSIONS—muscular spasms or twitchings, common in many diseases as in epilepsy and many nervous diseases; often due in children to reflex irritation from indigestion or worms.

CYANOSIS—lividity or blueness of the skin, a symptom of all diseases when the proper oxygenation of the blood is interfered with.

CYSTITIS—inflammation of the bladder.

DELIRIUM or mental confusion is common in many diseases and may take many forms: excitement, depression, delusions.

DIABETES—a chronic disease, attended with the presence of sugar in the urine and gradual loss of flesh; a very fatal disease in the young, but often comparatively harmless in stout, elderly people of gouty constitution.

DIAGNOSIS—the opinion one forms as to the nature of an ailment.

DIPHTHERIA—an acute, contagious disease, affecting usually the throat and wind-pipe, commonest in children.

DISINFECTION—the various methods in vogue for destroying the poisons of the contagious diseases and for preventing the spread of such diseases from the sick to the healthy. The usual methods are by *heat* or by chemical means.

DROPSY—the accumulation of serous fluid in the cavities of the body or between the spaces of the connective tissue of the body.

DYSENTERY—an acute or chronic disease of the bowels, attended with diarrhoea and ulceration of the bowels.

DYSPEPSIA—a general term applied to all disorders of digestion, however caused.

DYSPHAGIA—difficulty of swallowing.

DYSPNŒA—difficulty of breathing.

ECCHYMOSIS or **BRUISE**—circumscribed discolorations due to escape of blood into the tissue of the skin.

ECLAMPSIA—Convulsions.

EMBOLISM—the blocking of a blood-vessel by small detached masses of tissue carried along by the blood-stream until they reach a vessel too small for them to pass. In many diseases clotting of blood in the veins is common (*thrombosis*). The *thrombosis* or clot so formed may become detached and carried away and so cause an *embolism*.

EMPHYSEMA OF THE LUNGS—a chronic disease, attended by dilatation and rupture of the air-cells, often occurs as the result of long-continued bronchitis.

EMPYEMA—formation of matter in the cavity of the chest, one of the results of an attack of pleurisy.

ENDOCARDITIS—inflammation of the lining membrane of the cavities of the heart; one of the commonest complications in rheumatic fever.

ENTERIC or Typhoid Fever—a contagious fever, attended with ulceration of the bowels, usually contracted by swallowing infected food or liquid, but may also be the consequence of breathing impure air.

ENTERITIS—Inflammation of the bowels.

EPILEPSY—a functional disease of the nervous system, attended with temporary loss of consciousness followed by convulsions. Convulsions like those of epilepsy are also common in many functional and organic diseases.

EPISTAXIS—bleeding from the nose.

EPITHELIOMA—a form of superficial cancer, occurring chiefly at the junction of the skin and mucous membranes.

ERYSIPELAS—acute inflammation of the skin, arising either from wounds (*traumatic*) or apparently spontaneously (*idiopathic*); often infectious and very dangerous in the intemperate or where surgical patients are crowded together in hospitals.

FEVER—a general term for all disorders attended with abnormal elevation of the bodily temperature.

FUNCTIONAL DISORDERS are those which occur without obvious changes in the organs or parts of the body. Many diseases are apparently the result of merely functional disturbances.

GANGRENE—*mortification* or death of tissue. If the dead mass be small it may slough off and separate; if large, it may cause blood-poisoning and death.

GASTRITIS—inflammation of the stomach.

GASTRODYNIA—pain in the stomach.

GLANDERS—a specific disease common in horses and conveyed from horses to men by contagion.

GLOSSITIS—inflammation of the tongue.

GLYCOSURIA—sugar in the urine, a symptom of diabetes.

GOUT—a constitutional disease, markedly hereditary, attended with the deposit of urate of soda in the joints and other tissues.

GUMMATA—small tumours occurring in various organs as the result of syphilis.

HÆMATURIA—blood in the urine.

HÆMOPTYSIS—spitting of blood from the lungs.

HÆMORRHAGE—bleeding. May be arterial, venous or capillary.

HECTIC FEVER—the fever attending chronic diseases, especially malignant and tubercular diseases, associated with long-continued purulent discharges.

HEMIPLEGIA—paralysis of one side of the body, the usual result of rupture of a vessel in the brain or apoplexy.

HEPATITIS—inflammation of the liver.

HERNIA or Rupture—the protrusion of a coil of bowel through an abnormal aperture.

HYDROCEPHALUS—accumulation of serous fluid in the cavities of the brain.

HYDROCEPHALUS, ACUTE—is another name for tubercular inflammation of the *meninges* or lining of the brain.

HYDROTHORAX—collection of clear fluid in the cavity of the chest.

HYDROPHOBIA—an acute, very fatal disease caused by inoculation of a poison in the saliva of a dog or other animal suffering from *rabies*.

HYPERPYREXIA—an excessive degree of febrile temperature of the body, say 106°F. or upwards.

HYSTERIA—functional disorders of the nervous system, affecting the will *emotions* and intellect, commonest in young women, and in them often accompanied by or associated with disorders of the organs of generation.

ICTERUS or JAUNDICE—q.v.

IDIOPATHIC—a disease resulting from no known external cause, as idiopathic fever.

INFLUENZA—an acute, very infectious disease, affecting the nose and throat, and often followed by dangerous complications, as pneumonia.

ITIS—termination *itis* means inflammation of, as *Pericarditis* *Pleuritis*.

JAUNDICE or Yellowness of the Skin—a prominent symptom of all diseases where there is obstruction to the flow of bile into the bowel with consequent accumulation of bile in the blood.

LARDACEOUS DEGENERATION—a peculiar waxy change in the liver kidneys and other organs as the result of long-continued suppuration.

LARYNGITIS—inflammation of the larynx or wind-pipe.

LEAD COLIC—acute abdominal pain, the result of chronic poisoning by lead. Common in plumbers and painters, or in those who drink water impregnated with lead as a result of the chemical action of the water on the lead pipes which convey the water.

LOCKJAW—tetanus q.v.

LUMBAGO—rheumatic inflammation of the muscles and fibrous tissue in the loins or lumbar region of the back.

LYMPH, LYMPHATIC GLANDS AND VESSELS—The plasma of the blood exudes through the thin capillary walls and is then called *lymph*. After giving up nourishment to the tissues, the lymph is ultimately poured into the venous system by means of the lymphatic vessels. The lymphatic glands are small bodies of tissue scattered over the body into which the lymphatic vessels enter and from which they depart.

MALIGNANT, as applied to tumours and growths, means those which tend to recur after removal both locally and in distant organs, and generally sooner or later to cause death. Among the laity malignant is synonymous with cancerous, but medically other tumours are malignant as well as the cancers.

MELÆNA—the passage of black stools, the result of bleeding into the bowels.

MEMBRANOUS CROUP—diphtheria affecting the windpipe.

MENINGITIS—inflammation of the meninges or lining of the brain.

METRITIS—inflammation of the womb.

MICROCOCCI—microscopic organisms occurring in and probably directly causing many diseases of the nature of blood-poisoning.

MITRAL VALVE—the valves in the left ventricle of the heart to prevent regurgitation of blood into the auricle, when the ventricle contracts. It is often insufficient or “*incompetent*,” and then causes well-defined symptoms of heart disease.

MURMURS—where any of the valve of the heart are incompetent, the usual sharp sounds heard on listening to the chest are replaced by longer sounds of various characters. Such abnormal sounds are called *murmurs*.

MYELITIS—inflammation of the spinal cord.

MYOCARDITIS—inflammation of the muscular tissue of the heart.

NECROSIS—mortification or death of tissue. Term necrosis is often applied to death of *bone* after acute inflammation without marked alteration in its structure.

NEPHRITIS—inflammation of the kidneys. Is an essential part of Bright's disease, q.v.

NEURALGIA—pain in nerves.

NEURITIS—inflammation of a nerve.

NEUROMA—a tumour of a nerve.

NYSTAGMUS—constant involuntary oscillations of the eyeballs, occurring in some nervous diseases and also sometimes in colliers (*Miner's Nystagmus*).

ŒDEMA—dropsy, q.v.

ŒSOPHAGUS—the gullet.

ÆTIOLOGY—the causes influencing the occurrence of disease, as age, sex, climate, occupation.

OPHTHALMIA—inflammation of the conjunctiva or lining of the eye, often very infectious amongst children. Often, when one eye has been injured, there is danger of inflammation in the other eye (*sympathetic ophthalmia*), which may cause total blindness.

ORCHITIS—inflammation of the testicle.

ORGANIC DISEASES—those depending on some manifest change of structure in one or more organs.

OSTEOMA—a tumour of bone.

OSTEITIS—inflammation of bone.

OVARIES—two organs situated one on each side of the womb in women. They form periodically the ova which pass along the Fallopian tubes to the uterus, and if impregnated by spermatozoa, grow to form the foetus.

PARALYSIS means generally loss of power; may be loss of power of movement, or loss of power of sensation; may be more or less general, or may affect only a single nerve.

PARAPLEGIA means paralysis affecting both sides of the body and usually due to disease of the spine and not of the brain.

PARESIS—means loss of power of less degree than in paralysis.

PERICARDITIS—inflammation of the pericardium.

PERITONITIS—inflammation of the peritoneum, the membrane lining the cavity of and the organs in the abdomen.

PERIOSTEUM—the fibrous membrane lining the bones. Periostitis inflammation of the periosteum.

PERITYPHLITIS or APPENDICITIS as it is now usually termed, is inflammation around the cæcum or first part of the large bowel, usually due to some deposit in or inflammation of the tube of tissue attached to the cæcum known as the vermiform appendix.

PHARYNGITIS—inflammation of the back of the throat or pharynx.

PLACENTA or After-birth—the organ by which the foetus is nourished whilst in the womb. Usually it comes away easily *after* the birth of the child, but in some cases it is retained and then may cause fatal hæmorrhage or blood-poisoning. These results are very common after abortions.

PHLEBITIS—inflammation of a vein.

PHTHISIS—the disease usually known as consumption.

PLEURISY OR PLEURITIS—inflammation of the pleura, the membrane lining the chest and reflected over the lungs, etc.

PNEUMONIA—inflammation of the lung.

PRIAPISM—erection of the penis without sexual desire—common in some diseases of the spine.

PROGNOSIS—the opinion one forms as to the probable result of a disease.

PROSTATE GLAND, situated at the neck of the bladder, often enlarged in elderly people, and so interferes with complete emptying of the bladder and causes inflammation of that organ.

PYÆMIA—pus in the blood. Blood-poisoning arising from injuries, operations, etc., often contagious, probably due to poisons evolved by bacteria invariably present.

QUINSY or Tonsillitis—inflammation of the tonsils.

RABIES—a contagious disease in dogs and other animals, communicable to man by inoculation of the saliva.

RECTUM—the last portion of the large bowel, ending at the anus.

RHEUMATISM—a constitutional disease, very hereditary, supposed by some to be due to an excessive acidity of the blood.

RHEUMATOID ARTHRITIS is a chronic disease of the joints, affecting chiefly elderly women. Doubtful if it has any connection with rheumatism.

RICKETS—a disease of early childhood, characterised by softening of the bones, and general ill-health. Due to improper feeding usually.

RIGORS, or shivers, are common at the beginning of many acute diseases and also during the course of other diseases associated with the formation of pus or matter, which is pent-up and unable to become excreted.

ST. VITUS' DANCE—see *Chorea*.

SARCOMA—a form of malignant tumour, differing from cancers proper—often occurring in the young as well as old.

SCIATICA—pain along the sciatic nerve, *i.e.*, down the back of the thigh.

SCROFULA—chronic ill-health due to the irritative inflammation produced by the presence of tubercle.

SMALL-POX—an acute infective fever, very infectious in those not rendered immune by previous vaccination.

SYNOVITIS—inflammation of the lining membrane of joints.

STOMATITIS—inflammation of the mucous membrane of the mouth.

SUPPURATION—the formation of *pus*, as in an abscess.

SYPHILIS—a specific disease caught only by inoculation, and usually by sexual intercourse with one suffering from the disease. May last for years or for life, and may affect almost every organ or tissue.

TETANUS—an acute and usually fatal disease. Usually due to injury. May be idiopathic. Muscles become rigid and hard, commencing in neck and jaws. Commonly called Lockjaw.

THROMBOSIS—the act of formation of a *thrombus* or clot in a vessel. See also *embolism*.

- TRAUMATIC—something resulting from an injury, *e.g.*, traumatic erysipelas.
- TONSILLITIS—Quinsy.
- TUBERCLE—a new growth affecting specially the lymphatic tissues of the body; very widely distributed in small masses and giving rise to various kinds of wasting diseases of the organs and of the body generally.
- TUBERCULAR DISEASES—those caused by tubercle and commonly known as consumption.
- TUMOURS—Swellings or *new growths*. May occur in any part of the body, and may be (1) innocent, *i.e.*, do not recur after removal and do not threaten life unless perhaps by increase of size they offer some mechanical interference to the functions of an organ; and (2) *malignant*, *q.v.*
- TYPHUS—an acute epidemic fever, formerly often confused with typhoid or enteric fever.
- ULCERATION—means the destruction of parts by small progressive portions, and so there is formed an ever increasing sore. Ulceration of the stomach and bowels are common and often fatal diseases, but there may be ulceration of any other parts or tissues of the body.
- URÆMIA—urea in blood. The congeries of symptoms which occur in the last stages of diseases where the kidneys fail to excrete the urea which is produced by the chemical changes in the nitrogenous portions of the food and tissues.
- UTERUS—the womb.
- VAGINA—in women the passage leading from the external parts to the womb.
- VERTIGO—dizziness.

APPENDIX



PLEASE HAND TO CORONER AT INQUEST.

Notes of the Post-Mortem Examination of

Name	Sex	At	
Age	Date	Ext. Temperature	Body Temperature
Chief points in the history of the case			
External Examination.			
Length and Weight			
How Nourished			
Peculiarities of Hair, and Teeth ;			
Scars, &c., &c.			
Rigor Mortis, Hypostasis, Decom-			
position			
Marks of External Violence			
Wounds, Fractures, Dislocations, or			
other Injuries observed			
Internal Examination.			
Height of Diaphragm			
Pericardium			
Heart, size, weight			
[Right auricle, tricuspid orifice and valve.			
Right ventricle, pulmonary orifice and			
valve. Left auricle, mitral orifice and			
valve. Left ventricle, aortic orifice and			
valve.]			
Heart Muscle			
Aorta, Coronary Arteries, and Large			
Blood Vessels			
Mouth, Tongue, Oesophagus			
Larynx, Trachea, Bronchi, Thyroid			
and Thymus Glands			
Pleuræ R and L			
Lungs R and L			
Peritoneum, &c.			
Stomach and Contents			
Intestine and Mesenteric Glands			
Liver (surface, section, weight) Gall			
Bladder			
Spleen			
Kidneys and Ureters			
Bladder			
Urine			
Suprarenal Bodies			
Generative Organs			
Injuries observed			
Skull			
Meninges and Blood Vessels			
Brain			
[Hemispheres, ventricles, basal ganglia, &c.			
Crura, pons, cerebellum and medulla.]			
Spinal Column and Cord			
Conclusions and Cause of Death			

Signed

Date and Address

MEMORANDA
OF THE
POST-MORTEM EXAMINATION
OF

Extract from "THE CORONERS' ACT," 1887,
Secs. 22 and 23.

22. A legally qualified Medical Practitioner, who has attended at a Coroner's inquest in obedience to a summons of the Coroner under this Act, shall be entitled to receive such remuneration as follows ; that is to say,

- (a) For attending to give evidence at any inquest whereat no Post-Mortem Examination has been made by such Practitioner, one guinea ; and
- (b) For making a Post-Mortem Examination of the body of the deceased, with or without an analysis of the contents of the stomach or intestines, and for attending to give evidence thereon, two guineas ;

Provided that—

- (1) Any fee or remuneration shall **not** be paid to a Medical Practitioner for the performance of a Post-Mortem Examination instituted without the previous direction of the Coroner.
- (2) Where an inquest is held on the body of a person who has died in a county or other lunatic asylum, or in a public hospital, infirmary, or other medical institution, or in a building or place belonging thereto, or used for the reception of the patients thereof, whether the same be supported by endowments or by voluntary subscriptions, the Medical Officer whose duty it may have been to attend the deceased person as a Medical Officer of such institution as aforesaid, shall **not** be entitled to such fee or remuneration.

23. Where a Medical Practitioner fails to obey a summons of a Coroner, issued in pursuance of this Act, he shall, unless he shows a good and sufficient cause for not having obeyed the same, be liable on summary conviction on the prosecution of the Coroner or of any two of the Jury, to a fine not exceeding five pounds.

AVERAGE WEIGHTS AND SIZE OF ORGANS.

	ADULTS.	MALE.	FEMALE.
Brain	...	49 oz.	44 oz.
1 in 40 compared with the weight of the body.			
Lungs—			
Right side	...	24 oz.	17 oz.
Left side	...	21 oz.	15 oz.
Heart	...	10 to 12 oz.	8 to 10 oz.
Size—that of the closed fist of the individual.			
Auriculo-Ventricular			
Orifices Admit			
Right	...	Three fingers abreast	
Left	...	Three finger-tips ,,	
Arterial Orifices and			
Valves Admit			
Aortic	...	Two finger-tips ,,	
Pulmonary	...	Two fingers ,,	
Spleen	...	4 to 6 oz.	3 to 5 oz.
Liver	...	50 to 60 oz.	45 to 55 oz.
Kidneys			
Right	...	4 $\frac{1}{3}$ oz.	3 $\frac{2}{3}$ oz.
Left	...	5 $\frac{1}{2}$ oz.	5 oz.

NOTE.—The best way of preventing infection is to use photographers' gloves during the examination. At the end of the autopsy they can be washed in 1-40 carbolic solution, and then carefully dried before they are taken off. Under a Coroner's Order all the principal organs should be carefully examined, both superficially and upon section. In making sections of organs, a long knife is required to make cuts that leave smooth surfaces for inspection. When necessary, portions of the organs should be placed in 10 per cent. formalin solution for microscopic examination. The notes should be short and concise records of the facts observed; if opinions are expressed the grounds upon which they are based should also be stated. If there is any clue to the cause of death, the cavity supposed to be implicated should be opened first; otherwise the internal examination should begin with the opening of the abdomen. The height of the diaphragm should be noted, then the front of the thorax, and lastly the skull cap should be removed. Care should be taken not to injure the large veins at the root of the neck before the amount of blood in the right side of the heart has been ascertained.

J. JACKSON CLARKE.

STANDARD WEIGHTS FOR UNDER 1 YEAR.

The figures represent lbs. and ozs.

At birth	6 8	4 months old	10 8	8 months old	14 4
1 month old	7 4	5 "	11 8	9 "	15 8
2 "	8 4	6 "	12 4	10 "	16 2
3 "	9 6	7 "	13 4	11 "	17 8

STANDARD WEIGHTS AND HEIGHTS FOR 1 YEAR AND OVER.

Age in Years	MALE.		Height in Inches.	FEMALE.		Height in Inches.
	Weight lbs.	ozs.		Weight lbs.	ozs.	
1	19	13	27·5 $\frac{1}{2}$	18	13	27·0
2	24	3	31·0	24	3	30·7 $\frac{3}{4}$
3	27	8	34·2 $\frac{1}{4}$	24	3	33·6 $\frac{5}{8}$
4	30	13	36·6 $\frac{5}{8}$	30	8	35·9 $\frac{7}{8}$
5	34	14	38·8 $\frac{3}{4}$	33	9	38·5 $\frac{1}{2}$
6	39	1	41·2 $\frac{1}{4}$	36	11	40·7 $\frac{3}{4}$
7	43	5	43·4 $\frac{3}{8}$	39	1	42·9 $\frac{7}{8}$
8	47	8	45·7 $\frac{3}{4}$	41	13	45·5 $\frac{1}{2}$
9	51	11	48·1 $\frac{1}{8}$	46	3	47·4 $\frac{3}{8}$
10	55	6	50·4 $\frac{3}{8}$	50	13	49·2 $\frac{3}{4}$
11	59	6	52·5 $\frac{1}{2}$	56	1	50·6 $\frac{5}{8}$
12	63	13	54·5 $\frac{1}{2}$	63	13	52·7 $\frac{3}{4}$
13	72	13	56·4 $\frac{3}{8}$	71	8	55·8 $\frac{3}{4}$
14	81	9	58·6 $\frac{5}{8}$	79	13	58·1 $\frac{1}{8}$
15	90	9	61·0	88	0	58·9 $\frac{7}{8}$
16	99	13	63·0	95	11	59·8 $\frac{3}{4}$

From Woodman and Tidy, "Forensic Medicine," 1877.

Some points to be observed in the P.M. Exam. of a newly-born Infant.

Degree of maturity, length, and weight.

The length of the cord, and whether cut, torn, or tied.

The examination should be complete as in adults.

Note should be made of the height of the diaphragm, and of the state of the lungs, whether containing air within the alveoli, or gas from decomposition in the interstitial tissues, or both; the state of the heart and the degree of patency of the foramen ovale, of the ductus arteriosus and of the umbilical arteries and veins. The spinal column and cord should be examined for fractures, &c.

Death by Poison.

In cases where poison is suspected, but not patent, the stomach and its contents, with portions of the liver and kidneys, should be secured and placed in clean jars for further analysis.

PLEASE HAND TO CORONER AT INQUEST.

NOTES RELATING TO A DEATH REPORTED TO HAVE ARISEN FROM ANÆSTHESIA.

Name..... Age..... Sex.....
Date of Death..... Place.....

1. What anæsthetic or anæsthetics were administered, and what influenced your choice?
2. Where and when was the anæsthetic administered? State if in an operating theatre, casualty room, out-patient department, or private house?
3. What was the temperature of the operating room. Had the room, previous to the operation, been well ventilated?
4. Was the anæsthetic given by artificial light? State what kind. If gas, was the flame exposed?
5. For what purpose was the anæsthetic administered? State nature of operation, with name and address of surgeon operating
6. How many patients were placed under anæsthesia by you that day, and how much time was occupied in producing complete anæsthesia in each case?
7. Was there any, and, if so, what reason, for administering the anæsthetic quickly?
8. How was the anæsthetic administered? If by means of an inhaler, state what kind and make
9. How was the mixture of air with the vapour of the anæsthetic secured, and in what proportion?
10. What quantity of the anæsthetic was used?
 - (a) From the beginning of the administration until complete anæsthesia was produced
 - (b) From then until the administration was stopped.
 - (c) Was the anæsthetic applied by drops or by measurements
11. How was the deceased prepared for the anæsthesia? (*re* food, clothing, etc.)
Was there any mechanical or other obstruction to the respiration?
12. What was the condition of the heart, lungs, and kidneys of the deceased, previous to the administration?
Were you satisfied that the patient was in a safe condition to be placed under the anæsthetic?
Had the patient previously been under anæsthesia?
13. Was the deceased, at the time of the administration, suffering or recovering from any acute or chronic illness, or from alcoholism?
14. Was the deceased excited or violent during the first stage of narcosis?
15. Was the pulse and respiration watched during the administration, and, if so, by whom? State the conditions observed
What was the state of the pupils, and of reflex irritability generally?
16. At what period during the administration of the anæsthetic was the first symptom of impending death noticed? What was it?
Did deceased vomit at any time? If so, when and how often?
17. Did the deceased die *during* the administration of the anæsthetic? If not, how long after it had been discontinued?
Was the operation then completed? If so, for how long?
18. What efforts were made to restore animation and how long were they continued?
19. To what *immediate* cause do you yourself attribute the sudden death of the deceased?
20. In how many cases have you given an anæsthetic previously? If any fatal cases, say how many?

Signed..... Qualifications.....
Address..... Date of P.M.....

SYNOPSIS.

Of the POST-MORTEM APPEARANCES that have been observed in cases of DEATH FROM
CHLOROFORM OR ETHER POISONING produced by inhalation.*

	Death from Chloroform		Death from Ether.
	Sudden.	Protracted.	
Decomposition	Sets in early ; extensive dark-livid post-mortem stains in dependent parts ; blood contains air-bubbles ..	The same	Onset less rapid ; hypostatic discoloration well marked ; air-bubbles in blood less constant
Rigor mortis	Well developed ; lasts a considerable time	The same	The same
Peculiar smell of inhaled gas	Seldom noticed ; entirely absent after 24 hours after death	Absent	Noticeable for a long time in brain, lungs, liver and kidneys
Face	In some cases cyanosed, in others pale	The same	The same
Pupils	Of medium width ; equal	The same	The same
Conjunctive ; lips, mouth, tongue	No pathological changes	The same	The same
Scalp	Venous congestion	The same	The same
Meninges, Brain, medulla oblongata, and spinal cord	Congested ; sometimes blood-stained	The same	The same
Pharynx	Mucous membrane congested	No pathological changes	Mucous membrane much congested, sometimes swollen
Larynx and trachea and bronchi	Congested ; much post-mortem discoloration ; more or less numerous sub-mucous ecchymoses	The same	Mucous membrane much congested, swollen and covered with glassy mucous ; numerous sub-mucous ecchymoses ; much post-mortem discoloration
Lungs	Venous congestion ; moist ; blood in pulmonary veins often containing air-bubbles	Marked venous and hypostatic congestion	Much active and hypostatic hyperæmia ; œdema ; broncho-pneumonic con-

	Death from Chloroform		Protracted	Death from Ether
	Sudden			
Pleura	Sub-pleural ecchymoses ..	The same	The same	The same
Heart	Relaxed, flaccid, empty; or right ventricle and auricle distended with blood; wall of right ventricle often found thin and showing fatty infiltration; sub-epicardial ecchymoses at the base, especially at the back	Parenchymatous, or fatty degeneration of the heart muscle besides the other changes already enumerated.		Numerous sub-epicardial ecchymoses at the base, especially at the back; fatty changes in heart-muscle less pronounced
Blood	Dark, fluid	Loose, black-currant jelly-like clots in heart and large vessels		Dark, thick, fluid
Pericardium	Sub-pleural ecchymoses ..	The same		The same
Esophagus, stomach, intestines, peritoneum ..	No pathological changes ..	The same		The same
Liver, spleen	No pathological changes ..	Parenchymatous degeneration		No pathological changes ..
Kidneys	No pathological changes ..	Parenchymatous or fatty degeneration		No pathological changes ..
Muscular system	No pathological changes ..	Parenchymatous or fatty degeneration		No pathological changes ..
Thyroid body, thymus; suprarenal capsule ..	In children these organs sometimes contain petechial hæmorrhages	The same		The same
Pancreas	No pathological changes ..	The same		The same
Genital organs	No pathological changes ..	The same		The same

*Pathological changes obviously due to pre-existing diseases have been omitted from this compilation.

a In 10 cases of death from Chloroform poisoning, Chloroform was found in the		Times
oesophagus, stomach, duodenum, and intestines		4
heart substance		5
lungs		6
blood contained in the heart		6
liver, kidneys, and spleen		7
brain		8

a Prof. A. Lesser, Viertelj., f. ger. Med. vol. XVI.]



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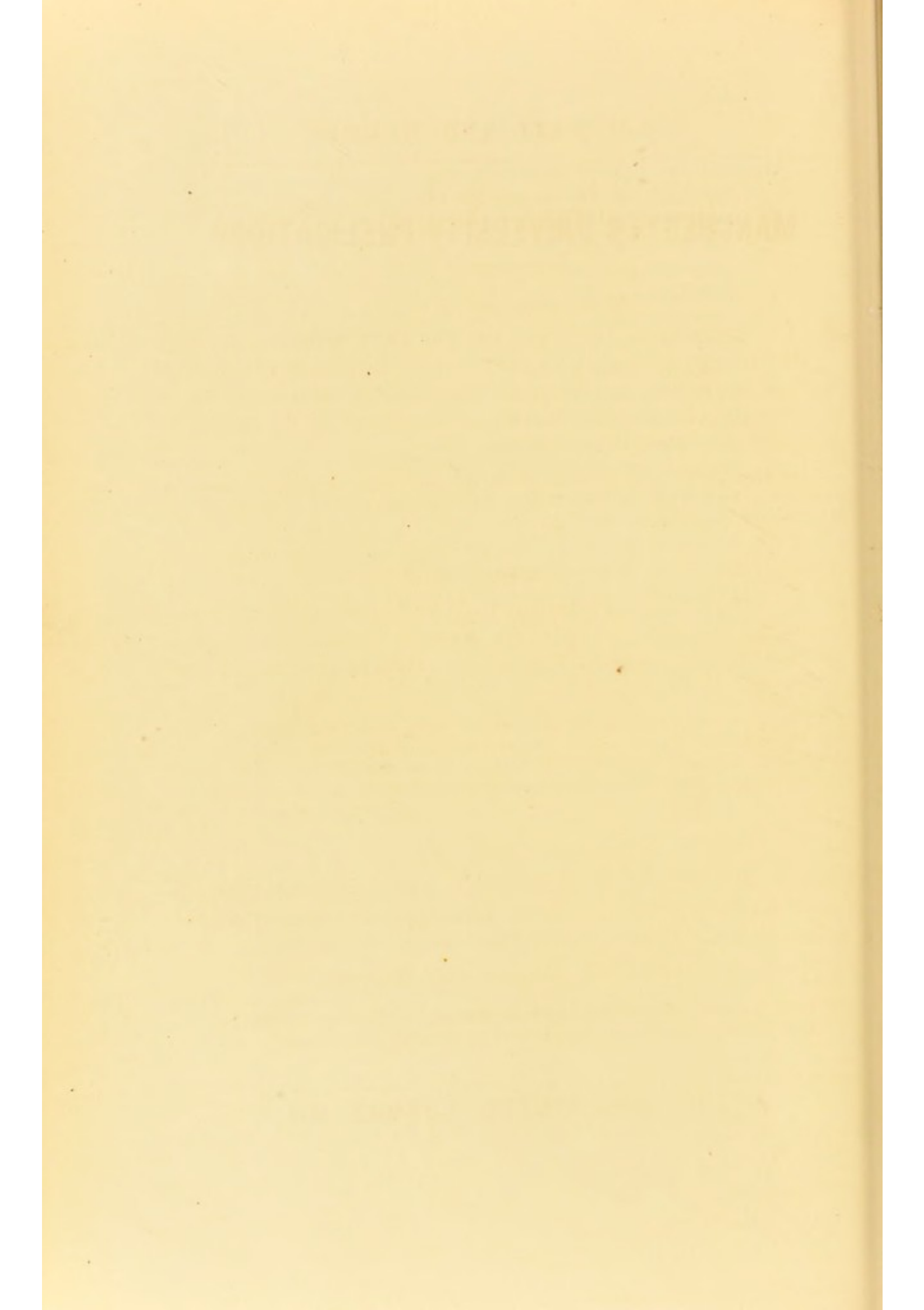
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