Post-mortem handbook, or, How to conduct post-mortem examinations : for clinical and for medico-legal purposes / by Thomas Harris.

POST-MORTEM HANDBOOK

THOMAS HARRIS

With the Author's compliments.

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OR

HOW TO CONDUCT POST-MORTEM EXAMINATIONS

FOR CLINICAL AND FOR MEDICO-LEGAL PURPOSES

BY

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WITH ILLUSTRATIONS

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THIS LITTLE BOOK IS DEDICATED

TO THE

MEDICAL STUDENTS OF MANCHESTER

PREFACE.

THE PRIMARY OBJECT of this little book is to furnish students with a practical guide to the method of making post-mortem examinations.

It is also hoped that it will be useful to teachers by serving as a text-book, and so facilitating their labours.

No handbook of the kind, however, can supersede the necessity of practical instruction in the post-mortem room, without which it is impossible for anyone to acquire dexterity in the various manipulations.

The method adopted is essentially a modification of that of Virchow, and is one with which I first became practically acquainted when working under Professor Rindfleisch at the University of Würzburg. Since then I have always adopted it, because I have found it convenient and systematic. Other methods may have special advantages in certain cases; but, on the whole, the method here described will, I believe, be found to be fairly complete and not difficult to carry out.

As this is not a work on morbid anatomy, only

such points in morbid anatomy are referred to as appeared necessary to explain the reasons for adopting certain methods.

I am indebted to the kindness of my friends Mr. F. H. W. Cottam and Dr. Paterson for the sketches from which the illustrations have been executed.

I am quite aware that the book has many imperfections. In describing details of manipulations, it is very difficult to convey to the reader's mind an accurate idea of the method without entering into such long and minute descriptions as would have rendered the book unacceptable.

T. H.

January 1887.

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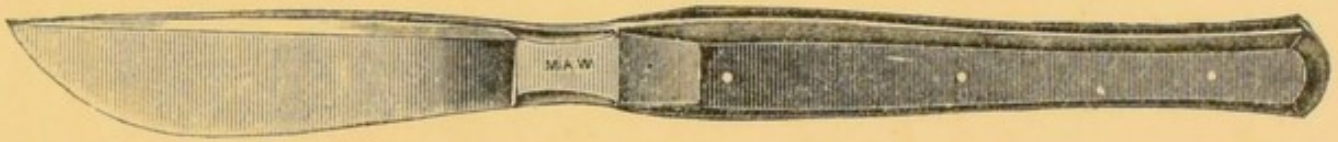
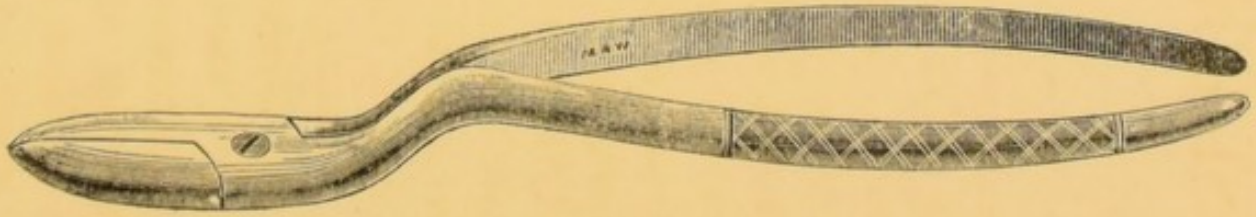
PLATE I.



FIGS. 1 AND 2.

VIRCHOW'S POST-MORTEM KNIVES.
(Half the natural size.)



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SAVAGE'S SPINAL BONE FORCEPS.
(Less than quarter the natural size.)

POST-MORTEM HANDBOOK.

Instruments.—The instruments absolutely necessary for making a post-mortem examination are comparatively few in number. They are as follows: Two strong knives in stout handles for making the incisions into the skin, &c., for cutting up the various organs, and dividing the costal cartilages when these are not ossified. The shape of the knives recommended for these purposes varies. For my own part, I prefer the knives known in this country as Virchow's, to the more commonly employed English cartilage knife. The shape of these knives is a most convenient one; a representation of them is given by figs. 1 and 2, Plate I. The stronger knife (fig. 1) may with advantage be employed for making the skin incisions and dividing the costal cartilages; while the other (fig. 2) is used for dissecting the various viscera —with it the greater part of the examination is made.

Although not absolutely necessary, it will be an advantage to have another knife with a blade about twice the length of the above, and only about three-quarters the breadth. Such a knife will be found more convenient than either of the two former for making long incisions into such organs as the lungs and liver.

Several scalpels of various sizes.

A saw with a good strong curved handle. The

straight handles which usually accompany the saws found in English post-mortem cases are most inconvenient, and necessitate an unnecessary amount of labour to remove the calvarium.

A small pair of bone forceps, which are almost indispensable, especially when the costal cartilages are ossified or the spinal column has to be opened.

A chisel. The best shape for post-mortem work appears to be the T-shaped instrument with the cutting edge about one inch broad. Such an instrument is of great assistance in opening the skull after the calvarium has been fully sawn, whereas the chisel commonly included among post-mortem instruments is of far less value.

A small post-mortem hammer with a hook at the end of the handle is occasionally useful.

Two pairs of scissors, one pair with strong but sharp points, another pair with one blade longer than the other and having a blunt or rounded extremity (intestine scissors).

One pair of dissecting forceps.

Several large post-mortem needles and some strong thread or thin string.

In addition, it will be often found useful, when we have to make examinations in private houses, to include in our case a trocar and canula with a length of india-rubber tubing, so that if there is a large amount of ascites the abdomen can be tapped before the body is opened, and much inconvenience from the fluid avoided. A tape, or better, a metal measure, marked both in inches and centimètres, is frequently required.

A glass vessel of known capacity, stoppered, or otherwise capable of being securely closed, is often necessary. Such a vessel serves not only the purpose of

measuring the quantity of fluid that may be present in any of the serous cavities, but is useful as a receptacle for portions of organs intended for subsequent examination.

The above are the requisites for making a post-mortem examination in a private house. In the pathological department of a hospital, it is further necessary to have convenience for weighing the organs, and also for making a microscopical examination of tissues both in their fresh state and after they have been hardened.

Before commencing an autopsy in a private house we should have at hand a plentiful supply of hot and cold water, some old rags, a couple of buckets, and convenience for washing the hands. We further require a table on which the body may be placed, and for this purpose an ordinary kitchen table is the most convenient, bedroom dressing tables or washstands often not being at all serviceable. In poor districts a door taken off its hinges and supported at both ends on a box or chair makes a very good post-mortem table, and frequently is the only one available. All our arrangements should be carefully completed before the work is commenced, as much inconvenience to ourselves and unpleasantness to the friends will be thereby avoided.

It may be noted that in the above list of instruments no mention is made of any special 'brain knife;' no such knife is required in dissecting the brain according to the method that is here recommended.

Facts to be ascertained before commencing an Examination.—Before commencing the examination, as much information as possible, in reference to the deceased, should be obtained from the friends, or in medico-legal cases from the police. This is necessary in order that special attention may be devoted to clear up any sym-

ptoms observed during life, and also that we may be in a position to give a definite reply to any questions that may be put during a legal inquiry, which we might otherwise have been unable to answer.

We should ascertain when possible the name, age, date of death, and the circumstances immediately preceding death.

External Examination.—Hardly too much stress can be laid upon the necessity of making a careful examination both of the body and of its surroundings before it is otherwise disturbed. Over and over again do we see that the first thing an inexperienced post-mortem clerk does, is to take up a knife and commence opening the body without having previously made any external examination which is worthy of the name. In all cases a most careful external examination of the body should be made, and it is especially necessary to do so in medico-legal cases. Far from being the least important part of the examination, it is often of the greatest value, and frequently it gives results of the utmost importance in explaining the cause of death.

In the majority of cases in which we are called upon to make an examination, the body has been removed after death and more or less disturbed; nevertheless we should note the position and the posture of the body: whether it is on its back or its face; whether it is composed as in natural rest, or whether its limbs are flexed and the body in a more or less constrained posture. Then what is its relation to surrounding objects. Is it on a bed or on the floor? Has it any clothes on, or is there any clothing near the body? We should then proceed to examine such clothing, looking especially for stains (blood, semen, &c.), noting their position and cutting them out for subsequent detailed examination. Then

note whether there are any articles of special interest to us near the body; any weapons, bottles, or remains of food, all which, if the case require it, should be preserved. This inspection of the surroundings having been completed, the body should be removed to a convenient position in the room, and a careful external examination made.

We first take a general view of the body, forming an opinion as to the probable age, remembering that our conclusions on this point, at this stage of the examination, can be merely approximate. At the same time we note the sex, the general build of the body, whether it is well developed, undersized, or malformed; also the state of nutrition, stout, moderately well nourished, or markedly emaciated. In legal cases it is often very important to consider the nutrition of the body, since we frequently have to take that into consideration together with the results of the internal examination in forming an opinion as to the cause of death.

We have then to note four points, which may be found in any body, whatever the cause of death, and which give us important information in forming an opinion as to how long it is since death ensued. These points are: the temperature of the body, is it warm or cold?—the state of the body as regards cadaveric lividity or hypostasis—putrefaction—and rigor mortis.

A body which has been since death in the supine position presents cadaveric lividity most markedly on, if it be not limited to, the back; the whole of the posterior surface does not, however, usually present the discoloration—those parts, as the buttocks and shoulders, where pressure is exerted being still pale; where a body has been in the prone position since death, then of course the lividity is on the anterior aspect of the trunk, &c.;

but in drawing conclusions from these facts as to the position which the body has occupied since death, it is very necessary to remember that the lividity may be most marked at one time on the back in consequence of the body having been placed in the supine position, but that if the body has not been very long dead and the position is reversed, then the lividity becomes most marked on its anterior aspect. This fact will be readily understood when we remember that the lividity is due to two factors—firstly to simple sinking of the blood after death according to the laws of gravity, and secondly to a putrefactive change—to the diffusion of the blood-colouring matter from the cutaneous vessels into the surrounding tissues. The effect of such diffusion is often very marked along the course of the large veins of the extremities and the neck, marked dirty reddish brown streaks then becoming evident in these parts.

Patches of cadaveric lividity must not be mistaken for ecchymosis ; the former are never associated with any swelling of the part, there is no elevation of the patch of cadaveric lividity above the surrounding cutaneous surface, and also in ecchymoses which have existed a few days we have evidence of changes in the effused blood, giving rise to the well-known colours seen in bruises of some standing, while in the case of cadaveric lividity we have no exactly similar appearances. In all cases of doubt, however, an incision should be made into the discoloured patch, when it will be found that, in the case of post-mortem lividity, there are simply a few blood points where the vessels are cut, or the tissues are simply stained by blood-colouring matter diffused from the vessels, whereas if it is an ecchymosis there is distinct extravasation of blood into the tissues.

The first external evidences of putrefaction in a body

which has been exposed to the air are seen usually as a greenish discoloration on the front and lateral aspects of the lower part of the abdomen. The process extends from this part with varying degrees of rapidity according to the temperature, moisture, access of air, mode of interment, age, sex, condition of body, &c., all which points must be carefully considered before any conclusion can be drawn from putrefactive changes as to the length of time the body has been dead; and although the state of the body as regards decomposition is important in helping us to judge of the period of death, when all the above points are also considered, it must be remembered that the bodies of persons dying under apparently similar circumstances have been conclusively shown to differ considerably as regards the stage of putrefaction reached within similar periods of time (Casper). It is not only in medico-legal cases that it is necessary to note the presence or absence of putrefactive changes; in any case it may be important as serving to explain certain of the internal appearances of the body.

Rigor mortis or cadaveric rigidity may be found present or absent; its absence may be due to the fact of it not having yet set in, or to it having passed off. We should note whether the rigidity is general and marked in all parts of the body, or whether it is limited to the upper or lower extremities, &c., because it usually appears in the various parts in a certain definite order. It shows itself first in the neck and lower jaw, then in the face, subsequently in the chest and upper extremities, and lastly in the lower extremities. It vanishes in the same order in which it sets in, and consequently it is common to find the arms relaxed, while the lower extremities are rigid. It is influenced as regards its time of appearance

and disappearance by so many factors, that we must know all the circumstances attending death before venturing to give an opinion, from its presence or absence, as to the length of time the body has been dead.

The above points having been noted, we proceed with a more detailed external examination. In the first place it is necessary in some cases, where the body is that of a person unknown, to look for signs by which it can be identified.

For this purpose we look especially for any deformities, curvature of the spine, deficiency of or peculiarities in reference to the fingers, scars, tattoo markings, peculiarities in relation to the teeth and shape of the jaws, &c.

We then examine for any signs of external violence, bruises, wounds, &c., and in doing this we should proceed systematically: commencing with the head, we should examine the whole body from the crown of the head to the soles of the feet, examining first the anterior aspect, and then, turning the body over, examine the posterior surface. In making this examination we must not forget to inquire carefully into the state of the various natural apertures (nose, mouth, genito-urinary orifices and anus), for foreign bodies, injuries, &c. The position of wounds and their nature (contused, incised, punctured, &c.) are to be carefully inquired into as well as their extent, so far as this can be done at this stage of the examination; forming an opinion as to whether the wounds are of ante- or post-mortem origin, and whether or not they could have been self-inflicted. At the same time we note also the colour of the body; looking especially for lividity of the nose, lips, and extremities; unusual paleness such as results from hæmorrhage; jaundice; punctiform hæmorrhages or

those of larger size; pigmentation, such as is seen in Addison's disease or the pigmentation round old cicatrices; presence or absence of ulcers, œdema and its extent (limited to one extremity or affecting both upper and lower limbs).

When examining the neck, we may require to look especially for finger marks, or signs of a cord having been applied, noting especially the position of the groove and its direction, whether horizontal or oblique, and whether the tissues beneath are condensed. In relation to this point, the marks due to the pressure of clothing after death must not be mistaken for those resulting from cords, &c., applied during life.

In examining the chest, we note its shape and the condition of the breasts (evidence of lactation, &c.) As regards the abdomen, we mark its condition as regards retraction or distension (gas, fluid, &c.); the presence or absence of silvery lines as indicating previous abdominal distension, and the presence or absence of hernial protrusions.

External Examination of the Bodies of Children.—In the examination of the bodies of children, particularly of infants, there are certain facts which have to be especially inquired into, with a view to determine the state of maturity, and whether there are any signs of violence.

In such cases ascertain the length and weight of the body; its colour; condition and amount of the hair, not only on the scalp, but over the body generally; presence or absence of the customary tumour on the scalp, and its position; size of the fontanelles; presence or absence of the pupillary membrane; foreign bodies in the mouth, or presence of finger marks about the mouth or neck; presence or absence of sebaceous matter on the skin;

state of development of the nails; condition of the umbilical cord; position of the testicles—i.e. whether they have descended into the scrotum or not.

Lastly, we should note specially whether the point of ossification has yet appeared in the lower epiphysis of the femur; to do which we open the knee-joint by a transverse incision across the front of it, and, having caused the lower end of the femur to project, take successive thin sections from its cartilaginous extremity until the point of ossification is discovered or otherwise, and its size ascertained.

Examination of Exhumed Bodies.—Only one or two points require to be specially drawn attention to in reference to the examination of the bodies of those that have been interred.

We ascertain the state of the coffin, whether it is well preserved or otherwise; and, before proceeding further with the examination, see that the body has been identified by some person who has known the deceased intimately.

We especially note the state of the body as regards the degree of putrefaction; and in some cases it is necessary to retain portions of the earth which is in immediate contact with the coffin, or with the body if the coffin has decayed, in order that it may be analysed for certain poisons.

When the body has not been long interred and is in a good state of preservation, it may be taken out of the coffin and the examination proceeded with in the usual way. But if it be very much decomposed, the examination should be made without first removing the remains from the coffin. Should this course not be adopted, much more difficulty will be experienced in ascertaining the relations and the condition of the various viscera, since

such bodies are liable to fall to pieces even with the most gentle manipulation.

A further suggestion will be found under the heading of the Examination of the Skull, with reference to the mode of procedure for removing the brain in cases of exhumation.

Internal Examination of the Body.—The order in which we proceed with this part of the examination will vary with the nature of the case ; in some we have to examine the brain, spinal cord, and contents of the thoracic and abdominal cavities, whilst in many it is only required to examine the thorax and abdomen. Where all the organs have to be examined, it will be best to commence by examining the skull and removing the brain, then to turn the body into the prone position and examine the spinal cord, and lastly to examine the contents of the thoracic and abdominal cavities.

By thus examining the brain before opening any other cavity, we are enabled to judge as to the quantity of blood contained in it and in its membranes, on which point an accurate opinion cannot be formed if the large vessels in the neck are first divided or the contents of the thoracic cavity first examined. The examination of the spinal cord before opening the abdomen and thorax will be found especially desirable when the examination has to be conducted in a private house, as otherwise great inconvenience would be experienced from the escape of fluids from the body on turning it into the prone position.

Although such is the order in which a complete autopsy is to be conducted, we will first consider the examination of the thoracic and abdominal cavities, since there are certain general principles which can be best enunciated in connection with this part of the examination.

Examination of the Thorax, Abdomen, and Structures in the Neck.—During the whole of the examination the operator should stand on the right side of the body, and, with the exception of the examination of the skull, the vertebral column, and their contents, there is no part of the autopsy which requires us to work on the left side; everything can be done with ease by keeping our position on the one side. By adhering to this rule of always conducting an examination from the same side, we not only save ourselves much obvious trouble, but are far less liable to subsequently mistake the side of the body on which any particular lesion was found, if we happen to have made no note of the fact at the time.

To open the trunk an incision is to be made from the lower part of the thyroid cartilage downwards along the median line of the body to the symphysis pubis. At the umbilicus the incision should be made to one side or the other of that structure, and not directly through it. It is advisable not to commence the incision at a point higher than that here given, because if we have occasion to remove the larynx, pharynx, &c., we can readily extend the incision; while if no examination of those parts is required, our incision will be completely concealed by the clothing from the friends of the deceased, a matter which should always be considered.

This incision in the neck should only involve the skin and subcutaneous tissue, on the chest it should pass directly to the bone beneath, and in the abdominal wall only to the muscular layer, care being taken that at this stage the abdominal cavity is not opened, since otherwise the viscera may be injured.

The abdominal wall is next to be raised as much as possible, being pulled forward by grasping the skin under the costal margin on the right side, and at the

same time the abdominal cavity is to be carefully opened just below the xiphoid cartilage; at present only an aperture sufficient to admit three fingers is to be made. When the cavity is opened we must notice whether any gas or liquid escapes; in the latter case the quantity should be measured. Through the aperture so made three fingers are introduced into the abdominal cavity, and the right side of the abdominal wall being firmly grasped, is pulled forward from the subjacent viscera, and the incision extended to the symphysis pubis, thereby making a large abdominal opening. Another good method to avoid injuring the viscera in opening the abdomen is, after having made the above small preliminary opening, to introduce the two first fingers of the left hand and then separate them in a V-shaped manner so as to make the wound gape, and by pulling the abdominal wall forward at the same time the opening can be rapidly extended with the knife held in the right hand.

In the case of young children we should before proceeding further examine the umbilical cord and the vessels proceeding from it along the anterior abdominal wall, noting especially whether there are any signs of inflammation of these parts.

To reflect the soft structures from the front of the chest, the upper part of the abdominal wall is to be firmly grasped so as to render the muscles attached to the lower ribs very tense. Then by a series of long sweeping cuts, beginning at the median line near the xiphoid cartilage and passing obliquely outwards and downwards along the costal margin, we soon are enabled to expose the costal cartilages and the anterior parts of the ribs. Care should be taken that, in reflecting the parts from the front of the chest, the costal cartilages,

and especially their points of junction with the ribs, are left clearly exposed, so that there may be no difficulty at a subsequent stage in opening the thorax. The reflection of the soft structures should be continued to just above the sternal notch, while the outer limit of the reflection should be, of course, much more extensive below than above; in the latter position only the inner third of the clavicle need be exposed, whilst below the reflection is continued as far as the anterior extremities of the floating ribs. In a similar manner the reflection is completed on the other (left) side.

In doing this dissection the cuts should be very long ones; by that means a much cleaner and neater dissection is made than by adopting a series of short cuts, such as we are accustomed to employ in the dissecting room.

Whilst we are opening the trunk we notice the condition of the soft parts; we note especially the thickness of the subcutaneous fat, and can form a more accurate opinion now as to the general nourishment of the body; we examine the muscles as we divide them, noting their development and whether they are healthy or otherwise; we especially notice, in connection with the muscles, their colour, whether they are of healthy red appearance, or pale and anæmic as seen when there has been marked emaciation, or if there are any special changes such as the semi-transparent, hyaline appearance, seen especially in cases of enteric fever, and which is usually very evident in the rectus abdominis muscle; at this time also the presence of trichina capsules would be detected, studding the muscular substance as minute, opaque white points.

Preliminary Examination of the Abdominal Cavity.—Before opening the chest, a general inspection is to be

made of the abdominal cavity, because if this is not now done no accurate idea can be formed of the position of some of the abdominal viscera, as they may have their relations considerably altered by the subsequent operation for opening the thorax. At this stage, however, the examination need not be minute.

We specially note the presence or absence of any abnormal contents in the peritoneal cavity, such as liquid effusion (serum, pus, &c.), contents of stomach or intestinal canal, &c.

We observe the condition of the intestines as regards their position and distension; whether any distension which is present is general or limited to some particular part of the bowel, and in the latter case we ascertain whether there is any local obstruction to account for it.

We further at this time notice the position of the liver, whether the left lobe extends more to the left than in the healthy body, and whether the anterior margin of the right lobe corresponds, in the right mammary line, with the costal margin, as in the normal state, or extends below it. In the case of children we must remember that the liver is relatively much larger than in the case of the adult.

Lastly, we ascertain the position of the diaphragm, observing the height to which it extends into the thorax on either side. This is most conveniently done by passing the fingers of the right hand into the abdomen and thence to the vault of the diaphragm, while at the same time, with the fingers of the left hand outside the chest wall, we ascertain the height of the diaphragm on both the left and right side in relation to the ribs. The normal height of the diaphragm is, on the right side, the fourth rib or fourth intercostal space, while on the left side it is

the fifth rib, the difference being of course due to the presence of the liver on the right side, and the absence of any correspondingly large solid organ on the left. These measurements are taken, as they always should in order to obtain comparable results, in the line of the junction of the ribs with the costal cartilages. The position of the diaphragm may be altered by morbid processes in the chest or in the abdomen; thus any general distension of the abdomen, as by excessive ascites, or any considerable enlargement of the liver, will elevate the diaphragm, whilst on the other hand air or fluid in the pleural cavities, or increase in volume of the lungs as in emphysema, will depress that structure. It is necessary to mention these facts so that no false conclusions be drawn from an alteration in the position of the diaphragm, because the height of its vault may be a point of some medico-legal importance. Thus in newly born children, who have not breathed, the diaphragm usually extends as high as the fourth rib on the right and the fifth rib or fourth interspace on the left side; whilst in those who have respired perfectly it reaches on the right as low as to the fifth-sixth, and on the left to the sixth rib (Orth). It must be remembered that the figures here given refer on the one hand to cases where there has been no respiration, and on the other to where the lungs have been perfectly expanded. Partial expansion of the lungs may take place, and the position of the diaphragm give no indication of it; so that the height of the vault of the diaphragm is not to be taken by itself as a trustworthy sign as to respiration having taken place or otherwise.

Opening the Thorax.—Before opening the thorax we notice the general outline of the chest (size, shape, and position of sternum, flattening on one or both sides, &c.)

To open the chest we first divide the ligaments connected with the sterno-clavicular joint on either side. This to the beginner usually presents considerable difficulty. It is necessary that all the ligaments connected with this joint be completely divided, since otherwise difficulty is experienced in the final stage of removing the operculum. Most pathologists are in the habit of opening this joint with the ordinary broad-bladed cartilage knife; it will be found very much more easily done with a small scalpel having a short and narrow blade. With such a blade we can much more readily follow the various curves of the articular surfaces, and a little experience alone is necessary to avoid chipping the edge of the finer bladed knife.

The clavicle should be firmly grasped about its centre with the fingers of the left hand, and the sternal end of the bone made to project as much as possible from the surface of the first rib by raising the whole bone towards the lower jaw. By that means the division of the costo-clavicular ligament will be much facilitated. The scalpel being held in the right hand, the blade is introduced close to the upper border of the clavicle, about half an inch from its sternal end, through the clavicular attachment of the sterno-mastoid muscle, the edge of the knife being directed inwards towards the median line of the body. Then having divided the muscular attachment we enter the joint, and, remembering the markedly curved articular surface, continue the cutting until we come on to the first costal cartilage, and then turning the blade so that the cutting edge points outwards, we finish by dividing the costo-clavicular ligament. From the commencement of this operation the knife should never need to be reintroduced, one continuous incision being made round the sternal end of the clavicle, and the knife held

perpendicular, the handle never being allowed to incline outwards towards the shoulder. In a similar manner we open the joint of the left side.

We then, with the aid of the stout cartilage knife, divide the costal cartilages close to their junction with the ribs. The first costal cartilage is often ossified, even in young people, and in that case it must be divided with the bone forceps; if, however, it is cartilaginous, it may be readily done with the knife, remembering, however, that the manubrium being the broadest part of the sternum we must make the cut at a correspondingly greater distance from the median line; it is forgetfulness of this point which often makes a difficulty in regard to the division of the first costal cartilage. In dividing the other cartilages we should grasp the knife firmly in the right hand and keep it nearly flat on the chest; then, beginning with the heel of the blade, we not only more readily divide the cartilages, but avoid any risk of injury to the parts beneath, since if the knife slip it catches on the following rib, and does not penetrate deeply into the thorax, as would be the case if it were held perpendicularly and the point only used. Further, by holding the knife as described we can very much assist the division by placing four fingers of the left hand on the back of the blade. As much as possible we should avoid dividing the structures between the cartilages, applying the knife to each cartilage afresh, and not running on directly from one to another through the intervening structures; by attending to this point we are less liable to injure the thoracic contents. We follow the line of junction of the ribs with their cartilages, so that a much wider opening into the thorax is obtained below than above. No attempt should be made to divide the bony ribs with the knife, for, not to

mention the greater difficulty experienced as compared with the division of the cartilages, we have afterwards left a series of rough points, which are very liable to cause injuries to the hands, and are probably the most fruitful source of poisoned post-mortem wounds; whereas non-ossified costal cartilages are perfectly smooth and harmless.

When the cartilages are ossified, the bone forceps must be used, and it is better then to commence the division below and pass upwards, inserting the lower blade of the forceps afresh beneath each cartilage, and not using the instrument to cut through the intervening structures. The operculum is then readily removed by taking hold of the lower costal cartilages, and dividing the attachment of the diaphragm, cutting directly on to the cartilages and sternum, so as not to open the pericardial cavity. When we have dissected the operculum free as far as the upper opening of the thorax, its final separation will be most readily effected by pushing it over to the left side, so as to facilitate the division of the muscles attached to the upper part of the sternum.

We then notice the shape of the sternum. If it is necessary to examine the cancellous tissue of any of the flat bones, the sternum will be a convenient one to choose for the purpose. With the object of making such an examination, the bone should be sawn through in a longitudinal direction.

Immediately after opening the thorax, we should notice whether either pleural cavity contains any effusion, and if so whether it be blood-stained or not. It is most essential to do this at once, because if the large veins at the upper entrance to the thorax are at all full they very rarely escape injury during the opening of the chest, and the blood thus escaping into the pleural

cavities is apt to be mistaken for the result of an ante-mortem hæmorrhage. Attention to the point just named is the only satisfactory way of avoiding this error.

We next make a general inspection of the contents of the thorax, passing the structures in review from above downwards. We note the condition of the anterior mediastinum; the presence or absence of any new growth or aneurism; the size of the thymus gland; the state of fulness of the large venous trunks; the external appearances of the pericardial sac, its size and the extent of it which is uncovered by lung; the size of the lungs, whether collapsed and lying at the back of the pleural cavities, or voluminous and more or less covering the heart. If either pleural cavity is seen to contain fluid, that liquid should be removed and measured. Lastly, we examine now more carefully the abdominal viscera as a whole; looking for any signs of peritonitis, or abnormal appearances connected with the coils of the intestine, so far as these may be evident without disturbing their position. If the abdominal cavity is seen to contain any matters which have escaped from the alimentary canal, the aperture of escape should at once be sought for by very gentle manipulation of the various parts of the alimentary tube, so that any perforation which may exist be not enlarged by the examination. If any perforation of the intestine be found, it is advisable at once to surround the bowel above and below the opening with a ligature, and remove the intervening portion for more careful examination. If the contents of the stomach are found to have escaped, then great care must be taken not only to ascertain whether there are any signs of inflammation round the aperture, but also lest the perforation be increased in size by the manipulation, an accident

which is exceedingly liable to happen in cases of perforation either from post-mortem digestion of the stomach or from the action of corrosive poisons. In the course of this general inspection we should have our attention drawn also to the presence of any new growth within the abdomen or to any marked enlargement of the solid viscera.

We now proceed to the more detailed examination of the various viscera, and the order in which such an examination is to be carried out will vary with the peculiarities of the case; as a rule, if the cause of death is quite unknown to us, and we have so far not been able to obtain any clue thereto, we commence with the examination of the thoracic organs, and subsequently proceed to the examination of the abdominal viscera. Although in some cases it will be found advisable to commence with the examination of the latter organs, the rule should be to commence with the examination of the pericardium and heart, and proceed in the order here given, since we thus follow a definite system, and one which is applicable to the majority of cases.

Examination of the Pericardium and Heart.—We first note the size and general outline of the pericardium, and how much of it is uncovered by the lungs. To open the pericardium a pair of ordinary sharp-pointed scissors is best employed. We pinch up the pericardium with the thumb and first finger of the left hand, just above the diaphragm over the lower and right side of the heart, and, having made a small aperture at this point, we cut in two directions, at right angles to one another; the first cut is directly upwards, and extends to the apex of the cavity, to where the sac is attached to the large blood-vessels; the second incision is at right angles to this, and, commencing from the point where the pericardium

was first opened, extends to the apex of the heart. By these incisions the cavity is freely exposed, and we note the presence or absence of morbid effusion, its amount and character, whether clear, turbid, sanguinolent, &c. Also whether there are any signs of old or recent inflammation. We notice also the presence or absence of opaque white patches (milk spots) on the surface of the heart, due to a local thickening of the visceral layer of the pericardium. We then raise the heart and examine the posterior part of the pericardial cavity for any abnormal appearances.

Normally we find in the pericardium one or two drachms of clear pale yellow fluid.

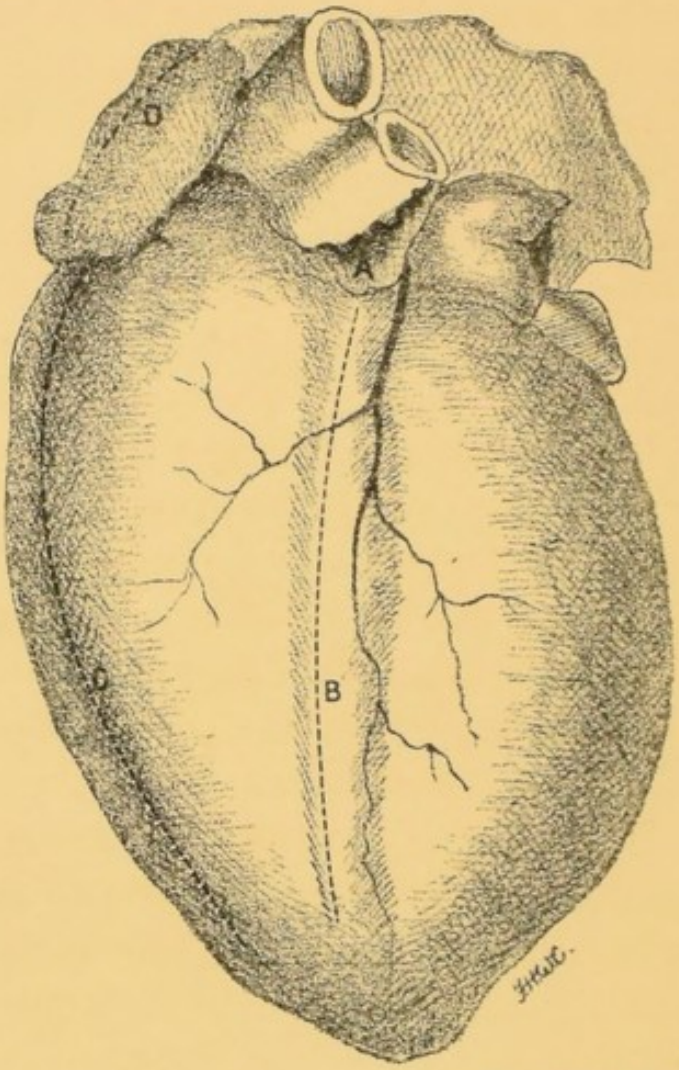
If any considerable amount of blood be found in the sac, its source should be at once sought for before we proceed to the examination of the heart; with this object in view we especially examine the arch of the aorta for an aneurism, so that if such is present we may not injure it when we come to remove the heart.

Examination of the Heart.—We examine the heart first *in situ*, noting its position, size as a whole, and of the individual parts (especially whether there is any sign of engorgement of the right cavities), the position of the apex, and whether that point is formed entirely by the left ventricle, or whether the right takes a part in its formation; the amount of subpericardial fat; the colour and consistency of the muscular substance.

It was stated by Laennec that the heart corresponds in size to the closed fist of the deceased; and if we bear in mind that this is merely a rough approximation, it may be of some value to us.

We now proceed to open the heart and examine the contents of its various cavities, as well as the size of the auriculo-ventricular orifices. This examination is made

PLATE II.



THE POSITION OF THE INCISIONS WHICH ARE EMPLOYED TO OPEN THE RIGHT AURICLE AND RIGHT VENTRICLE.

A. Ridge of fat on the pulmonary artery, to the right of which the incision B is continued through the wall of the artery.
B. Incision through the anterior wall of the right ventricle close to the septum ventriculorum. This incision is made *after* the heart has been removed from the body.
C. Incision through the right border of the heart into the right ventricle.
D. Incision into the right auricle. Incisions C and D are made while the heart is still *in situ*.

before the heart is removed, since by this means alone are we enabled to form anything like an accurate idea as to the amount of blood contained in the individual chambers, and to ascertain the size of the orifices between the auricles and ventricles. If we remove the heart before making these inquiries, the blood in great part escapes through the cut veins, and the quantity of the blood in the various cavities cannot be accurately ascertained. Consequently in all cases a very important part of the examination of the heart is that which is carried out before the organ is removed from the body.

With the above object we make two incisions into the right side and two into the left, one incision being made into each cavity of the heart. The incision into the right auricle is to be about one and a half to two inches in length, and commencing from a point midway between the entrances of the superior and inferior vena cava, passes down to the line of junction of the auricle with the ventricle, care being taken that the latter point is not passed, since otherwise the attachment of the tricuspid valve will be injured (Plate II. D). The incision into the right ventricle is made along the right border of the heart for a distance of two inches, commencing from just below the auriculo-ventricular sulcus, this incision being really a continuation of the one in the auricle, only that the groove between that cavity and the ventricle remains intact (Plate II. C).

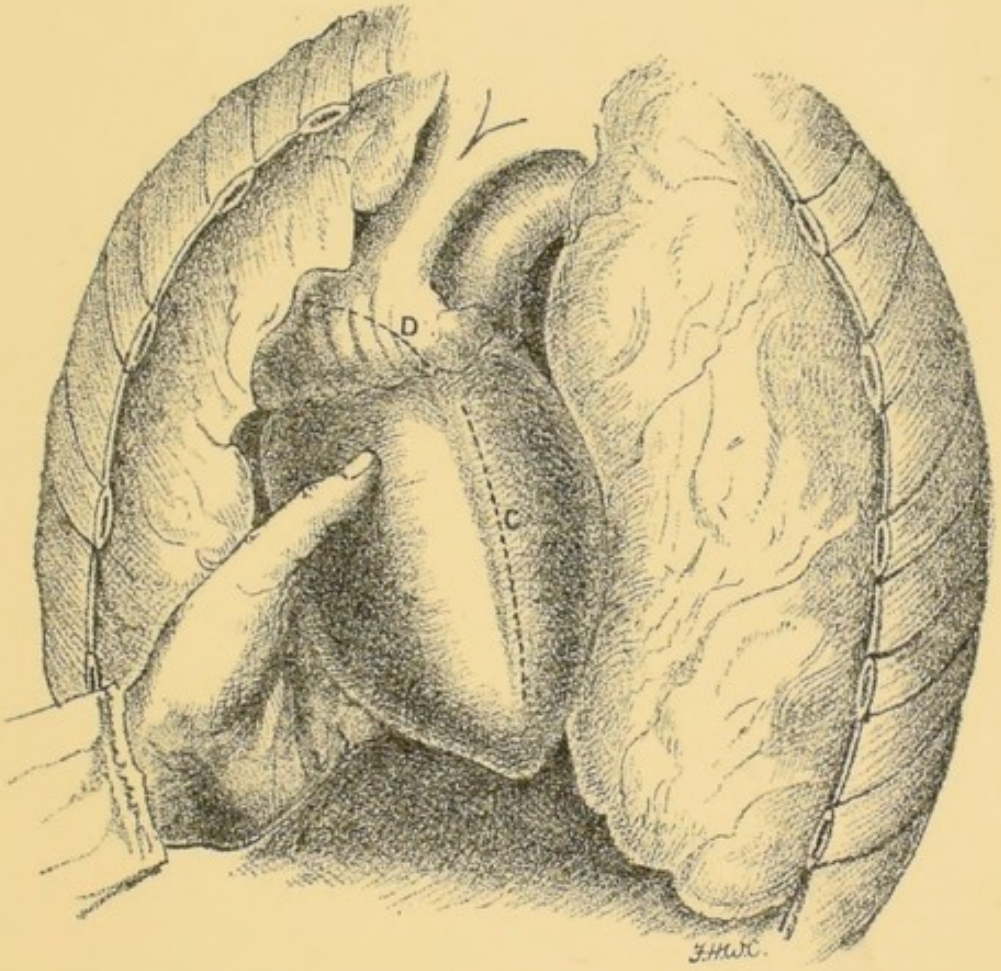
To make these two incisions into the right side of the heart, the organ has to be placed in a somewhat peculiar position, a position which the beginner usually has some difficulty in mastering. The heart has to be so twisted that the right border comes to project directly forwards, and in order to get the organ into this position the operator should stand on the right side of the body,

opposite the upper part of the thighs. Then four fingers of the left hand are passed under the heart, along its posterior aspect, and continued until they appear round the left border of the organ, and come to lie on the anterior surface of the heart; the thumb of the left hand will then be on the posterior surface, while the four fingers are on the front of the organ; then by grasping the heart between these two points it is easily rotated until the right border projects anteriorly. Plate III. represents the heart so grasped and twisted into the correct position.

By pulling the heart a little downwards and to the left a clear view is obtained of the superior and inferior vena cava as they enter the right auricle, and with a stout knife we make an incision from a point midway between those two vessels, downwards as far as the auriculo-ventricular sulcus (Plate III. D); then, passing over that sulcus, leaving it uninjured, we make another incision along the right border of the heart into the ventricle (Plate III. C) between the points where it is grasped by the thumb and fingers of the left hand.

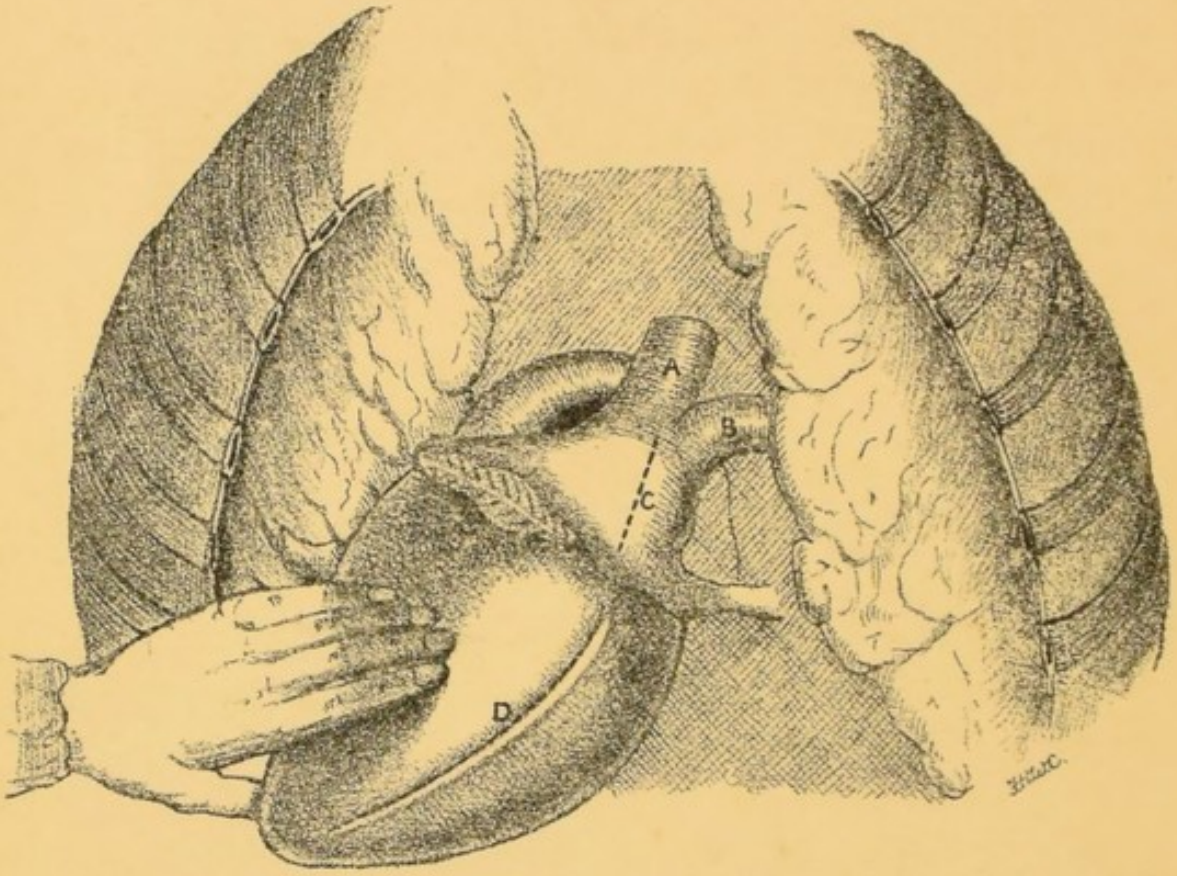
These incisions being made, we notice the quantity and colour of the blood which flows out through them; and, allowing the heart to fall back into its natural position, we introduce two or three fingers of the left hand through the incision in the auricle, clear out all clots from that cavity, noting their colour, consistence, and whether they are free or are attached to the wall of the auricle, and then thrust the fingers onwards through the tricuspid orifice, noting how many fingers it will admit without using any force, and remove any clots that there may be in the right ventricle. On an average the right auriculo-ventricular orifice will admit three fingers of a medium-sized hand.

PLATE III.



METHOD OF HOLDING THE HEART WHEN MAKING THE INCISIONS D AND C INTO THE RIGHT AURICLE AND RIGHT VENTRICLE.

PLATE IV.



METHOD OF HOLDING THE HEART WHEN MAKING THE INCISIONS C AND D INTO THE LEFT AURICLE AND LEFT VENTRICLE.

A, B. Pulmonary veins.

Next we make two similar incisions into the left side of the heart—one into the left auricle, and the other into the left ventricle.

To make these cuts the position in which the heart has to be held is very much more easily understood and explained than that necessary for the incisions into the right side.

The operator, standing in the same position as for dissecting the right side, places three fingers of the left hand on the anterior surface of the heart near the apex, while the thumb of the same hand is passed behind the organ on to its posterior aspect; then, grasping the heart, the organ is pulled over to the right side of the body (Plate IV.), and a good view is obtained of the posterior surface of the left auricle, entering which from the left lung are seen the two pulmonary veins of that side (Plate IV. A and B); from between these two vessels an incision is made as far as the auriculo-ventricular sulcus at the left border of the heart; then, that groove being left uninjured, a similar incision is made into the left ventricle, along its left border, extending from the sulcus to the apex of the heart (Plate IV. C, D).

These incisions being made, we notice the quantity of blood which flows out, and, as in the case of the examination of the right side of the heart, we introduce two or three fingers (preferably in this case of the right hand) into the auricle, clear out the clots and ascertain how many fingers the mitral orifice will admit, taking care that no force is used, especially if the edges of the valve feel at all rough. Normally the mitral orifice easily admits two fingers of a medium-sized hand.

So much of the examination having been completed, the heart is removed from the body by holding it by the septum between the ventricles, the forefinger of the left

hand being introduced near the apex into the left ventricle, while the thumb is introduced into the corresponding right cavity; then with the knife in the right hand we separate the connections of the heart by cutting from below upwards, beginning with the inferior vena cava and finishing by dividing the aorta and pulmonary artery about an inch from their origin.

Examination of the Heart after its removal from the Body.—The competency of the aortic and pulmonary valves is next to be tested. All clots must be removed from the origin of both vessels, since otherwise a really incompetent valve may appear to be competent; the heart is then dipped into water so that the fluid fills the two large vessels, or if there be convenience a stream of water is directed from above downwards on to the upper surface of the valves. In testing the sufficiency of these valves it is very necessary to be careful as to how the heart is held. It should not be supported by holding the wall of either blood-vessel, but held by the auricular appendices alone, and the line of attachment of the valves kept as nearly horizontal as possible. The competency of the valves is of course shown by the water not passing quickly through into the ventricles. It must not be expected that the water will not gradually disappear even though the valves are perfectly healthy; usually it is only retained above the valves for a short time, and then slowly escapes. In the case of the pulmonary artery the valve very often at first sight appears incompetent although it is quite healthy, no water at all being retained; this is probably due to the wall of the vessel being much thinner, and the cusps of its valve somewhat more delicate, than is the case with the aorta. A little manipulation in the management of the water and altering the position in which the heart is being held

usually suffices to overcome this difficulty and to show that the valves really are efficient. The aortic valves may also appear incompetent in consequence of the water escaping by the coronary arteries if these have been divided very near their origin.

There is no similar method which can be adopted to test the competency of the auriculo-ventricular valves. The only way by which we can form an opinion as to the competency of those valves is to ascertain carefully, before the heart is removed from the body, the size of the orifice on each side, care having been taken in making the opening into the auricles and ventricles not to injure the line of attachment of the valves, since if this part is divided it will cause the orifice to appear by so much the larger. In addition, we examine carefully the structure of the valves, together with that of the chordæ tendineæ, so that if we consider the size of the orifices, and the presence or absence of any alteration in the structure of the valves, we may form some opinion, though not a very accurate one, as to whether the valve had or had not allowed regurgitation of the blood during life.

To examine the various valves and the interior of the heart more carefully, we must make a further dissection of the organ.

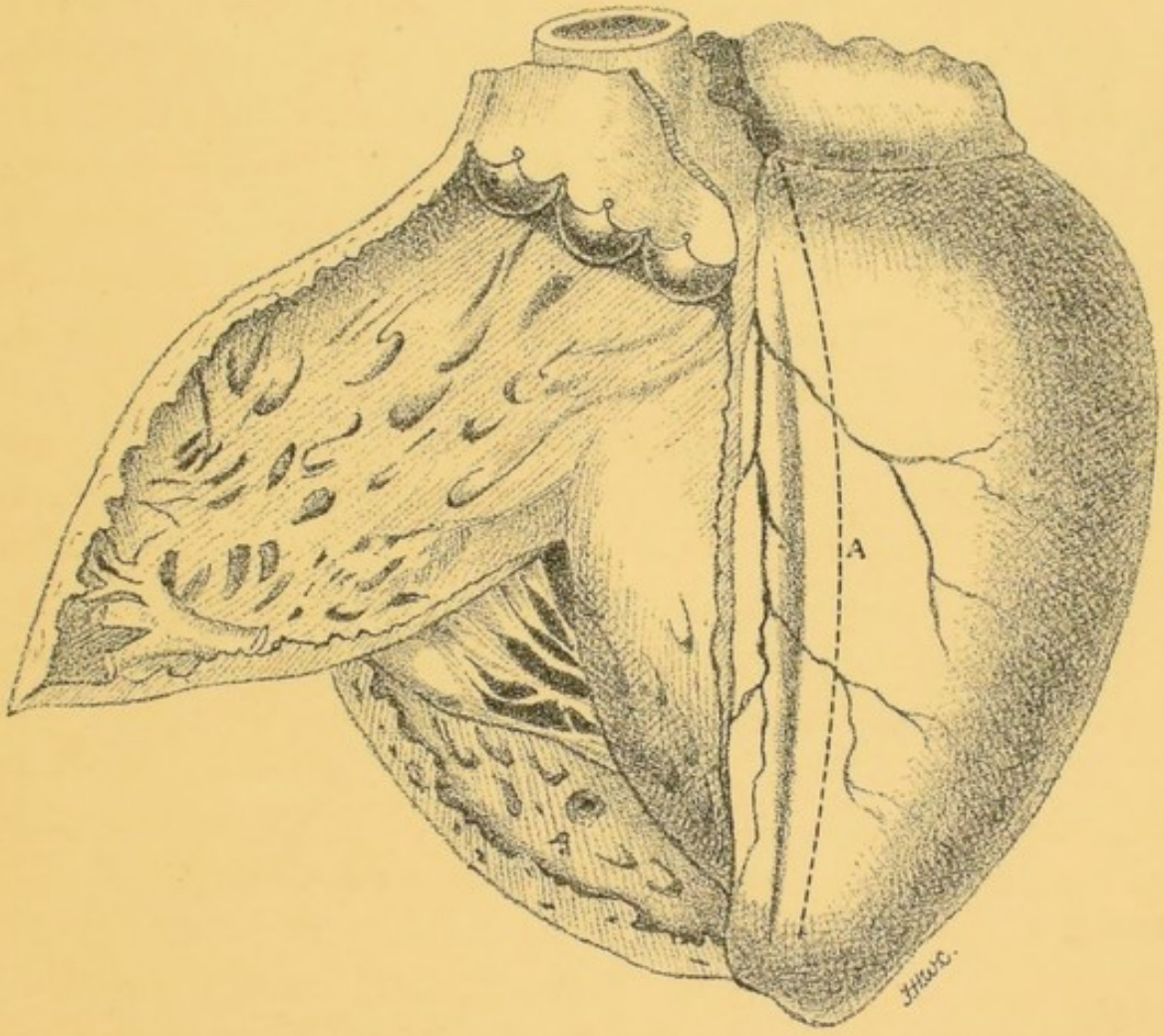
The heart is placed on a plate on its posterior surface, the base of the organ being directed towards, and the apex, of course, away from, the operator. Then, by means of the bowel scissors, the incision in the right auricle is united with that in the right ventricle by cutting through the auriculo-ventricular sulcus (Plate II. Incisions D and C are to be united). The auricle and ventricle are by this means thrown into one cavity, and the tricuspid valve is next examined, and subsequently the interior of the auricle. The auricular

appendix should be cut open, so that any thrombi present may not be overlooked. The position of the heart is then reversed, the apex being directed towards the operator, the organ still, however, lying on its posterior surface. The larger blade of the scissors is to be passed into the right ventricle, and thence into the pulmonary artery, and an incision made through the anterior wall of the ventricle, close to the septum ventriculorum, up into the pulmonary artery (Plate II. B). To avoid injury to the pulmonary valves in making this incision, there is a very good guide to the interval between two cusps, in a small ridge of fat, which lies along the left border of the pulmonary artery (Plate II. A), and if the incision is made immediately to the left (i.e. to the right of it, in the present position of the heart with the apex towards the operator) of this ridge each cusp of the valve will be found to remain uninjured (Plate V. represents the heart at the stage of the dissection). We then examine the structure of the valve and the internal surface of the right ventricle.

We again turn the heart round until the apex is directed away from the operator, and proceed to examine the left side of the organ by a dissection similar to that employed for the right side.

The incision in the left auricle is united with that in the left ventricle by cutting through the intervening bridge of tissue. The mitral valve is then carefully examined, and subsequently also the interior of the left auricle. After that, the heart is again rotated until the apex is directed towards the operator, the organ during all the time of the dissection still lying on its posterior surface. The larger blade of the scissors is then introduced into the left ventricle, and passed up into the aorta. An incision is made through the anterior wall of

PLATE V.



THE APPEARANCE OF THE HEART WHEN THE DISSECTION OF THE RIGHT SIDE OF THE ORGAN HAS BEEN COMPLETED.

A. Position of the incision through the anterior wall of the left ventricle and into the aorta.

the ventricle (Plate V. A), close to the septum, into the aorta, the upper part of the incision being between the pulmonary artery on the one side and the appendix of the left auricle on the other. The aortic valves and the interior of the left ventricle can then be examined.

It will almost invariably be found in making this last incision that one of the cusps of the aortic valve has been divided, since there is no such guide as in the case of the pulmonary artery. The injury to the valve is of very little consequence, since its competency was tested while it was yet intact. However, if we wish to avoid dividing a cusp, the last-described incision must be made after the pulmonary artery has been dissected from off the aorta, and then, by looking into the vessel and making the incision along the groove from which the pulmonary artery has been dissected, the cusps of the valve can be avoided.

Before uniting the incision in the auricle of each side with that of the corresponding ventricle, we should always examine the tricuspid and the mitral orifice by looking down on them from the auricles, and if there is any stenosis that part of the dissection may be omitted.

Finally, we notice the thickness of the walls of the various cavities of the heart, and the character of the muscle; whether it is of a healthy red colour, or pale and more or less yellow; whether the organ is firm or flabby, &c. We also examine the coronary arteries, noting especially the presence or absence of marked calcareous change in them.

The organ should then be weighed. The weight of the heart in the adult varies within rather wide limits, which depend on the general weight of the body and on the sex. The average weight may be said to be 9 ozs. in the female, and $9\frac{3}{4}$ in the male (Peacock).

Examination of the Pleural Cavities and Lungs.—Immediately after opening the chest a superficial examination was made as to the contents of the pleural cavities, in order that we might be sure that any blood or blood-stained fluid which might be present had not entered either cavity during the opening of the trunk.

We now remove any fluid that may be present, and note its quantity; if either cavity contains a large quantity of blood, its source should be ascertained, the aorta being especially examined for aneurism.

If either cavity contain clear fluid, the parietal and visceral layers of the pleura are to be examined for signs of recent inflammation, or the presence of any new growths. The position of any old adhesions is to be noted; whether they are generally distributed over the cavity, totally obliterating the space, or are limited to some particular part, such as over the apex of one or both lungs.

All adhesions are next to be broken down by gradually passing the open hand between the parietal and visceral layers of the pleura, until the whole lung, on each side, is quite free, there being no adhesions remaining even at the posterior part near the vertebral column. It is necessary that all adhesions should be separated now, since otherwise great difficulty will be experienced in removing the lungs at a later stage. It is in breaking down old pleuritic adhesions that pathologists very frequently injure their hands against the costal cartilages, especially when these are ossified; consequently, if the cartilages have undergone such a change, either a towel should be spread over their cut surfaces, or, what answers very well, the skin and attached muscles, which were reflected from the front of the chest, should be folded over the rough

cartilages, so as to protect the hand of the operator. In many cases, where the adhesions are of very old standing, it is impossible to separate them with the hand without at the same time lacerating the subjacent lung; in such cases the knife must be cautiously employed, the operator cutting towards the inner aspect of the ribs and not towards the lung.

In the majority of cases the lungs are most conveniently removed from the body separately from the upper respiratory passages, the latter being left for subsequent removal and examination. Sometimes, however (as, for instance, where the presence of a foreign body is suspected in the respiratory tract), it is advisable to remove the lungs together with the tongue, fauces, pharynx, larynx, &c., in the manner to be subsequently described. But as a rule, having noted the size of the lungs, whether they are retracted or otherwise, and having separated all pleuritic adhesions, we remove each lung separately in the following manner: the apex of the left lung is placed in the palm of the operator's left hand, and the root of the lung placed between the middle and ring fingers, which are separated in a V-shaped manner; at the same time the lung is drawn downwards towards the abdomen and forwards from the vertebral column; then, with the knife grasped firmly in the right hand, the operator cuts from above downwards through the root of the lung and finally through the pulmonary ligament, and so completely separates the organ from the body. If the lung is drawn well forward, and the incision through the root is made by keeping the blade of the knife close to the back of the fingers of the left hand, which surround the root, there is no fear of injuring either the aorta or the œsophagus.

The right lung is removed in an exactly similar

manner, the operator standing, as before stated, on the right side of the body.

When the left lung has been removed, it should be at once examined, or if the examination is postponed until the other lung has been separated, each lung, as it is taken out, should be placed on the corresponding side of the body, in order that no confusion may arise and no time be lost in having to examine which lung we are looking at.

The lungs having been removed, we should make a very careful examination of them before any incision whatever is made into their substance.

We note their size and colour; whether they are both of the same size; whether the colour is pale pink, grey, black from the deposit of pigment, or of a more or less uniformly livid hue.

In the case of infants, where it has to be decided as to whether the child had ever breathed and whether respiration had been perfect or imperfect, the *inspection* of the lungs is of the utmost importance, and the facts which can be obtained simply from inspection in such cases are of more value in settling such a question than any other tests which we can apply. To point out the differences between lungs in which respiration has taken place and those in which it has not, is beyond the scope of the present book; we can only warn the student that the small groups of pale or brilliant vermilion spots which are seen in the lungs of infants who have only imperfectly breathed are not to be confounded with the much paler and more transparent spots due to putrefaction which appear between the lobules as clear bubbles, readily displaced from point to point by gentle pressure with the finger.

The visceral layer of the pleura is also to be carefully

examined for small petechial hæmorrhages, signs of recent inflammation (lymph), miliary tubercles, secondary nodules of new growth, &c.

The surface of the lung is also to be examined for any depressions, such as are seen in cases of lobular collapse, cicatrices, &c.; or for any slightly elevated patches, as in cases of catarrhal pneumonia, or hæmorrhagic infarcts.

The consistence of the lungs is next to be inquired into: do the organs convey to the touch the sensation of healthy lungs? do they crepitate on pressure, or are they firm and solid? if diseased, what are the parts affected (base, apex, &c.)?

Lastly, we examine the root of the lung, noting any abnormal appearances connected with the bronchus, blood-vessels, or lymphatic glands which are present there.

The external examination of the lungs having been thus completed, we proceed to their further dissection.

Where it is especially necessary to examine the divisions of the bronchi or the pulmonary vessels, these should be laid open by means of scissors before any other incision is made into the lung. To do this the most convenient method is to place the lung in the palm of the left hand, with the root of the organ directed upwards; then, making the root project well by means of the tips of the fingers of the left hand, we can readily dissect and lay open either the divisions of the pulmonary vessels or bronchi as the case may require: one blade of the scissors is introduced into the bronchus, for instance, and then as much lung tissue as possible, by a little manipulation, is introduced between the two blades before they are brought together.

On the other hand, if we do not require to specially examine the above parts, but wish to ascertain the

presence or absence of changes in the true lung parenchyma, we proceed to make a long incision into each organ, from the base to the apex; this incision is most conveniently made from the rounded posterior border towards the root of the lung, by which means a large sectional surface is exposed. Subsequently any number of incisions may be made in any direction that may seem desirable, and specially any isolated patch of consolidation should be incised. The parts of the lung thus exposed are then carefully and systematically examined, our inspection proceeding from the apex to the base. We note whether the sensation produced on cutting the lung is that usually observed in the case of healthy lung, or is more or less like that produced on cutting liver; the colour of the divided parts, congested, pale or greyish, whether uniformly so or only in patches; presence of patches of caseation, tubercles, or of new growths, &c.; presence of cavities, their contents, character of their walls, whether such cavities are of old or recent formation; presence of œdema; condition of the bronchi, presence of exudation or foreign matters, narrowing or dilatation of their lumen; presence of any foul or gangrenous odour connected with the lungs. Lastly, we observe the condition of the lymphatic glands along the larger bronchi; their size, colour, presence of caseation, or calcareous change.

Any portion of the lungs may then be separated, and by placing the piece in water the fact ascertained whether it sinks or floats.

It will be found more convenient in the majority of instances to examine the larynx, trachea, œsophagus, and aorta after the abdominal organs have been examined, since the œsophagus and aorta can then be more easily separated near the cardiac orifice of the stomach than if

they are removed at the present stage, when the abdominal organs are encroaching upon the thoracic cavity.

Examination of the Abdominal Viscera.—A general inspection of the abdominal cavity was made before the heart was examined.

We now make a more careful examination, and first examine into the condition of the peritoneum for the presence of any signs of inflammation, its seat, whether general or localised; presence of tubercles, petechiæ, new growths, &c. The position of any hyperæmic patches is to be specially noted, so that simple hypostasis may not be mistaken for the first stage of inflammation; dependent loops of the small intestine often show very distinct hypostasis, while the intervening part of the bowel shows a perfectly pale peritoneal covering. At the same time special attention must be called to the fact that in the early stage of peritonitis we often see the hyperæmia limited to certain lines running in a longitudinal direction along the bowel, while the intermediate parts of the peritoneal covering are quite pale. So that both in post-mortem hypostasis and in the early stage of inflammation the peritoneum may be found reddened at certain parts, while others are quite white. Not only, however, will the position of the red parts be a guide to their real significance, but a little experience will show a distinct difference between the appearance of simple hypostasis and that of true hyperæmia. Of course, when there is an exudation of lymph, however small in amount, the distinction between these two conditions is rendered still more simple.

The great omentum is next examined. We observe its size and the amount of fat which it contains; the extent to which it covers the small intestines; the presence or absence of adhesions connecting it to adjoining

parts, and forming apertures through which a loop of bowel may pass and become strangulated; the presence of miliary tubercles (these are not to be confused with certain small collections of fat that are apt to form in the omentum, and which often at first sight have a great resemblance to tubercles).

The presence of numerous peritonitic adhesions, or of new growths within the abdominal cavity, may prevent us from examining the abdominal viscera in the order given below. As a general rule, however, it will be found most convenient to examine the various parts in the following order, which is somewhat different to that given by Virchow, but is more adapted to the majority of cases.

1. *Intestines* from the sigmoid flexure of the large bowel upwards as far as the third part of the duodenum.
2. *Left Kidney*, suprarenal capsule and ureter.
3. *Right Kidney*, suprarenal capsule and ureter.
4. *Pelvic Organs*, testicles and penis.
5. *Spleen.*
6. *Duodenum* and *Stomach.*
7. *Gall Bladder*, gall duct, venæ portæ.
8. *Liver.*
9. *Pancreas*, semilunar ganglia, mesenteric and retro-peritoneal lymphatic glands.
10. *Aorta*, *inferior vena cava*, and receptaculum chyli.

Examination of the Intestines.—The examination of the intestines, being the most disagreeable part of the examination of the abdominal viscera, is by many pathologists allowed to remain until the other abdominal organs have been examined. However, if a complete examination of the parts within the abdomen is to be made, it will be found that this can be far more readily

and conveniently carried out if we commence by removing the intestines. After they have been removed they may be at once examined, or, for the sake of cleanliness, their further dissection may be postponed until the other viscera have been inspected.[1]

Before disturbing the position of the bowels we observe their general outline, noting anything abnormal connected therewith: their state of distension, whether they are unusually collapsed or the reverse; if distended, whether that distension is a general one, or limited to a certain part, and the cause of such local dilatation ascertained; whether the distension is due to gaseous, liquid, or solid contents; whether there is any marked lesion of the intestinal walls, such as thickening or ulceration, the latter often being indicated by the presence of small patches of hyperæmia at various intervals along the bowel, which may frequently be observed before the intestines are removed from the body.

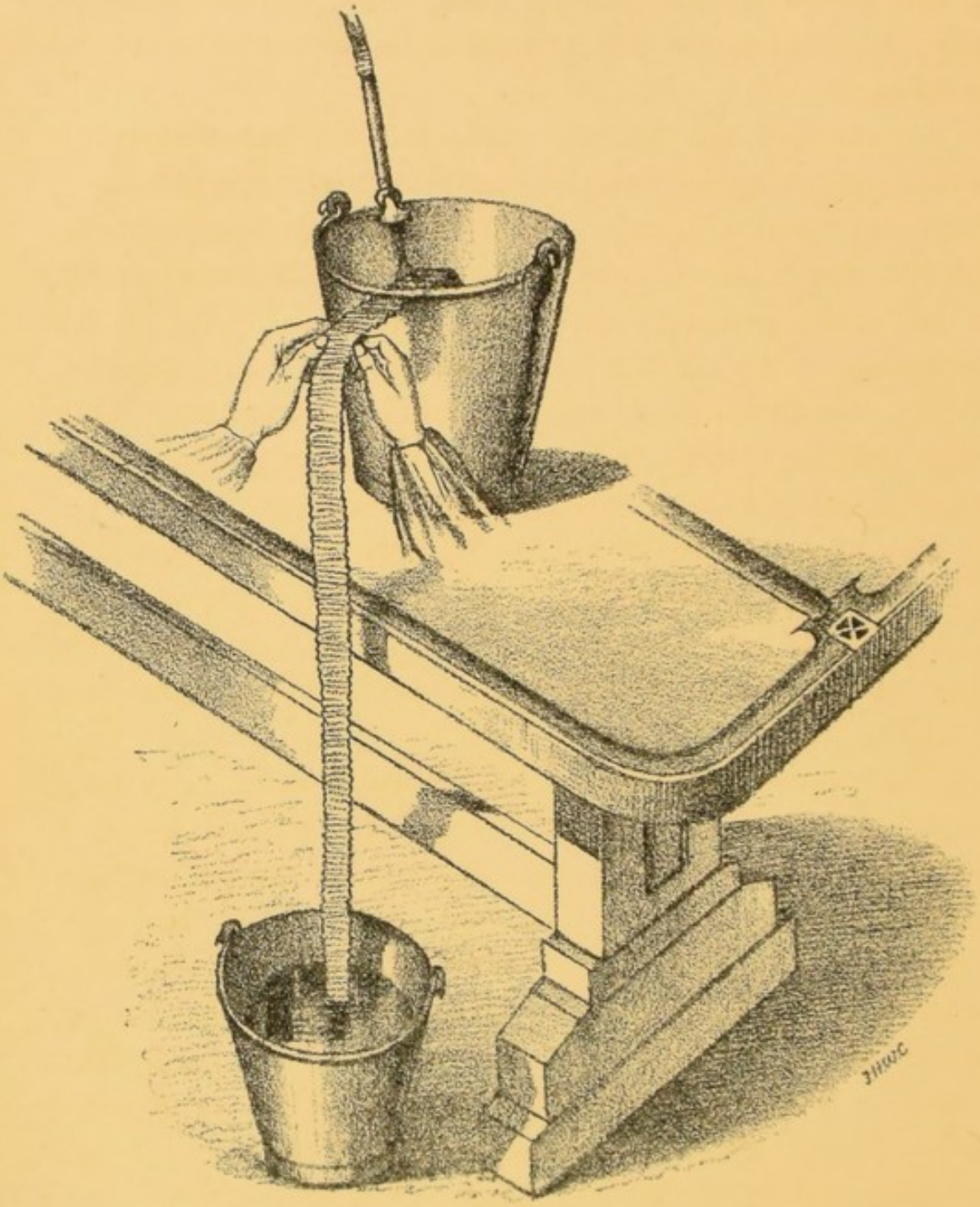
To take out the intestines, we commence at the lower part of the sigmoid flexure of the colon, and gradually dissect them away from their attachments, until we come to the duodenum, which is left in the body to be examined together with the stomach.

The coils of the small intestines are first to be drawn well over to the right side of the abdomen, so that a good view is obtained of the descending colon and sigmoid flexure. The bowel at the lower part of the sigmoid flexure is now surrounded by a double ligature, and divided between the ligatures. The descending colon is then dissected from its attachments, care being

[1] At the same time it should be pointed out that it is always better to examine the intestines at once after their removal from the body, since in some cases capillary injection of the mucous membrane diminishes in a remarkably short time after the intestines have been separated from their connections.

taken to cut close to the bowel, so that while the meso-colon is left in the abdominal cavity the bowel is quite straight and not knuckle-bent, for if thus bent it impedes the subsequent dissection of the bowels. In removing the large intestine it is best to cut parallel to the bowel, in a longitudinal direction, first dividing one side of the meso-colon and then the other; this method answers better for the large intestine than cutting transversely to the axis of the bowel, as we do to remove the small intestines. After separating the descending colon, we proceed to free in a similar manner the transverse portion, separating the great omentum, which is left in the abdomen. When the hepatic flexure is reached, the small intestines are to be put over to the left side of the abdomen, and the ascending colon dissected from its attachments. In completing the separation of the cæcum from its connections, care must be taken that the vermiform appendix be not injured. As soon as the separation of the small intestine is commenced, the bowel should be held in the left hand and gently put upon the stretch, while with the knife held as a violin bow in the right hand we separate the intestine from the mesentery *close* to the attached margin. The cutting edge of the knife should not be held transversely to the bowel, but very nearly parallel with it, when it is put on the stretch with the left hand. It is very necessary to be careful that the mesentery be divided close to the attached margin, otherwise very great difficulty will be experienced afterwards in opening the bowels. As the intestines are removed, they should be allowed to pass into a bucket partly filled with water, which will also facilitate the subsequent dissection of them. If, however, there is any suspicion of poisoning, the bowels should be passed into a clean empty vessel. When the duo-

PLATE VI.



Method of Cleaning the Intestines.

denum has been reached, a ligature[1] should be passed round the bowel, and the latter divided on the side remote from the duodenum. The end of the jejunum should then be hung over the side of the bucket, so that no difficulty may be experienced in finding it, when we come to cut them open.

To examine the mucous surface of the intestines, it is best to open the bowels before any attempt is made to wash away the fæcal contents. With the intestine scissors we cut the small bowel open along the attached margin, so as to avoid injuring the Peyer's patches. As we cut them open, they should be allowed to pass into another bucket containing a small quantity of water. The large intestine may be cut open along any line, there being no need of any special care on this point.

Of course in cases of suspected poisoning the contents of the intestines must be saved; the bowels should then be cut open and allowed to pass back again into the same vessel into which they were received when removed from the body.

To examine the walls of the bowels when they have been cut open, the intestine may be passed through between the first and second finger of the left hand, the mucous surface of the bowel being directed upwards. A more cleanly, and at the same time more convenient method, however, is to pass the intestines between the handle and the rim of a bucket, while at the same time a stream of water (where that is procurable) is directed on to the mucous surface, and so all fæcal matter removed and retained in the bucket (Plate VI.).

Examination of the Kidneys, &c.—It is advisable to

[1] In cases of poisoning a double ligature should be employed, and the bowel divided between them, so that all escape of the contents is avoided.

examine the left kidney before the right, since the former is more readily removed owing to the operator being on the right side of the body.

An incision is made through the fatty tissue which surrounds the kidney, and with the fingers of the left hand this tissue is separated from the left kidney, the suprarenal capsule being detached from the kidney, and its condition should be noted at this stage of the examination. The kidney, having been separated from the surrounding fat, is drawn forwards, and by a few strokes of the knife the ureter is dissected from the posterior abdominal wall, and then, having been divided at the brim of the pelvis, removed with the kidney. It is advisable to remove the ureter in connection with the kidney, since by that means it can be much more readily examined, and the connection of any disease of the kidney with that arising in the lower urinary passages demonstrated.

The left kidney and ureter having been removed from the body, any fat that may still be attached to the kidney is separated from the organ. The size, shape, and colour of the kidney are then noted. At the same time we observe whether the surface of the organ is smooth or granular, or presents any other abnormal appearances (cysts, new growths, tubercles, &c.) An incision is then made along the whole convex border of the organ, so as merely to divide the capsule, and not to extend any depth into the substance of the kidney. The object of this incision is merely to acertain whether the capsule can be separated easily or otherwise from the true kidney substance. To ascertain this point the organ is held in the left hand, and the cut capsule seized with the thumb and first finger of the right hand and separated as far as the hilus, first from one half and then from the other

part of the kidney; while doing this we observe not only the readiness with which it can be effected, but whether portions of the kidney substance remain attached to the capsule, and also whether the surface of the organ from which the capsule has been detached is smooth or granular.[1] To examine the substance of the kidney an incision is made from the convex border to the hilus, so that the two halves of the organ only remain connected by the pelvis of the kidney. In making this incision the organ should be held between the thumb and first finger of the left hand, and well away from the palm, so that in carrying the incision, between the thumb and finger through the kidney substance, there is no fear of wounding the hand, which may readily happen if the kidney is held so that the hilus lies on the palm of the hand.

After this long incision has been made, any others may be adopted in whatever direction may seem desirable.

The ureter should now be laid open by means of a pair of scissors, its calibre and the condition of its mucous membrane being noted.

Lastly, the kidney is weighed, the ureter having first been detached so that the secreting organ is alone placed in the balance.

The average weight of the kidney is about four and a half ounces in the male, and somewhat less in the female. Usually the left organ is about one-sixth of an ounce heavier than the right.

The right kidney is then examined in a similar way to that adopted for the left organ.

Examination of the Pelvic Organs, Testicles, Penis,

[1] Attention may be called to the fact that the kidney may be perectly healthy, and yet we may be unable to separate the capsule easily on account of the persistence of the fœtal lobes.

&c.—It is advisable, for obvious reasons, to proceed to the examination of the other genito-urinary organs immediately after the kidneys and ureters have been inspected. The external organs of generation have been to a certain extent examined before the trunk was opened; a more careful examination of these should now be made.

In the male the penis should be examined for scars, especially on the glans. The condition of the scrotum and size of the testicles are points next to be noted. As regards the scrotum, we look especially for œdema, hydrocele, &c. In examining the testicles we note any difference in size between the organs of the two sides, and whether any enlargement which may exist is due to increase in size of the body of the testicle, or to that of the epididymis.

In the female we examine carefully the labia for any signs of violence, of inflammation or other disease. We then note the condition of the hymen: absent or present? its precise state, entire or lacerated? surrounding the entire vaginal orifice or only a part of it? imperforate? All these are points to be noted in connection with the hymen. We also now observe the presence or absence of any foreign body at the entrance to the vagina.

Lastly, we examine the anus for piles, fistulæ, foreign bodies, &c.

Having completed the examination of the external parts, a very careful inspection of the pelvic organs *in situ* should be made. This inspection should be most carefully carried out in the case of the female, and especially where there is any suspicion of an attempt having been made to procure abortion.

Before any instrument is brought near the pelvic

viscera, the peritoneum covering those organs should be examined, so that if any wound is found no doubt may exist as to when it was inflicted. The positions of any wounds in the pelvis, and of any signs of inflammation around them, are specially to be observed.

The size of the uterus, its position (flexed, &c.), distension of the bladder, state of the ovaries, presence or absence of pelvic adhesions, are all points which are now noted.

If we wish to examine the urine in the bladder, an incision should now be made in the median line, through the anterior wall of the bladder, into the interior of the organ, when a specimen of the urine can be easily obtained.

To remove the organs from the pelvis, an incision is made through the peritoneum all round the brim of the pelvis. The fingers of the left hand are then gradually introduced between the peritoneum and the walls of the pelvis, and the whole organs contained therein separated from the pelvic walls, until they are only attached in the female by the rectum and vagina, and in the male by the rectum and urethra. All the organs are then firmly grasped in the left hand and pulled upwards towards the abdomen, while the knife, held in the right hand, is introduced into the pelvic cavity from above, and the lower part of the rectum and vagina (or the urethra in the case of a male subject) divided, the blade of the knife being kept as close as possible to the symphysis pubis, when the vagina or urethra is being separated.

Such a method suffices for the removal of the pelvic viscera in the majority of cases, but in some instances it is advantageous to remove with the internal organs a greater length of the urethra and the testicles

in the case of the male, and more of the vagina in the female subject.

In the case of a male subject, all that is necessary is, after separating the pelvic viscera from the wall of the pelvis as above described, and without dividing the rectum and urethra, to extend the incision made in the abdominal wall to open the trunk, along the dorsum of the penis to within about an inch of the glans; the body of the penis is then dissected away from the surrounding skin and the organ divided just behind the glans, which part of the penis should always be left uninjured, and only in the most exceptional cases removed from the body. The separated posterior part of the penis is then dissected back, and severed from its attachments to the pubic arch, to do which the legs should be well separated from one another. The knife is then kept close to the bones forming the pubic arch, and an aperture made into the pelvis immediately beneath the pubic arch, through which the posterior half of the penis is passed into the interior of the pelvis. Finally, the pelvic organs, having been previously separated from the wall of the pelvis, are grasped together with the posterior half of the penis and pulled well up towards the abdomen, whilst the lower part of the rectum, together with a portion of the surrounding skin, is separated by cutting along the posterior part of the pubic arch and then behind the rectum, the knife being held in the right hand between the legs of the subject, care being taken not to injure the left hand, which is in the interior of the pelvis dragging up the viscera towards the abdomen.

If it is desired to remove the testicles and spermatic cords in connection with the pelvic viscera, those parts are dissected up into the abdomen on each side, and the above dissection proceeded with as before.

In the case of the female, where we wish to remove the whole of the vagina and the rectum, we first separate the pelvic organs from the wall of the pelvis, and then, having placed the legs of the subject well apart, introduce the blade of the knife, held in the right hand between the legs, just within the labia majora; thence it is passed through into the interior of the pelvis, and keeping it close to the pubic arch and afterwards well behind the anus, we can readily separate the parts, while the left hand is in the pelvis dragging up the viscera as before described.

The method, however, first mentioned, where the whole dissection is carried on from within the pelvis, suffices for the majority of cases, and is more easily accomplished. It is especially in cases of stricture of the urethra that the posterior part of the penis should be removed in connection with the bladder.

Examination of the Pelvic Organs after removal from the Body.—When the pelvic viscera have been removed from the body, a careful inspection should be made of their peritoneal covering for any lesions connected with that part. We afterwards proceed to examine them in the following order :

Rectum.

Urethra, prostate, bladder, testicles, spermatic cord, and vesiculæ seminales.

Vagina, uterus, ovaries, and broad ligaments of the uterus.

The rectum is simply cut open along its posterior aspect, the nature of its contents noted, and then these removed by washing in water, so that the mucous membrane of this part of the bowel can be examined.

To examine the urethra and bladder, one blade of a pair of scissors is introduced into the former, and the

passage laid open by cutting through its roof and the dorsum of the penis, and then continuing the incision through the anterior wall of the bladder. This is a little more trouble, but is much better than cutting along the floor of the urethra.

If the testicles have been removed, they are next examined, and with them the spermatic cord and the vesiculæ seminales.

Lastly, in the case of the female, we proceed to the examination of the internal organs of generation, which it is advisable not to examine until after both the rectum and the bladder have been inspected.

The orifice of the vagina is first examined for any abnormal appearances, and then the passage is cut open along one side, by means of scissors, until the cervix uteri is reached, care being taken not to injure the latter with the point of the instrument. The vagina is examined, and then the portion of the cervix projecting into the vagina, for any signs of recent injury, erosions, cicatrices, or other disease. The size of the os uteri, and the presence or absence of fissures around it, are points also to be specially noted.

If there are any signs of recent injury to these parts, we must not only form an opinion as to whether they were of ante- or post-mortem origin, but also whether the wounds are such as could be occasioned by the passage of anything (fœtus, &c.) from the uterus outwards through the vagina, or whether they arose from the direct injury occasioned by the introduction of an instrument into the vagina. The importance of such a question in cases where there is a suspicion of an unlawful operation having been performed scarcely needs to be specially mentioned.

The uterus is next examined by cutting, with a strong

pair of scissors, along one side of it, and thence along the fundus, to the opening of the Fallopian tube on the other side. By this means the cavity of the uterus is well exposed, and the nature of its contents and the condition of its mucous membrane ascertained. The whole length of the uterine cavity, and the length of the body and cervical parts of the organ, should then be ascertained, as well as the thickness of the walls at various parts. The shape of the uterine cavity, and the presence of the markings in the cervix known as the arbor vitæ, are points which it may be of importance to note in some legal cases.

The ovaries are next examined, their relative size and any adhesions being specially observed, as well as the presence and characters of any corpus luteum.

One broad ligament would be examined in laying open the uterine cavity; we now complete the examination of the pelvic organs by examining the ligament of the other side and the two Fallopian tubes.

Examination of the Spleen, Duodenum, Stomach, Liver, &c.—After the completion of the dissection of the genito-urinary organs, we proceed to the examination of the *spleen*, the *duodenum*, the *stomach*, the structures contained between the layers of the *lesser omentum*, and the *liver*, in the order in which the parts are here named.

The *spleen* is grasped carefully in the left hand, and, having been drawn forwards from behind the fundus of the stomach, is separated from its connections by a few strokes with the knife. When removing the organ from the body, we notice the size and fulness of the blood-vessels in the hilus.

Not unfrequently one or more accessory spleens are to be observed near the hilus of the organ, and they

commonly participate in the morbid changes which may exist in the spleen.

When we have removed the spleen, we note its size, weight, colour, consistence, condition of the capsule, and finally make several incisions into the substance of the organ, in order to examine its interior.

The spleen varies very considerably in size and weight, even within the limits of health; it may be stated that, on an average, it weighs from five to seven ounces in the male, and somewhat less in the female.

Duodenum and Stomach.—Before any incisions are made into these parts, the stomach should be carefully examined for any perforation; and if any aperture exist, its size, position, and the condition of its edges must be examined, any signs of inflammation of the surrounding serous layer being particularly sought for. When any perforation exists, great care should be exercised in manipulating the organ, since perforations are readily enlarged.

The size, shape, and position of the stomach are at the same time to be noted.

In an ordinary case, where there is no suspicion of poisoning, and where we do not wish to retain the contents of this part of the alimentary canal, the duodenum and stomach are most conveniently opened *in situ*.

To do this, the ligature, which was previously placed at the termination of the third portion of the duodenum, is removed, and the long blade of the bowel scissors introduced into the duodenum. That part is then laid open, the incision stopping short of the pylorus, so that the finger may be introduced through that aperture and its size ascertained; it should admit a medium-sized finger easily. Some difficulty will be experienced in cutting open the duodenum, unless the curves made by

that portion of the bowel be carefully remembered: we first cut downwards and towards the right, and freely lay open the third part by cutting in that direction, before we cut directly upwards so as to open the second part.

After ascertaining the size of the pyloric orifice, the incision in the duodenum is continued along the greater curvature of the stomach as far as its cardiac extremity.

The quantity and characters of the contents of the stomach and duodenum are noted, and attention paid to any difference in colour between the mucous membrane above and that below the entrance of the bile duct into the duodenum. If the incision along the greater curvature of the stomach is not made quite to the extreme cardiac end, the greater part of the contents may be readily removed to a glass vessel, and so more conveniently examined.

If a stream of water is available, the mucous membrane of the stomach and duodenum should be carefully washed, so that the presence of any lesions may be ascertained. In the case of the stomach, care must be taken not to mistake post-mortem changes for those which have occurred during life. The mucous surface over the cardiac extremity of the stomach is usually very much darker than that elsewhere, in consequence of post-mortem hypostasis and staining of the stomach walls in that region; that part of the stomach lying after death far back in the abdominal cavity, in the groove to the left of the vertebral column. Post-mortem digestion of the stomach may be found as one large patch of softening, often perforating the stomach walls; the edges of an aperture so produced are soft, thin, and very readily torn, since there is, of course, no induration to strengthen the margins, such as exists, to a certain

degree, in an ulceration occurring during life. Post-mortem digestion of the stomach may also show itself as a number of minute defects in the mucous membrane, the patches varying in size from that of a pin's head to that of a large pea; and in such cases the interior of the stomach often presents a large number of small depressions, which frequently have a punched-out appearance, and involve only the mucous and submucous layers.

After the examination of the inner surface of the duodenum and stomach has been completed, the patency of the gall duct should be next tested. We observe the condition of the gall bladder, as regards distension, and then seizing it firmly in the palm of the right hand, pressure is exerted on it, when, if the duct is open, bile is seen to flow out into the duodenum. If any obstruction of the duct exist, the position and nature of it should next be ascertained.

If any lesion is expected to be found in connection with the vena portæ, now is the most suitable time for investigating it by dissecting out that vessel.

Examination of the Stomach and Duodenum in cases of suspected Poisoning.—In cases of suspected poisoning, the stomach and duodenum must not be opened *in situ*, as above described, but a ligature should be passed round the lower part of the œsophagus, and the stomach and duodenum removed from the body together. They should be cut open, the contents being allowed to escape into a clean vessel, and the mucous membrane carefully examined. The stomach, duodenum, and contents may then be reserved for chemical analysis.

Examination of the Liver.—The size of the liver and its relation to surrounding parts have already been noted in the general inspection of the contents of the abdomen. We have now to remove the organ from the body, so

that it may be more carefully examined. To remove the liver, the best method is to take hold of the organ by the left lobe, so that the tips of the four fingers of the left hand are placed in the longitudinal fissure on the under surface between left and right lobe, while the thumb is on the upper surface near the suspensory ligament; the left margin of the left lobe lies in the palm of the left hand. The great advantage of holding the organ in this manner is that our hold can be easily maintained while the connections of the liver are severed.

The liver should then be removed by cutting its various ligaments, &c., the organ being pulled well forward while this is being accomplished.

The size, shape, colour, and condition of the anterior margin (sharp, rounded, &c.) are points to be next noted; then a series of incisions should be made in the organ transversely from left to right, so as to include the substance of both lobes.

The gall bladder should next be opened by means of a pair of scissors, and its contents, &c., examined. The liver is then weighed: the usual weight of the organ is between fifty and sixty ounces.

Examination of the Pancreas, &c.—The pancreas, semilunar ganglia, mesenteric and retroperitoneal lymphatic glands, are next to be examined.

The pancreas can be readily examined, in the majority of cases, by simply making an incision from the tail to the head of the organ; or it may be dissected away from the posterior abdominal wall and examined after removal from the body.

Examination of the Aorta, Inferior Vena Cava, and Receptaculum Chyli.—The abdominal aorta may best be examined by laying it open *in situ*, and the inferior vena cava may be similarly treated.

To ascertain the condition of the receptaculum chyli and the commencement of the thoracic duct, a more careful dissection of the parts must be made.

Examination of the Tongue, Fauces, Œsophagus, Larynx, and Trachea.—As stated before, it is advisable to leave the examination of the structures in the neck until the dissection of the abdomen has been completed. The body should be drawn to the end of the table, so that the head hangs well over the end, and the parts between the chin and the sternum put upon the stretch. The incision in the median line of the neck is now extended upwards to the lower part of the chin, care being taken that no cut is made on the front of the chin, so that the features shall not be at all disturbed. The soft parts are then dissected away from the larynx and trachea until the vertebral column is reached, while above the parts are dissected from the ramus of the lower jaw as far back as the angle on each side. If any lesion is expected in connection with the large vessels and nerves of the neck, the above dissection must be carefully performed, the structures where the lesion is expected to be found being preserved from injury.

The shape of the larynx, position of the trachea, size of the thyroid gland, condition of the lymphatic glands, &c., in the neck, are the points to be next noted.

An incision is now made immediately behind the symphysis of the lower jaw until the mucous membrane of the floor of the mouth has been cut through, and the wound is then extended on each side as far back as the angle of the jaw. By means of the fingers of the left hand the tongue is now drawn out of the mouth, through the incision below the jaw, and pulled well forward; the soft is then separated from the hard palate by a knife

held in the right hand and introduced through the wound below the chin. The incision is then continued through the fauces above the tonsil on each side, and through the posterior wall of the pharynx as high as possible. By drawing the tongue well forward the pharynx can now be easily dissected from the front of the vertebral column, and the whole of the upper part of the respiratory and alimentary tract removed together. The dissection should be continued downwards through the thorax, the aorta being removed with the œsophagus, by keeping close to the vertebral column, until the cardiac orifice of the stomach is reached, when the parts are separated by cutting transversely to their long axis.

The parts removed are now placed in front of the operator on the table, the pharynx being uppermost and the tongue directed towards the operator.

The soft palate is divided on one side of the uvula, and the tongue, tonsils, and fauces examined. At the same time the upper orifice of the larynx is inspected, the presence of any foreign body or signs of disease being specially looked for. The pharynx and œsophagus are cut open with the bowel scissors by an incision through their posterior wall. Their mucous surface is then examined.

The larynx and trachea are then laid open with the scissors by an incision through their posterior wall and through the pharynx. In opening out the larynx, after making this incision, care should be taken not to introduce the fingers into its passage, but to place the thumb of each hand on the inner aspect of the great corner of the hyoid bone, and then by bending these forcibly outwards the larynx may be so opened that there is no fear of disturbing any foreign body, or of damaging the mucous membrane.

The incision in the trachea is continued into the two main divisions of the bronchi.

Lastly, the thoracic aorta is to be cut open, and with that the dissection of the parts that have been removed is completed.

Examination of the Skull.—Although the description of the method of procedure for examining the skull and its contents has been postponed until now, it is advisable, for the reasons previously stated, to commence with the examination of the head when a complete autopsy has to be made.

The general shape of the head, the amount and colour of the hair, and presence or absence of any wounds or diseases of the scalp, are points that will all have been observed during our general inspection of the body.

The position, extent, and character of any wounds should now be accurately noted before we proceed further with the examination.

To reflect the scalp an incision is made from the tip of the mastoid process on one side, over the vertex of the head, to the corresponding point on the opposite side. This incision is preferable to the one in front of the ears commonly recommended. In the case of female subjects, it is often necessary to previously unplait the hair. In making the incision through the scalp the knife must be held in a peculiar manner, and quite differently to that adopted for the examination of any other part of the body: the point of the knife should first be inserted over the tip of the mastoid process down to the bone, and then the instrument, with its back against the bone and its cutting edge directed outwards, is made to run along, point first, over the vertex, so as to divide the fleshy scalp from within out-

wards. Unless the incision is made in this way, and the knife run along with its point first, not only is the edge taken off the instrument by the hair, but a very large amount of hair is unavoidably cut away in making the incision. From the upper border of the temporal muscle of one side to the corresponding point on the opposite side, the whole structures of the scalp, quite down to the bone, should be divided in this incision; over the muscle itself, however, the incision need only extend as far as the temporal fascia, and not into the substance of the muscle. Over the vertex even the pericranium should be divided, as otherwise the subsequent reflection of the scalp will be rendered difficult. When the incision is completed, the scalp can be most readily reflected by stripping off the pericranium from the bone with a chisel; often, also, the process may be hastened by firmly grasping the scalp and pulling it forcibly from the bone beneath. Usually, however, the knife has to be used to a certain extent, and especially to remove the scalp from the temporal fascia. The anterior half of the scalp should be reflected nearly as far as the orbits, the posterior until the great occipital protuberance has been well exposed. The temporal muscle on each side together with the temporal fascia is next separated from its attachments to the skull, and reflected over the ear. In reflecting the scalp we note any sign of disease, contusion, or other injury.

The general shape of the upper part of the skull can now be more accurately seen, and any want of symmetry noted.

We should also now look for any sign of disease connected with the outer table of the skull.

To remove the calvarium the bone is sawn through, along a circular line indicated by the following four

points, which will be found convenient landmarks: anteriorly, the depression between the frontal eminences; posteriorly, the great occipital protuberance; laterally, a point on each side corresponding to the upper border of the helix of the ear, when this is drawn well up towards the vertex.

In using the saw, the bone should be completely divided at one point before proceeding to another part, and care should be taken that the dura mater beneath is not injured. The beginner will have great difficulty in avoiding such injury, but a little experience will soon make him aware of an alteration in the sound produced by the saw directly the bone is divided, which, to the experienced ear, is very characteristic, and affords a very sure indication that, at that point, the process has gone far enough.

A considerable quantity of blood and cerebro-spinal fluid usually escapes during the sawing of the skull, so that a bucket should be placed beneath the edge of the table over which the head is projecting.

If the bone has not been completely divided all round, a few taps with a mallet and chisel often suffice to complete the division; but when there is any suspicion of fracture of the skull, or in any legal case, whatever be its nature, the *mallet should not be used*, since it is possible to produce a fracture with it, which may be very difficult to distinguish from one produced during life.

The anterior part of the calvarium should now be grasped by introducing the fingers of the right hand into the incision in the frontal bone, and an attempt made to remove the skull-cap. If, however, any difficulty is experienced in doing this, in consequence of firm adhesion between the dura mater and the calvarium, no forcible

traction should be used, but the dura mater should be divided, by means of a pair of scissors, along the line of incision through the bone, and then the brain removed in the skull-cap with the dura mater adherent to the latter. The dura mater is often firmly adherent in old persons and young children, so that usually in examinations at both these extremes of life the brain has to be removed in the skull-cap. Further, whenever the person has been dead some time, as in the case of exhumed bodies, no attempt should be made to pull off the calvarium; it should be removed at the same time as, and together with, the brain, by cutting round the dura mater in the manner described. This is necessary on account of the softened condition of the brain in such cases; for it will be found that if the dura mater has been injured at any one part during the sawing of the bone, and then an attempt be made to drag off the calvarium, the softened brain will exude through the apertures.

In post-mortem examinations on adults who have recently died, however, the calvarium can for the most part be separated, and in such cases the attempt should always be made, since the removal of the brain is by this means rendered much easier. The calvarium should be examined at once before we proceed any further. We note the thickness of the bone, the shape of the interior of the calvarium, and any signs of disease or injury.

We next pass on to the examination of the dura mater and to the removal of the brain. A block of wood or an ordinary brick should be placed beneath the skull under the occipital bone to support the head, so that the weight of the brain may not drag upon the nerves and other structures at the base of the skull.

By means of scissors the great longitudinal sinus is to be cut open along its whole length, and its contents

examined. Usually all that is discovered is either some dark liquid blood or a coagulum which anteriorly is pale and discoloured; while posteriorly in the occipital region it is dark and black, the difference in appearance between these two parts of the clot being simply the result of the greater specific gravity of the red corpuscles, which causes them to sink to the most dependent part of the sinus. The dura mater is next divided in a circular manner just above the line along which the bone was sawn. As the membrane over each hemisphere of the brain is divided, it is reflected over to the other side, so that its under or inner surface may be examined. The falx cerebri is next separated from the crista galli of the ethmoid bone, and then the dura mater is pulled backwards and allowed to hang over the posterior border of the base of the skull.

We then carefully examine the surface of the cerebral hemispheres and their covering of pia mater. Here we note especially the colour of the pia mater and the condition of turgescence of its vessels;[1] we look for any signs of inflammation, and note the presence of any excessive amount of subarachnoid fluid. In reference to the brain, the only special point that we have to note at this stage is the condition of the convolutions on either side, observing whether they are more flattened on one side than another, as in cases of distension of one lateral ventricle with blood or other fluid, and in cases of profuse hæmorrhage into, or new growths in, the substance of one hemisphere.

Removal of the Brain. — The brain is removed by raising the frontal lobes from the anterior part of the

[1] It must be remembered that the veins over the occipital and posterior parts of the parietal lobes may be much engorged simply from post-mortem hypostasis.

skull, and then dividing the various nerves and blood-vessels at the base of the brain, cutting them close to the bone at their exit from the skull, so as to avoid lacerating them. When the tentorium cerebelli is reached, it must be very freely divided close to the bone and as far back as possible, since the removal of the brain is much facilitated by a free incision into this part of the dura mater. While the various structures are being thus divided, the brain must be carefully supported with the left hand placed beneath the occipital lobes, so that no laceration of the parts at the base may take place. The spinal cord is to be divided as low as possible by passing the knife into the vertebral canal along the anterior aspect of the medulla; the vertebral arteries and the nerves coming from the medulla oblongata are to be divided on each side before any attempt is made to remove the brain from the skull. When all these structures have been divided, the medulla must be grasped between the index and second finger of the right hand, and the cerebellum gradually turned out from the posterior fossa of the skull.

The brain should then be placed on a plate, while we return to the

Examination of the Base of the Skull.—We first examine the condition of the dura mater covering the various parts of the base, proceeding in such examination systematically from front to back. The various sinuses in that membrane are next to be examined, after incisions have been made into them with the knife. Finally, we examine the bones forming the base of the skull, by stripping off the dura mater from all parts with the aid of a pair of dissecting forceps. In all cases of suspected fracture of the base it is very necessary that the dura mater should be carefully separated from the bone,

since otherwise the linear fractures of that part are readily overlooked.

Removal of the Brain in the case of Young Children.—In the case of infants, where the sutures are still unclosed, and the bones of the vertex of the skull both thin and pliable, we can remove the brain far more easily and quickly than by sawing round the skull-cap in the ordinary way. After reflecting the scalp, we cut with a stout pair of sharp-pointed scissors along the various sutures on the vertex and lateral aspects of the skull, and also through the median line of the frontal bone nearly as far as its articulation with the nasal bones. We next divide the falx cerebri close to the great longitudinal sinus, and then forcibly bend the two parietal bones outwards, the upper part of the occipital bone backwards, and the two halves of the frontal bone forwards and outwards, together with the dura mater, which at this age is firmly united to their inner surfaces. By this means the brain will be fully exposed, and can then be removed in the usual manner, though greater care will be necessary in doing so, a child's brain being much softer than that of an adult.

Examination and Dissection of the Brain.—When the brain has been removed it should be placed, base upwards, on a large plate, and the pia mater, vessels and nerves of the base, carefully examined.

In connection with the pia mater we especially look for signs of acute inflammation and for the presence of tubercles. The edges of the Sylvian fissure should be separated, and the pia mater of that part carefully examined, that being a very common seat for tubercles. The arteries are examined especially for atheroma, obstructions (thrombi or emboli), aneurisms, &c. Where either thrombosis or embolism is suspected, it is advisable to

lay open the arteries at the base, with the aid of scissors, commencing with the basilar and continuing the dissection until the main divisions of the middle cerebral vessels have been reached.

The brain is now to be turned over, and the convexity of the cerebral hemispheres examined more carefully than before the organ was removed from the skull. The number and size and shape of the convolutions should be noted, and any signs of disease connected therewith be observed.[1]

We next proceed to the dissection of the brain. The methods which may be adopted are very numerous, some having special advantages in certain cases. The one here described has, amongst other advantages, that of being very systematic; all parts of the brain being examined in a certain definite order. Further, after the dissection has been completed, the parts can be so put together again that any lesion which may have been found in the interior of the brain can be compared as regards its position with any of the convolutions of the cortex. The dissection can also be accomplished with a small knife, so that there is no need to carry a special brain knife.

The brain is placed upon a plate, or, preferably, on a small dish, resting on its base with the frontal extremity away from, and the occipital towards, the operator; in other words, we place it in the position of our own brain.

The two cerebral hemispheres are then slightly separated until the upper surface of the corpus callosum

[1] In many forms of chronic cerebral disease it is necessary at this stage to separate the pia mater from the surface of the cerebral hemispheres, in order to ascertain whether such a separation can be effected readily, or only with laceration of the subjacent brain substance.

is exposed. The left hand then supports the left hemisphere, being so placed that the four fingers are spread over the lateral aspects of the hemisphere, while the thumb lies on the inner aspect of the same hemisphere in the great longitudinal fissure. The knife[1] is held as a pen in the right hand, and an incision is made through the corpus callosum, about one-eighth of an inch to the left of the raphé, from front to back, until the left lateral ventricle is opened, care being taken that the incision is not made too deep, since otherwise the basal ganglia will be injured. It is also essential that, when the corpus callosum is being divided, the left hemisphere should be well supported with the left hand, since otherwise the parts about the basal ganglia will be lacerated. When the left ventricle has been opened, we note the amount and character of its contents.

The position in which the knife is held is now changed: it is seized between the thumb and first two fingers, very much as a pen is held, but with the cutting edge of the blade directed away from, instead of towards, the operator (Plate VII. fig. 1). The point of the knife is then introduced into the lower part of the anterior horn of the left lateral ventricle, and while that point is kept fixed, the handle and upper part of the blade are made to revolve forwards and outwards, so as to cut through the anterior part of the left frontal lobe.

The knife is next held between the thumb and first two fingers, and the hand flexed forcibly at the wrist joint, so that the cutting edge of the knife and the tips of the fingers of the right hand are directed towards the operator (Plate VII. fig. 2).

The point of the blade is now inserted into the lower part of the posterior horn of the left lateral

[1] A convenient one for this purpose is one of Virchow's (Plate I. fig. 2).

PLATE VII.

FIG. 1.

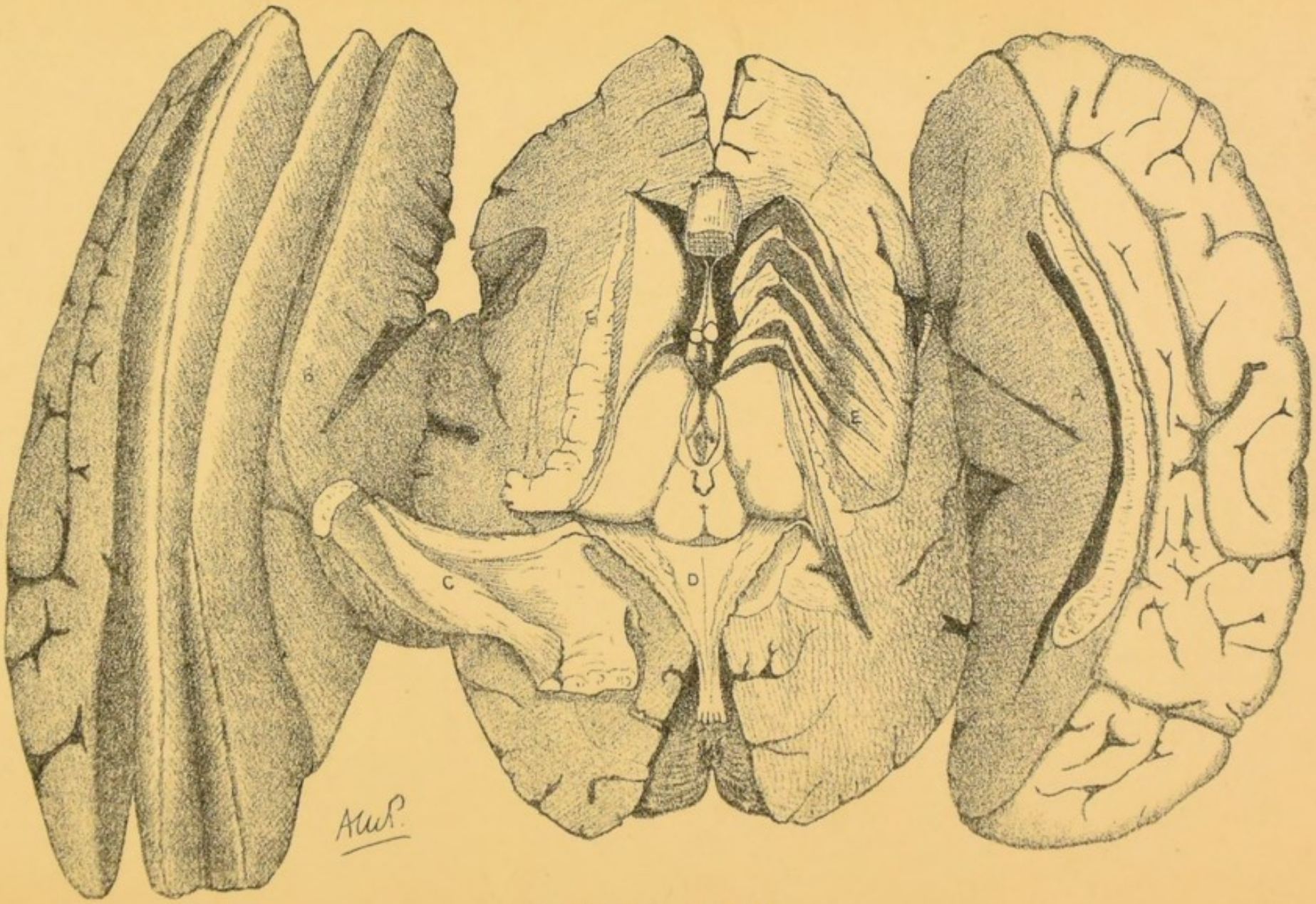
FIG. 2.

METHOD OF HOLDING THE KNIFE WHEN DISSECTING THE CEREBRAL HEMISPHERES.

Fig. 1. Method of holding the instrument when making the incision through the frontal lobe.

Fig. 2. Ditto ditto through the occipital lobe.

PLATE VIII.



DISSECTION OF THE BRAIN.

A. Right cerebral hemisphere partially separated from the other part of the brain.
B. Left cerebral hemisphere partially separated from the other part of the brain and several incisions made into it.
C. Posterior part of the corpus callosum and the body of the fornix turned over to the left side.
D. Choroid plexus reflected backwards.

ventricle; and keeping that part of the blade fixed, the handle and upper part of the blade are made to revolve backwards and outwards, so as to divide the posterior part of the occipital lobe. During the whole of this time the left hand is carefully supporting the left hemisphere.

The position in which the knife is held is now again changed, it being grasped firmly in the palm of the right hand, and the blade held nearly horizontal; the incision in the frontal lobe is then united with that in the occipital lobe by a long incision immediately over the upper surface of the basal ganglia, and continued downwards and outwards to the pia mater, so that the greater portion of the left cerebral hemisphere, as a prismatic mass, is left attached to the other part of the brain by the pia mater alone. As this last incision is being made, the separated part of the hemisphere is allowed to fall outwards, by withdrawing the support which has up to this period been given it with the left hand (Plate VIII. A).

Three or four incisions are next to be made into the substance of the left cerebral hemisphere, which is now attached to the other part of the brain by the pia mater. These incisions are not to be made parallel to one another, but should all commence from (what in the normal position of the brain is) the inferior part of the inner surface of the left hemisphere, and radiate from that line outwards towards the surface of the cortex, so that each incision is perpendicular to the surface at the point of emergence. Consequently the first incision will be made close to, and nearly parallel with, the inner surface of the left hemisphere, while the succeeding incisions will diverge from this at a larger and larger angle. The incisions should extend quite to the surface of the brain, but the pia mater should not be divided, that membrane acting

as the binding of a book to keep the several slices of the hemisphere together (Plate VIII. B). Each slice in succession is then carefully examined.

The plate or dish on which the brain has been placed is now turned round, so that the frontal lobes of the brain are directed towards, and the occipital lobes away from, the operator.

The same dissection is now repeated on the right cerebral hemisphere as was done in the case of the left. The left hand supports the hemisphere, the four fingers being on the lateral aspect of that part, while the thumb is on its inner surface. An incision is then made into the right lateral ventricle by cutting through the corpus callosum, about one-eighth of an inch to the right (i.e. to our left, as we are now looking at the brain in its reversed position) of the raphé.[1]

The subsequent dissection is the same as in the case of the left side, only that in consequence of the altered position of the occipital and frontal lobes in reference to the operator, the knife is held, in making the incision into the occipital lobe, as described for dissecting the frontal lobe in the case of the left hemisphere, and *vice versâ*. The incisions into the substance of the right hemisphere are exactly similar to those made into the left.

The plate is now again turned round until the frontal lobes of the brain are once more directed away from the operator. The point of the knife is introduced into the foramen of Monro, and, the cutting edge of the blade

[1] In judging of the contents of the right lateral ventricle, we must remember that that cavity might have contained a large quantity of fluid before the left ventricle was opened, but that such fluid will probably have escaped through the foramen of Monro when the left cavity was opened.

being directed upwards, the fornix and the portion of the corpus callosum remaining in the middle line are divided transversely by cutting upwards. The anterior and posterior halves of these structures are then turned forwards and backwards respectively. By this means a great part of the choroid plexus is exposed, and the whole of that structure will be brought into view, by dividing the posterior half of the fornix and corpus callosum (which has just been turned backwards) on one side, and reflecting it over to the opposite side (Plate VIII. c).

We have now a complete view of the choroid plexus, with the veins of Galen, and any abnormal appearances connected with those parts are to be noted.

The choroid plexus is next to be turned backwards over the upper surface of the cerebellum (Plate VIII. D).

We have now completely exposed the basal ganglia, the third and lateral ventricles, and the corpora quadrigemina. Our next procedure is to examine the basal ganglia by making a series of transverse incisions into them at intervals of about one-eighth of an inch (Plate VIII. E). The knife is held in the right hand, transversely to the long axis of the brain, and with the cutting edge directed downwards. The incisions are made first into the ganglia of one side, and subsequently into those of the other side; or by means of a long thin-bladed amputating knife we may at the same stroke make the incisions into the ganglia of the two sides. In either case these incisions should be made by pushing the knife from right to left, and then drawing it back in the opposite direction; after finishing the latter stroke, the edge of the blade should be drawn over the surface of the incised part, so that the latter may be freed from blood, &c., and any morbid appearances detected. It will be understood

that these incisions are made transversely into the basal ganglia, the first incision being through the anterior part of the caudate nucleus of the corpus striatum, and the last through the posterior part of the optic thalamus on each side. Two or three transverse cuts are next made into the corpora quadrigemina, and those ganglia together with the aqueduct of Sylvius examined.

We now proceed to examine the fourth ventricle by raising the left lobe of the cerebellum with the fingers of the left hand, so as to avoid injury to the floor of the ventricle, and then cutting from above in the median line directly through the middle lobe of the cerebellum, and finally through the valve of Vieussens between the superior peduncles of the cerebellum. By separating the two halves of the cerebellum we then obtain a clear view of the floor of the ventricle, and any abnormal appearances connected therewith can be readily observed.

The cerebellum is next examined by making a series of incisions into the two lateral lobes. These incisions should be made from above downwards, and should radiate from the corpora quadrigemina as a centre. As each incision is made, the edge of the knife is drawn back over the cut surface to clean it, exactly as was done in dissecting the basal ganglia.

The whole brain is now rolled together again; and it will be found that, although so many incisions have been made into its substance, the original shape of the brain can still be reproduced with a fair amount of accuracy, so that any lesion which may have been found in its interior may be compared, as regards its position, with any area of the cortex.

We next turn the brain over, so that its base is directed upwards; and if any lesion has been found in the

course of distribution of any particular artery, that blood-vessel may now be dissected out and examined.

The examination of the brain is completed by examining the crura cerebri, pons, and medulla oblongata. After a careful scrutiny of their under surface, a series of transverse incisions is to be made into them. The incisions into the pons and medulla are best made after the first finger of the left hand has been passed into the fourth ventricle, and thence continued along the upper and posterior aspect of the pons. The finger so placed affords a good support to the pons and medulla, and with a little experience incisions can be made into those parts without wounding the finger.

The average weight of the brain in the male is forty-nine and a half ounces, and forty-four ounces in the female; however, the weight varies within very wide limits, even in the absence of disease.

Examination of the Eye.—In the majority of cases we only require to examine the posterior half of the eye, especially the posterior part of the retina and choroid. This examination can be most readily effected without causing any disfigurement to the features by removing the roof from the orbit after the brain has been removed. By means of a chisel and mallet or post-mortem hammer, a triangular piece of bone is taken from the roof of the orbit, the apex of such triangular portion being at the optic foramen, and the base at the anterior part of the orbital plate of the frontal bone. Or another method, which is very efficient, is to batter in the roof of the orbit with the post-mortem hammer, and then pick off with the dissecting forceps the various spiculæ of bone.

After the orbit has been exposed by either of these methods, the fat and muscles are carefully dissected away from the posterior part of the globe of the eye and

the optic nerve. The posterior half of the globe of the eye is then separated from the anterior half, and with the optic nerve attached removed from the orbit. The retina, choroid, &c., can then be readily examined. The whole globe must not be removed.

The orbit should then be filled with a small quantity of cotton wool to avoid any disfigurement to the face from the sinking in of the eyeball, care being taken that the anterior part of such a plug of wool is blackened, since otherwise the pupil will appear white instead of black.

Examination of the Nose.—An easy method of examining the anterior part of the nasal cavities is to dissect up the upper lip from the anterior part of the superior maxilla, when a view of the interior of the nose at its anterior part will be obtained. But by this means very little can be ascertained as to the condition of the posterior part of the nasal cavities. In order to make anything approaching a complete examination of these parts, a certain portion of the base of the skull must be removed in the following manner:

After the brain has been removed, and the base of the skull has been examined, the body of the sphenoid bone, a little in front of its line of union with the basilar portion of the occipital bone, is divided transversely with the aid of a chisel, and then by means of a small saw the base of the skull is divided along a line running on either side from the extremities of the incision in the body of the sphenoid, through the middle fossa on the outer side of the cavernous sinus, and thence forwards through the lesser wing of the sphenoid to the anterior fossa, where the inner part of the orbital plate of the frontal bone on both sides is divided as far as its anterior extremity, and then the extremities of these

incisions are united by a transverse one across the front part of the perforated plate of the ethmoid bone. We are then enabled, by means of a chisel and a pair of bone forceps, to remove the portion of the base of the skull included between the lines of incision, and to examine the interior of the nasal cavities.

The connection, however, between diseases of the ear, the throat, and back part of the nasal cavities is so intimate, that it is advantageous in some instances to remove the internal ear together with the upper part of the pharynx and nasal cavities. To do this, the method described by Schalle [1] can be strongly recommended. As, however, that method would require a long description, and necessitates the employment of certain special instruments, the reader is referred to the original article for the details.

Examination of the Internal Ear.—Those who are specially interested in diseases of the ear are recommended to adopt Schalle's method, above referred to, for removing the internal ear together with the nasal cavities and the upper part of the pharynx. But for ordinary cases a more simple, though far less perfect, plan may be adopted.

After the brain has been removed, and the sinuses of the dura mater carefully examined, the dura mater is stripped off from the petrous portion of the temporal bone, and that part of the base of the skull is examined for any signs of injury or disease (caries, &c.) The soft parts are then dissected off from the outer aspect of the temporal bone, the cartilaginous portion of the external auditory canal separated from its bony attachment, and the lower jaw disarticulated. By means of a saw the whole temporal bone may then be removed,

[1] Virchow's *Archives*, vol. lxxi. p. 206.

and subsequently, with the aid of bone forceps and a small saw, the roof of the tympanic cavity and the other parts of the internal ear can be taken away, and the underlying structures examined. The condition of the mastoid cells can also be inquired into by sawing through that part of the temporal bone.

Examination of the Vertebral Column and Spinal Cord.—To examine the vertebral column and spinal cord the body is placed upon its anterior surface, and the head allowed to hang over the end of the table, so as to facilitate the examination of the parts in the cervical region.[1] We first look for any signs of contusions or other injuries to the soft parts over the back, and note any abnormal appearances connected with the spinous processes of the vertebræ; whether they are all in the same line or deflected at any part to one side or the other; whether there is any unusually large interval between any of the processes, as is sometimes seen in fractures of those parts.

An incision is then made in the median line from the upper part of the occipital bone, down the back, to the upper part of the sacrum. The soft parts are then reflected on each side from the posterior aspect of the vertebral column, care being taken to remove all the soft parts so as to leave the spinous processes and laminæ exposed along the whole length of the spine. We then examine the spinous processes and laminæ carefully for fractures, &c., taking hold of and attempting to move the spinous process of each vertebra.

The vertebral canal is opened by sawing through the

[1] Where a careful examination of the spinal cord is required, and the autopsy cannot be made until some hours after death, the body should be placed, immediately after death, in the prone position, and ice applied along the back.

laminæ on each side, at a short distance from the spinous processes. The saw should be held nearly perpendicularly or only slanting very slightly inwards towards the middle line, so that the sawing may be done nearly in the antero-posterior line of the body, because if the instrument is inclined too much towards the mesial line there is great danger of damaging the cord. To saw through the laminæ of the lumbar and greater part of the dorsal regions, the operator stands at the end of the table at the head of the body; but to saw the laminæ of the cervical and upper dorsal parts of the spine, he stands on the left side of the corpse. It is usually very difficult to saw the laminæ of the upper two or three cervical vertebræ, so that these should be left to be divided subsequently by means of the bone forceps.

The ligaments between the posterior parts of the second and third lumbar vertebræ are now divided, and by means of a pair of bone forceps the portion of the spine between the saw cuts is gradually removed from below upwards, and so the vertebral canal opened. For this latter part of the operation the large bone forceps introduced by Dr. Savage, of Bethlem Hospital, London, will be found most useful (Plate I. fig. 3). These forceps are a very powerful and formidable-looking instrument, but are very valuable for opening the spinal canal; they save a great deal of time and labour, for we do not need to saw the laminæ so completely as is otherwise necessary. Dr. Savage has also introduced a saw of convenient shape for dividing the laminæ, the chief feature of which is that the handle is set back above the blade so as to be out of the way when the instrument is in use.

In the case of young children, we can usually easily

open the spinal canal with a pair of strong scissors without the aid of a saw.

After we have opened the canal, we examine the dura mater from its posterior aspect, removing if necessary any blood therefrom by means of a sponge. We next take hold of that membrane at its lower part with the aid of dissecting forceps, and divide it transversely, together with the cauda equina, as low as possible. Then, retaining our hold of the dura mater, we remove the spinal cord with that membrane by cutting the nerves first on one side and then on the other, and liberating the membrane from the posterior aspect of the bodies of the vertebræ. Lastly, the dura mater and spinal cord are divided as near the great occipital foramen as possible. If the brain has been previously removed, we only require to divide the dura mater.

The spinal cord is now placed on a dish on its posterior aspect; and after the outer aspect of the dura mater has been carefully examined, that membrane is divided by means of scissors along the anterior median line. In doing this, care should be taken that the point of the lower blade of the instrument does not enter and so damage the substance of the spinal cord, an accident which not unfrequently happens to beginners.

The dura mater is now opened out, and without removing it entirely from the spinal cord its inner surface is examined. We next notice the general outline of the spinal cord, and the condition of the pia mater covering it. A series of transverse incisions about half an inch apart is then to be made into the cord, and the condition of both the grey and white matter noted. In making these incisions, the cord should be allowed to hang across the first finger of the left hand, being retained there by holding the dura mater between the

thumb and first finger, so that the spinal cord is quite free from pressure, and not so liable to injury as it would be if we held the cord itself.

If the spinal cord is found softened at any part, doubt may exist in the mind of the pathologist as to whether he has to do with simple post-mortem softening, or with a softening which is the result of myelitis. In the majority of cases the naked eye characters of the two allow of this point being readily settled; but where any doubt is felt, a small portion of the softened part should be teased out and examined in the fresh condition with the microscope for the presence of granule cells, which are present in large numbers in acute myelitis, but not in the softening due to post-mortem change. The presence of a large number of granule cells is the best and most conclusive proof which we can obtain that any softening of the spinal cord is of ante-mortem origin.

After we have examined the spinal cord, we return to the vertebral column, and examine first the parts of the laminæ and spinous processes which we removed, and subsequently the bodies of the vertebræ, for caries, fractures, &c. The body of each vertebra requires very careful examination in all cases where a fracture of the spine is suspected, since often it is extremely difficult to detect linear fractures where there has been but little displacement of the parts adjoining the fracture.

APPENDIX.

Post-mortem Wounds.—In conducting a post-mortem examination there is undoubtedly considerable risk of absorption of virus, but such danger can be very greatly lessened by the adoption of a few precautionary measures. We should always, before commencing the examination, carefully examine our hands for any scratches or small abrasions which may exist. The small lacerations which so frequently are present round the bases of the nails are liable to be overlooked, and afford a ready entrance for the introduction of the poison. If any wounds exist on the fingers, india-rubber finger-stalls will be found serviceable. India-rubber gloves can also be obtained, but they are inconvenient, and an autopsy cannot be so satisfactorily conducted when the hands are so covered. If there are any wounds on parts of the hand other than the fingers, they should be covered with collodion, over which is placed some firmly adhesive plaister.

Small lacerations of the cuticle, however, are so liable to be overlooked, that it is well in all cases to anoint the hands with some greasy substance before commencing the operation. For this purpose olive oil or lard is always obtainable and will suffice, but a better preparation will be found in an ointment made of ordinary beeswax and vaseline, sufficient of the latter being well rubbed up with the former to make an ointment of suitable consistence. With this the bases of the nails

should be well filled, and all parts of the hands anointed. The only objection to this ointment is that it is so adherent that, without hot water and a nail brush, great difficulty is found in removing it. I am fully convinced, however, of its value. It also prevents the odour of the post-mortem from adhering to the hands for so long a period, as it is otherwise apt to do, and I certainly attribute my own immunity from any form of post-mortem wound to its regular use.

Note Taking.—Whenever practicable, notes should be taken at the time when the post-mortem examination is made. In all medico-legal cases where we wish to refer to our notes at a subsequent date in a court of law, it is absolutely necessary that such notes should have been taken at the time of the post-mortem examination, otherwise an objection can be raised to our employing notes when giving evidence. In fact, in all medico-legal cases, however simple, in which we may have to recollect the facts observed at the autopsy for any length of time, we should take some notes at the time of the examination. If two medical men are engaged in the examination, it is convenient for one to take notes at the dictation of the other, and then before leaving the body such notes should be read over by each, and each should affix his signature.

Even in medico-legal cases, especially when the facts observed at the autopsy are few and very simple, a medical man is very apt to think it quite unnecessary to take notes, and to place implicit reliance on his memory. However, it is a great mistake to do so, since every person is liable to forget some point which may subsequently be of importance; and further, even though we may not need to refer to such notes at the time of giving our evidence, it is very convenient to be able to

give an affirmative reply, in case we are asked whether we made notes at the time of the examination.

'Stitching-up' &c.—After completing the examination of the various organs, there still remains the very important duty of 'stitching-up' the body, and leaving it in such a condition that the feelings of friends may not be hurt.

We have already laid stress upon the necessity of avoiding all incisions on the face. No wound should be made upon any part of the face when it can be possibly avoided, and the cases are very rare when such incisions are a necessity.

All blood and other fluids should be carefully removed from the various cavities of the body before the organs are replaced and the stitching commenced. If any considerable amount of fluid be left in the body, it is very liable to stain the linen if the corpse has to be subsequently moved.

It is advisable to place the brain, with the other viscera, in the abdominal or thoracic cavity, and not return it into the cranium. After drying up all blood from the base of the skull, it is a good plan to plug the foramen magnum with cotton wool or a small piece of rag, so as to avoid the passage of blood into the cranial cavity from the spinal veins. The skull-cap should be carefully adjusted, since in many cases there is a tendency for it to fall backwards, and so leave a groove across the front of the forehead, which very much alters the features. If any great difficulty is experienced in this respect, it may be readily overcome by drilling the skull and putting in a few wire sutures to retain the calvarium in its natural position.

If there is any cotton wool or some old linen available, it is advantageous to put some inside the body

along the median line immediately beneath the incision in the front of the chest and the abdomen. Such an addition not only renders any soiling of the clothes less liable to occur, but tends to maintain the natural outline of the chest, which otherwise is apt to be altered by the falling in of the sternum.

For stitching-up the body, a well-known but peculiar form of continuous suture is adopted. The needle, armed with strong thread or thin twine, is introduced through the soft structures *from within outwards*, first through one lip of the incision and then through the other; and if care be taken that not more than about half an inch intervenes between the points of insertion of the needle on each side of the wound, it will be found that when the thread is tightened very little of the uniting material is seen, and a very close apposition has been effected.

Where parts of the limbs (joints, &c.) have been removed, and we wish to reserve them for subsequent examination, the space should be filled up with cotton wool, or some material which will answer the same purpose.

The body must then be carefully washed, all traces of blood being removed. Special care is necessary in well washing the hair, since otherwise there will be staining of the pillow; the hair also should be again arranged.

Lastly, any clothes, &c., which were on the body before the examination was commenced should be replaced, and the corpse placed in the position in which it was found; unless, however, it is possible to at once place it in the coffin, which, if practicable, should always be done.

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