

The flaps are next brought into apposition preparatory to sewing them together. To do this take a piece of stout twine one and a half times the length of the incision; after threading it, take a stitch at the extremity of the long incision and tie a hard knot in the end of the string. For sewing, the glover's stitch is to be used, *i. e.*, from inside out. The stitches should be about three-quarters of an inch apart and three-eighths of an inch from the edge of the flap, taking up only the skin and subcutaneous tissue, but not the fat tissue. When the seam is finished a double knot is made in the string and the end drawn under the skin.

Certain final details will be considered after the method of removal of the brain and cord has been explained.

Method of Removal and Examination of the Brain.—Note the ratio of the head to the body, and of the cranium to the face.

Make an incision in the scalp, beginning half an inch behind the right ear, near its lower border, and extending over the middle of the vertex to the corresponding point behind the left ear. In women the hair should first be roughly parted, along the line where the incision is to be made, with the handle of the scalpel. After the incision has been started by cutting with the edge of the knife downward, it is best to reverse the blade so that its back comes against the bone and to cut upward. The incision is to be carried to the bone except in the temporal region, where it should be carried only to the aponeurosis covering the temporal muscle.

The anterior flap is first to be freed from the temporal muscle on either side, leaving the muscle attached to the bone, as it is through this that the stitches will be taken later that are to hold the calvaria in place. The flap is now to be seized by the left hand and strong forward traction made, while a series of sweeping cuts through the pericranial connective tissue are made with the scalpel held in the right hand. This dissection should be continued until the frontal eminences come into view. The posterior flap of the scalp is now to be dissected from the bone as far back as the occipital protuberance. While the scalp is being removed the condition of the loose pericranial tissues should be noticed with reference to evidence of edema, hemorrhage, or purulent inflammation. The skull is now bare over the vertex, and note should be made of any abnormalities of its surface.

The next step is the removal of the calvaria. This is sometimes done by sawing through the skull in a circle; but this is bad practice, in that the calvaria cannot be later held firmly in place when it is sewn up—it will wobble. The best way is to saw along three lines to be marked in the periosteum, as a guide, with the scalpel. The first or anterior cut begins above and behind the ear, and is carried directly over the vertex to a corresponding point on the other side, the line passing just behind the edge of the hair above the forehead. The other two incisions in the bone are to begin, one at each end of the cut just described, and be carried backward to the median line behind, the two lines meeting at an angle of about one hundred and sixty degrees, well in front of the occipital protuberance. Each of these two lines just described should meet the anterior line at an obtuse angle in the temporal region.

If the hair be long it should be wrapped up in a towel, so as to form a ball, and the whole mass placed beneath the nape of the neck. This is to prevent the sawdust getting into it.

The calvaria is now to be sawn along the lines already marked, the head being steadied by placing the left hand upon the calvaria; a towel placed between the hand and the bone prevents slipping.

The incision in the bone should be carried through the outer table and diploë, and nearly through the inner table. One can readily determine when the saw has reached the diploë by the red color of the sawdust and the softer feel conveyed to the hand through the saw blade. What remains unsawn can be readily cracked with the chisel and hammer, placing the chisel in the incision and striking with the hammer a quick, sharp blow

known as a recoil blow; this obviates the danger of driving the chisel into the brain.

If there be a suspicion of fracture of the skull, the incision with the saw should be carried through the bone and no cracking whatever done with the chisel and hammer.

The calvaria being now loosened, the wedge-shaped end of the hammer head is to be introduced in the middle of the anterior cut and pressed downward with the left hand, while the handle is rotated in the horizontal plane with the right hand. In this way a powerful leverage is obtained, and the calvaria can be forced backward sufficiently to introduce the hook on the end of the hammer handle into the cut in the bone. By pulling backward on the hammer the calvaria may be separated from the dura and so removed.

Generally the adhesion between the calvaria and dura is not a firm one, but occasionally in adults the separation requires the aid of the end of the enterotome, introduced between the dura and the bone and the two pried apart. Occasionally in old people, and always in young children, the adhesion is so firm that the dura has to be removed with the bone. This is accomplished by incising the dura along the incision in the bone and then cutting the attachment of the falx to the crista galli in the superior longitudinal fissure, when the calvaria may be drawn backward and the falx cut posteriorly.

After the removal of the calvaria, its thickness, the relation of diploë to tables, and the appearance of the inner surface should be noticed.

The examination of the dura is now in order. First observe whether the alternation of fissures and convolutions, as darker and lighter areas lying beneath, can be determined through it. If so, the dura has the normal degree of translucency, and is of the normal thickness. If this alternation of dark and light cannot be made out the dura is thicker than normal. Next open the superior longitudinal sinus and note its contents, whether fluid or coagulated blood or a thrombus. With scissors and forceps cut through the dura along the line of incision in the bone; then reflect it toward the median line so as to expose its inner surface. The presence of hemorrhagic or pigmented false membranes or patches is the important pathological condition to be looked for here.

The knife is now to be introduced into the superior longitudinal fissure, the dura drawn backward, and the attachment of the falx to the crista galli severed. The dura can now be drawn backward as far as the posterior incision in the skull; it should not be cut off, but should be allowed to hang down. The veins of the pia, where they enter the superior longitudinal sinus, offer slight resistance to the removal of the dura. They may be divided with the knife or scissors or else torn.

The greater portion of the convexities of the brain is now in view. One should note, in connection with the pia, the degree of fulness of its blood-vessels; whether it is translucent or opaque; whether abnormally dry; whether its meshes contain clear serous fluid, and, if so, the amount; also whether there be fibrin or pus in its meshes. One should then note whether the brain fills the cavity of the skull; also the relation of the convolutions to the sulci as to proportionate size.

The brain is now to be removed from the skull. Insert the two forefingers between the dura and the frontal lobes on either side of the median fissure and hook them around these lobes; draw backward on the brain until the optic nerves can be seen; then making slight traction backward on the brain by two fingers of the left hand hooked around its tip, cut across the cranial nerves and carotid arteries close to their foramina until the tentorium is reached; cut the latter close to its attachment to the petrous portion of the temporal bone. Next divide the cranial nerves given off from the medulla oblongata. Then carry the knife as far down in the vertebral canal as possible, and cut the cord by an inverted V-shaped cut, starting in the median line, and cutting first to the right, then to the left. The vertebral arteries are divided by the same stroke.

The brain is now readily removed by hooking the fingers of the right hand under the cerebellum, supporting the brain from behind with the left hand, and then lifting it out by the same turn employed in delivering the aftercoming head in a breech presentation.

The further examination of the brain is to be postponed until the basal portion of the cranial cavity has been looked at. The lateral sinuses are to be opened and their contents noted. If there be a suspicion of a fracture the whole of the dura is to be stripped off, it being usually impossible to discover a fracture of the base while the dura is *in situ*.

The posterior part of the eye may be exposed and removed by chipping away with the chisel the thin orbital plate which forms the roof of the orbit and the greater part of the floor of the anterior fossa.

The middle ear can be exposed by chipping off its roof, which lies in the middle of the petrous portion of the temporal bone. If the inner ear is to be examined, the whole petrous bone must be sawn out by a V-shaped incision in the squamous portion of the temporal, the apex of the V extending below the external meatus.

The mastoid cells can be opened either from the inside of the skull or from the outside.

An excellent view of the nares can be obtained by removing those portions of the ethmoid and sphenoid lying in the middle line, from the cribriform plate of the ethmoid in front to the posterior clinoid processes behind.

By removing the basilar process of the sphenoid and the sphenoidal process of the basilar, the so-called clivus Blumbachii, an excellent view of the pharynx and larynx can be obtained.

The examination of the brain is now to be resumed. If it is desired to weigh it, this should be done before it is incised. The brain is placed upon the convexities, the base uppermost. The pia of the base is to be examined especially for evidence of inflammation or tuberculosis. The blood-vessels should then receive careful attention—first the circle of Willis, then the vertebrals and basilar, then the anterior cerebrals. The fissure of Sylvius is now to be opened by cutting the pia that forms a bridge across the fissure from the frontal to the temporal lobes, and the branches of the middle cerebrals followed out as far as the island of Reil. These are the most important of the cerebral vessels, owing to the liability of lodgment of emboli in them and because they supply the larger and most important part of the brain. Evidences of endarteritis should be looked for, and the vessels opened with the probe-pointed scissors. Emboli or thrombi, if present, can now be readily discovered.

This examination completed, the brain should be placed upon its base and the incisions made to open the lateral ventricles. This is a curved incision following the direction of the ventricle, the convexity being inward, the anterior end about the middle of the frontal lobe, the posterior end near the middle of the occipital lobe, the middle of the curve about a quarter of an inch from the longitudinal fissure. The hemisphere should be supported by placing the fingers of the left hand under the base and the thumb of the same hand in the longitudinal fissure, lifting the hemisphere upward. This serves to separate the roof from the floor of the ventricle.

The anterior portion of the cut should be deep, made with the knife held at an angle of forty-five degrees, point downward (to reach the anterior horn). The middle portion of the cut should be less deep, made with the knife held horizontally (so as not to injure the floor of the ventricle). The posterior cut should be deep, made with the knife held at an angle of forty-five degrees, handle downward (to reach the posterior horn).

One lateral ventricle having been opened, the brain is to be turned half around and the other lateral ventricle opened in the same way. The knife is now introduced in the foramen of Munro, and an incision is made vertically upward through the anterior pillars of the fornix and the corpus callosum. The posterior portions of the fornix and corpus callosum are now drawn backward as

far as possible. By so doing the velum interpositum and choroid plexuses are brought into view. These are also to be drawn backward, thus exposing the third ventricle. The right posterior pillar of the fornix and the adjoining brain substance are now cut transversely and carried over to the left. This procedure exposes the corpora quadrigemina. The fourth ventricle is now to be opened by an incision made through the middle line of the cerebellum, from above downward, at the same time dividing the corpora quadrigemina and valve of Vieussens by extending the median cut to the aqueduct of Sylvius.

The whole ventricular tract is now exposed to view. Note should be taken of the size of the ventricles, the character and amount of their contents, and the condition of the ependyma.

The hemispheres are next examined. In doing this it is essential to expose as large an area of white and gray matter as possible, but without disturbing the relations of the parts. The first incision is a curved one just to the outside of the basal ganglia and following the line of their outer borders. It should extend near to the pia below. A series of cuts are now to be made, each succeeding cut being made in the middle of the preceding cut and extending to, or nearly to, the pia. In this way the hemisphere is rolled out, unfolded as it were, and a large surface or series of surfaces is exposed to view. The pia is to be left uninjured, serving as a binding to retain the parts in their normal relation; so that, if a lesion be discovered in the white or gray matter, the parts may be replaced and the situation localized as to convolution.

The basal ganglia (corpora striata and thalami optici) are now to be examined by means of a series of transverse incisions, the cuts being about one-twelfth of an inch apart. These are most readily made by supporting the ganglia by one hand placed underneath, while with the knife in the other hand the cuts are made and the slices turned to one side so as to expose the cut surface. The necessity of the numerous incisions in the basal ganglia is owing to the fact that lesions sufficient to lead to a fatal result are often small, and might go unobserved were the incisions made far apart.

The cerebellum is now to be examined by a primary incision beginning in the middle of the cut made in it in opening the fourth ventricle and extending through the greatest breadth of the organ. This divides it into two equal portions, exposing a large surface of gray and white matter and the arbor vite. A series of radiating, fan-shaped incisions should then be made in each of these lateral portions, the cuts extending to the pia.

The pons is now to be lifted by the left hand placed beneath it and a series of transverse incisions is to be made, beginning anteriorly in the corpora quadrigemina and crura cerebri and extending through pons and medulla to the spinal cord. As in the basal ganglia, so here, the slices should be as thin as possible, that even a minute lesion may not escape observation.

The remaining step in the examination of the brain is to strip the pia from the convolutions of the organ, especially on the convexities, and note whether it is readily removed or whether it comes away with difficulty and removes portions of brain substance with it, leaving a worm-eaten appearance of the cortex beneath. Such an adhesion indicates a meningo-encephalitis, common in dementia paralytica.

The examination of the brain being now completed, the cavity of the cranium should be sponged dry and filled with a sand bag, made by taking a piece of cotton cloth eighteen inches square and putting on it as much house sand as corresponds, in the judgment of the operator, to the capacity of the cranium; then gathering the corners into a mass and tying them together with a string. A sand bag serves the double purpose of giving weight to the head and supporting the calvaria. The calvaria is to be replaced and held there by stitches taken through the temporal muscle on either side, care being taken to draw the twine tight to prevent slipping

of the calvaria. The two flaps of the scalp are now drawn together and sewn, after the method described in connection with the body. The seam requires a piece of twine twice the length of the incision.

Examination of the Spinal Cord.—To remove the cord the body should be placed face downward, with a block under the thorax. An incision is made along the ridge formed by the spinous processes of the vertebrae from the occiput to the sacrum. The skin together with the muscles filling the vertebral grooves should be dissected from the arches, leaving the laminae bare. The laminae are now sawn nearly through in a line with the roots of the transverse process. By means of the straight chisel, or, better, with the rachitome (Fig. 452) and the hammer the arches are freed and then pried off. The arches of the upper cervical vertebrae are best divided with the costotome (Fig. 447).

The membranes and cord are now divided transversely at the lower end; the dura is seized with the forceps and the cord lifted upward, and the spinal nerves are divided with the scalpel close to the foramina. When the atlas is reached the cord is held only by the dura, where it is reflected on the margin of the foramen magnum to become the periosteum of the inner surface of the skull. This is divided by a circular incision a little below the foramen magnum. The cord is now free.

The dura of the cord is now incised anteriorly and posteriorly throughout its entire length, and its inner surface, as well as the pia of the cord, examined.

The cord is examined by a series of transverse incisions half an inch apart, the pia on the anterior surface being left intact to serve as a binding to hold the parts together. The incision in the back is to be sewn up in the same way as the one in front.

Cultures of bacteria from the blood are best made from the right ventricle of the heart. The surface of the right ventricle is sterilized by a case knife heated in a Bunsen lamp, laying it flat on the surface of the heart. An incision is made through the wall with another knife sterilized in the same way, and the platinum wire introduced through the cut and the culture made.

Cultures from any of the solid organs may be made in the same way.

The examination of the whole body being now completed, the soiled newspapers are to be removed and burned in the furnace or kitchen fire. The operator should himself attend to the emptying of the slop pail, which will contain bloody fluid and more or less intestinal contents; and should also see that all utensils are thoroughly cleaned, that all spots of blood are removed from the body, and that the body is restored to the position it was in before the autopsy was begun.

A word as to the report of the autopsy. A proper report should consist of two parts. The first, to consist of a description of what is seen, should be purely objective, and should contain no expression of opinion. The second part is to contain the anatomical diagnosis; in other words, the inferences drawn from the appearances presented by the organs.

If the report consists (as unfortunately it so often does) simply of the inferences of the operator, without a description of the appearances upon which those inferences are based, it is of little value to any one else, and of no value as evidence.

Let the physician, then, in his report, describe to the best of his ability what he sees, and if he is in doubt as to what the meaning of the appearances is, any specialist taking his report can give him much more assistance than if the inferences only are stated.

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AUTOPSIES, MEDICO-LEGAL RELATIONS OF.—**GENERAL CONSIDERATIONS.**—When death is due to other than natural causes, the data upon which such a conclusion is based may become the subject of legal inquiry. This article concerns itself with such data as may be furnished by the performance of an autopsy. The lesions found, the method of their observation, and the

deductions to be drawn therefrom are the subjects for discussion.*

"Natural cause of death," is rather difficult to define tersely. The importance of its full comprehension is apparent, not only to avoid error in reaching such a conclusion, but also from the fact that an effort to show the evidence, including data from the autopsy compatible with natural causes, is frequently made by the defence. "Senile changes or disease unassociated with poisoning or traumatism," although it might answer in the majority of cases, is nevertheless faulty, as the following considerations show. The acute infectious diseases accepted as natural causes are all associated with poisoning from the toxins produced by the bacteria. Even the acute infectious diseases may come under the category of unnatural causes if the bacteria are accidentally or deliberately inoculated.

Accidental inoculation of bacillus mallei (gländers) has caused a number of deaths in bacteriological laboratories, and the deplorable cases of death from accidental inoculation of the bacillus of bubonic plague in a laboratory in Vienna furnish additional examples of acute infectious diseases in which the cause of death can by no means be considered natural. The deliberate ingestion or injection of a pure culture of pathogenic bacteria with suicidal or homicidal intent might occur. The ingestion of a pure culture of typhoid bacilli with suicidal intent, followed by typhoid fever and recovery, has come to notice. Again, the pathological changes following the long-continued ingestion of alcohol in excessive amount are looked upon as natural causes, although they are certainly the products of poisoning. Erysipelas and tetanus are invariably produced through some solution of continuity in the skin or mucous membrane, in some cases so slight that no notice may have been taken of it, nor can it in some cases be demonstrated at autopsy.

If we adopt the above, with these restrictions, as a working definition, it becomes necessary in examining lesions to differentiate between those produced by disease and those produced by poisoning or traumatism. Nor is this an easy matter, as might at first appear. A lesion apparently traumatic may be due to disease. Lesions apparently due to disease alone may prove to be dependent upon trauma primarily, as when infection follows a wound. Again, a diseased condition (as cerebral arteriosclerosis, or pachymeningitis hæmorrhagica) may be an important contributing cause (vertigo) of an accident in which traumatism is sustained, causing death; or the diseased condition may directly predispose to a result (fatal hemorrhage) out of proportion to the comparatively slight traumatism. Finally, traumatism and disease not dependent in causation upon one another may both contribute more or less equally in causing death. The lesions of disease may so closely resemble the effects of poison (in the toxicological sense) that their differentiation by gross examination is almost impossible, chemical and bacteriological examinations being necessary to clear up the case. The occurrence of this similarity is not strange, when we remember that many of the lesions of infectious diseases are due to poison, namely, the bacterial toxins.

TECHNIQUE.—The method of observation includes the technique employed in the performance of the autopsy. Not only the data and the deductions drawn therefrom, but the way in which these data were acquired may be subjected to searching investigation in court. By faulty methods incorrect data may be obtained. Direct mistakes in observation are not here referred to, but unintentional and unobserved artifacts, and their diagnosis as lesions. It is absolutely necessary to be fully cognizant of all methods and manipulations by which such artifacts may be produced, not only to avoid them, but also to be able to testify to that effect. In considering the technique of medico-legal autopsies only these points will be dwelt upon.

* For signs of death, rigor mortis, putrefaction, etc., subjects embraced in an external examination of the cadaver, see *Cadaver, Legal Status of.*

Head.—In removing the vertex the bone should be sawed through completely. The wedge, or chisel and mallet, had better not be used. Although the physician may be certain that a fracture was produced during life and not post mortem by use of chisel and mallet, yet if their use is admitted a reasonable doubt may be cast upon his testimony. The brain should be removed with special care, raising the frontal lobes sufficiently to cut nerves and vessels close to the foramina of exit and, raising the temporal lobes, to sever thoroughly the anterior and lateral attachments of the tentorium, first on one then on the other side, and divide the remaining nerves and vessels below, in doing which the brain should not be raised from the base of the skull more than necessary. After division of the tentorium the brain should be supported, as the final division of nerves, vessels, and spinal cord proceeds, lest by its own weight dragging upon these structures, it causes artificial lacerations. The brain should be perfectly free before its removal is attempted, and should be allowed to slide backward, the convex surface resting in the palm of the hand.

Spinal Cord.—To avoid artifacts a complete division of the laminae on either side, 1 cm. from the spinous process, should be made with a straight saw curved on the end, the serrations extending a short distance upon the curve. Chisel and mallet had better be avoided. Test the complete division by pressing each spinous process from side to side. If free, the laminae and spinous processes can readily be removed together from below upward, by grasping the lowest and using the knife alone. After the attachment of the dura spinalis to the foramen ovale within the skull has been severed, the spinal cord should be removed together with its dural sheath, the spinal nerves being cut close to the intervertebral foramina on either side from below upward. The dura should be opened in the median line anteriorly and posteriorly after the removal.

Mouth and Neck.—The examination of the fauces and aditus laryngis is of importance, more especially in infants, great care being required to prevent occurrence of artifacts. The tongue, anterior and posterior pillars of fauces, tonsils, soft palate, pharynx, œsophagus, larynx, and trachea may be removed together. The incision is extended to the chin, or, after the thorax has been opened, they may be removed, without extending the incision over two inches above the episternal notch, by separating the skin from the clavicle and working up from the thorax, separating the unincised skin from larynx, hyoid bone, and muscles of the floor of mouth. Retraction of the skin by hooks or a finger of an assistant on either side in an upward direction gives ample room if the sternum and costal cartilages have been removed; and the space may be still further increased by partial incision of the sternocleido-mastoid muscle near or at its insertion to the clavicle. With a sharp-pointed knife the floor of the mouth is punctured in the median line close to the inferior maxilla, and the muscles and mucosa cut through along the body of the bone to the angle on both sides. The tongue is drawn down through the incision, and with the knife passed over the dorsum of the tongue, an incision is made through the soft palate close to the bone from the median line outward, then, anteriorly to the anterior pillar of the fauces, downward into incision through the floor of the mouth on both sides. The loose areolar tissue on either side of the trachea and larynx, œsophagus and pharynx, and posterior to the latter, is separated well up to the occipital bone, where the attachment of the pharynx is cut across. The styloid muscles are cut and the organs drawn gently downward, care being taken to observe whether there are any points at which attachments still require to be divided. It is possible for the stomach contents to reach the larynx or the aditus laryngis post mortem, either in moving the cadaver about or during the performance of the autopsy. During the removal of the stomach its contents may be forced into the œsophagus and pharynx and larynx. To guard against this a ligature should be applied to the car-

diac end of the œsophagus before dissecting out the stomach.

Thorax.—In cases of hemorrhage, great care should be exercised so that its origin may be accurately determined, and its cause, whether traumatic or due to disease or possibly to both conditions, determined. The examination of the organs *in situ* should be made. To determine the presence of pulmonary thrombosis the pulmonary artery should be opened with organs *in situ*. If the examination is unsatisfactory, the organs of the thorax may be taken out together with those of the neck and mouth if necessary. Pleural adhesions having been separated, or if too dense (rather than risk an artificial laceration of the lung), the costal pleura having been stripped off, the attachments of the diaphragm cut away from the ribs, and its pillars severed, an incision is made through the parietal pleura along the vertebral column external and posterior to the aorta on the left side, the lung being brought forward for that purpose, and the left subclavian vessels, common carotid, and jugular are cut. On the right side the incision is made external and posterior to the vena cava superior, right auricle, vena cava inferior, and the innominate artery and vein are cut across. The œsophagus near the cardia is ligated and cut above the ligature. The aorta, inferior vena cava, and suspensory ligaments of the liver are then severed. By this technique injuries may be clearly demonstrated which by the usual technique might escape observation, or, if observed, their origin or relations might be doubtful.

Abdomen.—The abdomen should invariably be opened before the thorax, the skin and muscles of the latter being dissected off to give more room for inspection. The height of the vault of the diaphragm in the mammillary line on either side should be determined. The organs should be examined as far as possible *in situ* and the contents of the peritoneal cavity, if any, its character, amount, and distribution noted. In cases of injury special care is to be taken in the removal of organs, the incisions necessary being deliberately and cleanly made and laceration of tissue avoided. In cases of bullet and stab wounds their site should be accurately determined and their measurements carefully made so that the direction of the course of the bullet or knife may be determined. The abdominal organs may be removed together with the thoracic organs and diaphragm, in order to determine more accurately the relations of certain traumas. The œsophagus, aorta, vena cava, and ligaments of the liver are not divided. An incision is made through the parietal peritoneum on the right side external to the right kidney and ascending colon, on the left side external to the left kidney, descending colon, and sigmoid flexure. The loose connective tissue between the organs and the posterior abdominal wall is readily separated by blunt dissection, the lumbar branches of the aorta and the common iliac vessels requiring the knife.

Pelvis.—The pelvic organs may also be removed together, the connection of ureters with bladder and the sigmoid with rectum remaining intact. The female genital organs, after examination *in situ*, should be removed together. A circular incision is made through the peritoneum around the margin of the true pelvis, the loose areolar tissue stripped up with the fingers down to the levator ani et vaginae, and anteriorly well down behind the symphysis pubis. With a few sections of the knife the ostium vaginae together with the urethra, the bladder, vagina, uterus and appendages, and rectum are removed. After examination of the rectum, bladder, urethra, and the appendages, especially the ovaries for a corpus luteum of pregnancy, the vagina is laid open with knife or scissors. The cavity of the uterus should not be opened by thrusting the blade of the scissors or knife into it. A clean incision should be made in the median line posteriorly until the cavity is reached so as to avoid all chances for the occurrence of artificial laceration or puncture.

Cases of suspected poisoning require special consideration. The presence of the chemist at the autopsy and his direct reception of the organs for examination from