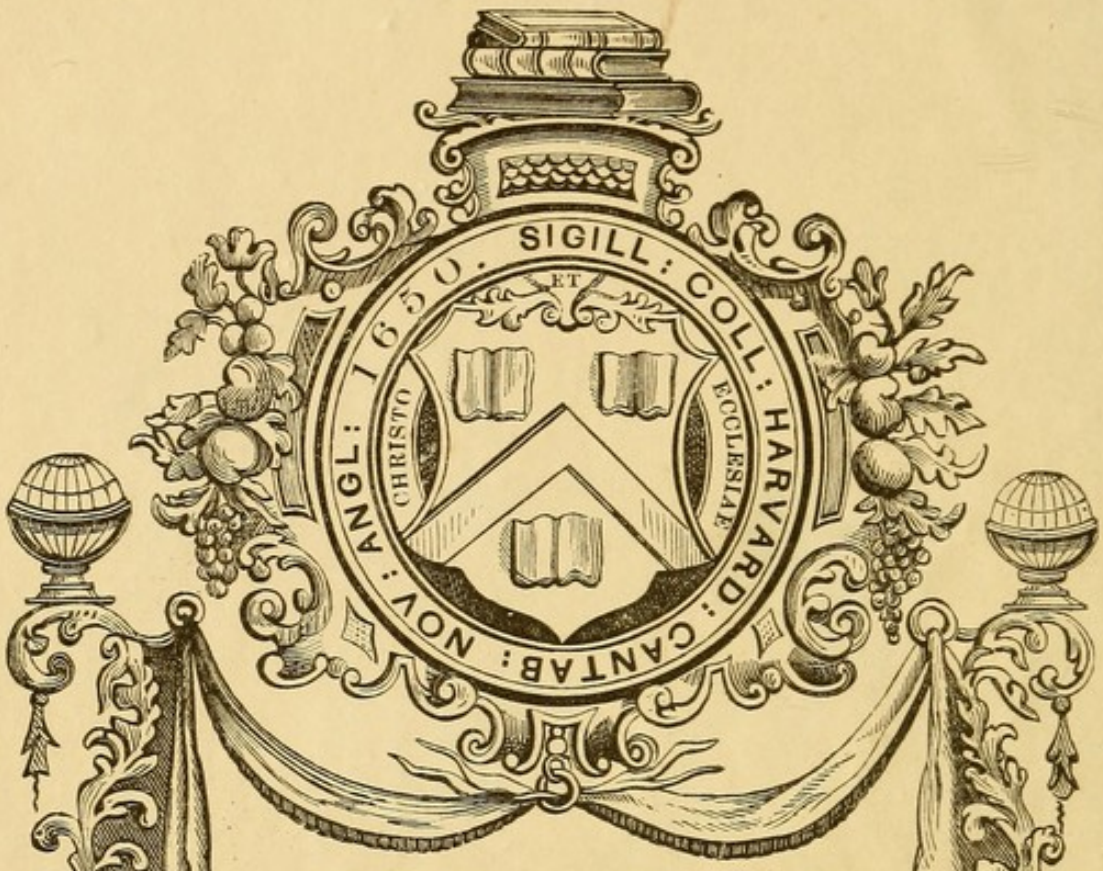
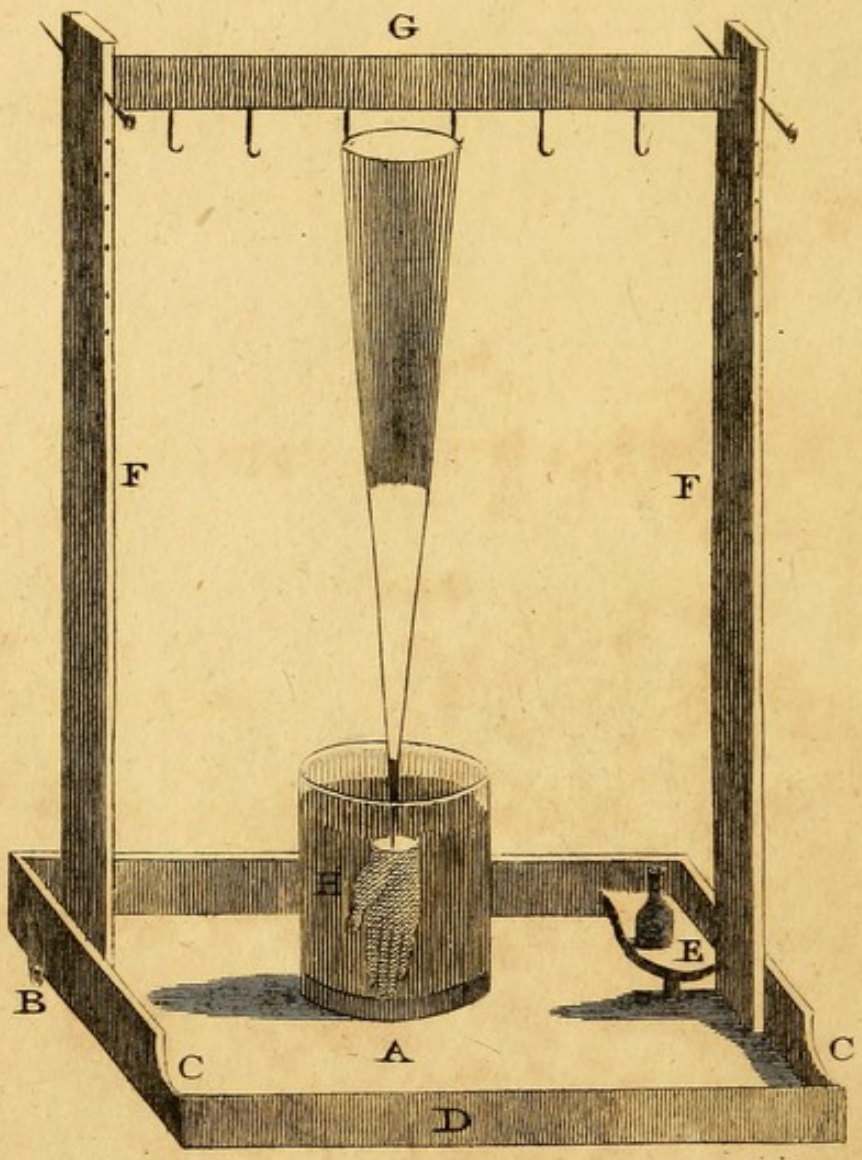
Companion to the London dissector, or, The art and method of making preparations, exhibiting the structure of the human body : Intended to assist the anatomical student in this useful study.





THE INJECTING TRAY AND ITS APPENDAGES,

For the purpose of facilitating the process of Quicksilver Injections, and preventing the loss of Quicksilver, which is constantly occasioned by the old method.

COMPANION

TO THE

LONDON DISSECTOR;

OR, THE

ART AND METHOD

OF

MAKING PREPARATIONS,

EXHIBITING THE

Structure of the Human Body.

INTENDED TO

ASSIST THE ANATOMICAL STUDENT IN THIS USEFUL STUDY.

LONDON:

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1813.

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THE

ART OF MAKING

Anatomical Preparations.

PREPARATIONS OF THE VISCERA.

THE various parts of the body may be preserved in a healthy state, either to exhibit their form or structure, or to compare them with morbid parts.

GENERAL OBSERVATIONS.

1. When removed from the body, and the useless parts dissected away, the part to be preserved is to be soaked in water, in order to get out the blood.

2. When it is necessary to give parts their natural form, which is lost by macerating, put them into a saturated solution of alum, retaining them by any means in the required form, until they become hardened. If it be a hollow part, as the stomach, bladder, &c. fill it with, and immerse it in, the solution.

3. When an opening is to be exhibited, as that of the ureter, the bile-duct, the lacunæ of the urethra, Stenonian duct, Fallopian tube, &c. introduce a bristle. After this manner preserve the uterus and its appendages, cutting open the vagina and cavity of the uterus, the bladder, intestine, stomach, heart in the pericardium, liver, spleen, kidney, &c. &c.

4. All preparations of the brain are best hardened in a saturated solution of corrosive sublimate.

5. The parts are to be suspended in proof spirit by raw silk, in a tie-over bottle, and covered with bladder, taking care to exclude all air. When dry, varnish the bladder with mucilage of gum arabic several times; then put a sheet of thin lead over, and varnish its edges with mucilage; and lastly, tie another bladder over, and give it a coat of common spirit varnish, in which lamp-black, or other colouring matter, is mixed.

PREPARATIONS OF MORBID PARTS.

All morbid parts should, immediately after their removal from the body, be put into rectified spirit of wine for a day or two, and then preserved in proof spirit. These preparations foul a great quantity of spirit, and should therefore be kept in stopper-glasses, from which the spirit can easily be removed, and fresh put in, until the preparation ceases to foul the spirit, when it may be put into a tie-over bottle.

PREPARATIONS MADE BY MACERATING.

Preparations obtained by this process are very various.

GENERAL OBSERVATIONS.

1. Let the water be frequently changed, until it is no longer coloured with blood, but never after the blood is steeped away.

2. Let the macerating pan be placed in a warm place, to facilitate putrefaction.

3. The macerating pan should never be in a cold place, for the spermaceti-like conversion of the soft parts will be formed, and the bones spoiled.

4. The soft parts surrounding bones are a long time before they detach themselves from the bones.

5. Bones, when macerated, should be exposed to the sun's rays, and frequently wetted with clean water, or they may be bleached with the diluted oxygenated muriatic acid.

BONES.

Bones are macerated to be preserved whole, or they are sawed to expose their internal structure.

Bones of the head. Put the whole head, without disturbing the flesh or brains, into the pan. When sufficiently macerated, all the soft parts will come away with the periosteum; then detach the vertebræ, and wash out the brain. Bones are separated from each other by filling the cranium with

peas, and putting it into water. The same method is to be adopted with other bones.

Bones in general, for structure. Divide the femur into two halves: the os innominatum, the petious portion of the temporal bone, the parietal bones, &c. these, when macerated, will exhibit the compact, the spongy, laminated, and recticular substance of bones.

A FOETUS.

Cut carefully away the fatty substance enveloping a fœtus, but do not cut any of the cartilages. Steep out its blood, and macerate. It should be frequently looked at, and taken out when the flesh is all destroyed, before the cartilages are separated. The following preparations are obtained in this way:

1. The superior extremity, to show its bones, the progress of ossification, and the cartilage to be formed into bone.

2. The lower extremity, to expose the same circumstance.

3. The spine, which forms a beautiful preparation.

4. The pelvis, not less elegant.

Preservation. The above all to be preserved in proof spirits.

CUTICLE.

The cuticle of the hand and foot may be separated by maceration; the former is called *choro-*

theca, the latter *podatheca*. The arm and foot of a large fœtus are to be preferred; they are first to be well washed with a soft sponge in soap and water.

Preservation. Suspend them in proof spirit; first tie the part by which they are to be suspended, then put them into the bottle with the spirit, and gently pour some spirit into the cuticle, to distend it like a glove or stocking.

INJECTING INSTRUMENTS.

The celebrated Dutch anatomist, *Ruysch*, first invented the art of injecting animal bodies.

There are three kinds of apparatus used in making injected preparations. The one for the coarse and fine injections, and the minute injection; the other for injecting with quicksilver; and the third, called the oyster syringe, for injecting minute preparations with the minute injection only.

The first consists of a brass syringe made for the purpose, of various sizes, from one carrying six ounces to one sufficiently large to hold two pounds. The point of these syringes is adapted to the pipes into which it is to be affixed. To this syringe belong a stop-cock, and a great variety of pipes.

The instrument for injecting quicksilver consists of a long glass tube, at whose end is fixed, by screwing in, a steel pipe, the end of which is extremely fine.

The oyster syringe is similar to the large syringe,

except in size. It is so small, that when the syringe is in the hand, and full, its piston may be commanded by the thumb of that hand to throw its contents into any preparation in the other hand.

The pipe affixed by being screwed to the end of this syringe is nearly as small as that belonging to the quicksilver tube.

These instruments are always to be had at the surgical instrument makers.

INJECTIONS.

The injections employed for anatomical purposes are of four different kinds: coarse, fine, minute, and mercurial.

COARSE INJECTIONS.

Red. Yellow bees' wax, sixteen ounces—the palest resin, eight ounces—turpentine varnish, six ounces, by measure—finely levigated vermilion, three ounces.

Yellow. Yellow bees' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—king's yellow, two ounces and a half.

White. Fine virgins' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—best flake white, five ounces and a half.

Pale blue. Fine virgins' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces—best flake white, three ounces and a half—fine blue smalt, three ounces and a half.

Dark Blue. Fine virgins' wax, sixteen ounces —pale resin, eight ounces—turpentine varnish, six ounces—blue verditer, ten ounces and a half.

Black. Yellow bees' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces —pure lamp-black, one ounce.

Green. Yellow bees' wax, sixteen ounces—pale resin, eight ounces—turpentine varnish, six ounces —levigated crystallized verdigrise, four ounces and a half—best flake white, one ounce—levigated gamboge, one ounce.

Liquefy the wax, resin, and turpentine varnish over a slow fire, in an earthen pipkin; then add the colouring matter, having previously mixed it in another pipkin, with a very small quantity of the melted composition. Stir the whole well together with a wooden pestle, so that the colouring ingredients may be intimately and smoothly blended; place the whole again over the fire, and, when they have acquired their due heat, the injection will be fit for use.

FINE INJECTIONS.

Brown spirit varnish, white spirit varnish, of each four ounces—turpentine varnish, one ounce.

These are to be put together in an earthen pipkin, over a slow fire, until they have acquired the necessary degree of heat. To make it of a red colour, put one ounce of finely levigated vermilion into another pipkin, and gradually add the heated

materials, stirring the whole with a wooden pestle, that the colour may be equally diffused.

One ounce and a quarter of king's yellow—two ounces of best flake white—one ounce and a half of fine blue smalt, with one ounce and a quarter of best flake white—four ounces of blue verditer—half an ounce of pure lamp-black—are the proportions for the various colours to the quantity of ingredients ordered above.

MINUTE INJECTIONS.

The size, which forms the vehicle to the colouring matter in these injections, is made in the following manner:

Take, of the finest and most transparent glue, one pound, break it into small pieces, put it into an earthen pot, and pour on it three pints of cold water, let it stand twenty-four hours, stirring it now and then with a stick; then set it over a slow fire for half an hour, or until all the pieces are perfectly dissolved; skim off the froth from the surface, and strain it through a flannel for use.

Isinglass and the cuttings of parchment make an elegant size for very particular injections; and those who are not very nice may use the best double size of the shops.

Red. Size one pint—Chinese vermilion, two ounces.

Yellow. Size, one pint—king's yellow, two ounces and a half.

White. Size, one pint—best flake white, three ounces and a half.

Blue. Size, one pint—fine blue smalt, six ounces.

Green. Size, one pint—levigated crystallized verdigrise, two ounces—best flake white, levigated gamboge, of each eight scruples.

Black. Size, one pint—lamp-black, one ounce.

GENERAL OBSERVATIONS.

1. All injections are to be heated to such a degree as not to destroy the texture of the vessels they are intended to fill; the best criterion of this degree of heat is dipping the finger into the injection. If the finger can bear the heat, the texture of the vessels will not be hurt.

2. All the coloured materials should be as finely levigated as possible, before they are mixed with the injection.

3. Great care should be taken lest the oily ones boil over, or bubble; and that the heat be gentle, otherwise the colour will be altered.

4. They should be constantly stirred, lest the colouring material, which is much heavier than the vehicle, fall to the bottom.

5. The instrument to stir them with should be a wooden pestle, and there should be one for each colour.

6. A large tin pan to contain water, with two or three lesser ones fixed in it for the injections, will be found very useful, and prevent all acci-

dents, and the colour from spoiling, when on the fire.

PREPARATION MADE WITH COARSE INJECTION.

The blood-vessels are mostly filled with coarse injection, and the parts dissected, to show their course; and when the anatomist wishes to exhibit the minuter branches, the fine injection is to be thrown in first, and followed by the coarse.

GENERAL OBSERVATIONS.

There are several circumstances to be observed in injecting with the fine and coarse injections, which are applicable to every part into which they are thrown; these are—

1. The part to be injected should be freed from its blood as much as possible, by steeping it for several hours in warm water, and repeatedly changing it.

2. Having emptied the part of its blood, the pipes are to be fixed in their proper vessels, and all other vessels to be tied with a ligature.

3. The heat of the water is then to be gradually increased to the same temperature with the injection to be thrown in.

4. The injecting syringe should be steeped in the water with the part to be injected, until wanted.

5. The injection being finished, and the subject

cold, remove the pipes, and tie up the parts they were in. Whenever a vessel is open, by accident or otherwise, be sure to secure it by a ligature, or cover it with a piece of thin and moist bladder, or the injection will always be oozing out.

6. The parts dissected and dried are to be varnished twice with copal or hard varnish, first washing them free from grease with some soap lees, and well drying them again.

BLOOD-VESSEL SUBJECT.

Select an emaciated subject, between the age of two and fourteen years.

Preparation. Make an incision through the integuments the whole length of the sternum; then, with a saw, divide the sternum longitudinally into two equal parts; introduce a dissecting knife under the divided bone on each side, separate it from the mediastinum, and lay open the thorax, by bending back the two portions of the sternum and the cartilages of the ribs: an incision is then to be made into the pericardium, and the left ventricle of the heart, and a large pipe introduced into the aorta, and secured by a ligature. The subject is next to be put into warm water, and gradually heated. The time generally required to heat the whole subject is four hours, in a large body of water.

If the veins are to be injected, three more pipes are required: one to be put into the angular vein,

at the corner of the orbit; another into a vein as near the fingers as possible; and the third into a vein as near the toes as possible.

Injection. The subject and injection being properly heated, throw the coarse red injection into the heart pipe, which will fill the arterial system; and then the coarse yellow injection into the head pipe first, and next into the pipes of the extremities. The subject, when injected, should be put into cold water, with its face downwards.

Dissection. Open the abdomen by an incision from the sternum to the umbilicus, and from thence to each ilium. Cut away the abdominal viscera, the stomach, spleen, and intestines, leaving the mesenteric vessels as long as possible: dissect away the liver, leaving the vena portæ and hepatic artery as long as possible. This done, dissect away the fat and cellular membrane from the vessels; secure the mesenteric vessels in an arborescent form on a piece of pasteboard. The kidneys, urinary bladder, uterus, and its appendages, are to be preserved and dried in their situations. From the thorax are to be removed, the lungs and heart, or the latter may remain. The integuments being carefully dissected from the sternum, it is to be bent back, and kept in that situation, to expose the internal mammary arteries. The dissecting away the skin is next, in order to exhibit the muscles, and expose the arteries and veins. The skin should only be removed from time to time to carry on the dissection, and never more than that

covering the part to be dissected; otherwise the parts from which the skin is removed will become dry, and the dissection be spoiled. In dissecting the arteries and veins, the dissector will find no difficulty, if he proceeds cautiously from the larger trunks towards their extremities. The brain is to be removed by sawing away a large portion of the bone on each side of the longitudinal sinus of the dura mater. The cheeks should be pushed out by introducing horse hair into the mouth.

Drying. When dissected, or before, the subject should be hung up by the head in a frame: one arm is to be placed at a little distance from the side, and the other turned up over the head, with the palm of the hand in front; the legs at a little distance from each other, and kept in these postures by pack-thread. Should any muscles obstruct the sight of the arteries, they are to be separated to a proper distance by pieces of wood. This done, expose it to a current of air, in a place where it cannot get wet; and if the weather be moist, remove, from time to time, all moisture, by a soft sponge.

Preservation. Varnish it several times, and keep it in a dry place, and in a proper case, with a glass front and back.

A HEAD, FOR ARTERIES AND VEINS.

Choose an emaciated head of an adult, separated from the body, by a transverse section, about the sixth or seventh vertebra.

Preparation. Put a pipe into each carotid, or, what is better, one pipe with a bifurcation; remove a portion of bone over the longitudinal sinus of the dura mater, about the middle of the parietal bones, and secure a pipe in the longitudinal sinus, pointed towards the occiput. Put the head into warm water, to soak, pressing the blood occasionally out of the external and internal jugulars. Then tie up the jugular veins and vertebral arteries, and all the small vessels.

Injection. Into the carotids throw the red injection, and the yellow, or dark blue, into the pipe in the sinus of the dura mater. The former will fill the arteries, the latter the veins.

Dissection. Follow the course of the larger trunks, dissect out the globes of the eyes, and remove, with a fine saw, the portion of the jaw-bone behind the last molaris, to show the course of the internal carotids. To prepare the whole head, a portion of the cranium must be removed, by sawing on one side of the longitudinal sinus of the dura mater from the frontal sinus to the horizontal spine of the occipital bone, and then sawing horizontally above the ear, from one extremity of the former incision to the other. The dura mater should be removed with a pair of scissars, the brain carefully washed out, and the tentorium and falx preserved. It is better to make a perpendicular section of the head, a little to one side of the sagittal suture, through the nose, foramen magnum, and vertebræ; and thus prepare each side. The course of the

cervical artery is to be shown by dissecting away the muscles, &c. from between the transverse processes.

Preservation. Varnish it several times, and keep it in a glass case, suspended; or fix it by the neck, and cover it with a glass bell.

AN ARM, FOR ARTERIES AND VEINS.

Remove the superior extremity from the trunk, by separating the clavicle from the sternum, raising it, and passing the knife under it to the articulation, including the greater part of the pectoral muscle. Then cut under the scapula, so as to remove with the arm the clavicle, scapula, and subscapularis muscle.

Preparation. After soaking it in warm water, force out the blood from the veins, by pressing the extremity from the fingers toward the shoulder. Fix a pipe in the axillary artery, and another in the largest vein on the back of the hand; some warm water may be injected into the vein, so as to wash out the blood; and, when pressed out, the axillary vein should be tied. Tie any muscular branches that may be gaping.

Injection. Red injection may be thrown into the artery, and yellow, or dark blue, into the vein.

Dissection. This is very simple; it requires only the removal of the cellular and fatty membrane, and exposing the course of the vessels. Tie up the limb by the clavicle.

Preservation. When varnished, keep it in a cool and dry place.

A LOWER EXTREMITY, FOR ARTERIES AND VEINS.

Having removed the contents of the abdomen, make a section through the symphysis of the pubis, and the ligaments connecting the ilium and sacrum, so as to remove one side of the pelvis.

Preparation. Fix a pipe in a vein as near the toes as possible, and another in the iliac artery. When the limb has been well soaked in warm water, press out the blood from the veins, or throw in some warm water at the venal pipe; but carefully press it out again, and tie up the iliac vein. Secure all divided vessels.

Injection. Blue injection, or yellow, may be put into the vein, and red into the artery.

Dissection. Expose the course of the artery and veins, particularly the profunda of the thigh.

THE GRAVID UTERUS, FOR ARTERIES AND VEINS.

The gravid uterus, or the uterus soon after it has expelled the fœtus, may be injected, to show its large and tortuous vessels.

It may be injected whilst in the body: but this is always attended with much difficulty, and never succeeds so well as when removed from the body. Therefore separate the spermatic and hypogastric

vessels as far from the uterus as possible, and cut out the uterus with the bladder, vagina, and external parts of generation.

Preparation. Put a pipe in each spermatic artery, and each hypogastric, and also one into each spermatic and hypogastric vein; so that, at least, there will be four pipes for arteries, and four for veins, necessary. Be very careful that all the divided vessels be secured by ligature, which only can ensure success.

Injection. Red and yellow are mostly preferred; the former for the arteries, the latter for the veins. Be careful that the red be thrown into all the arterial pipes, and the yellow into the venal; and, to prevent mistakes, it will be better to have the pipes of the veins different from those of the arteries.

Dissection. Distend the vagina and uterus with horse hair, either by introducing it through the vagina, or, if the fœtus be in it, by a perpendicular section through the anterior parietes, which is to be sewed up again. Then dissect away all loose cellular structure and fat, preserving the round and broad ligaments, and Fallopian tubes. Should the fœtus be in the uterus, an incision should be made, as above directed, except the placenta be adhering there, which is known by the great number of vessels, and then on the opposite side, and through the membranes, to remove the child; cut the umbilical cord close to the fœtus, and fix a

pipe in one umbilical artery, and another in the umbilical vein; the latter, carrying arterial blood, should be filled with red injection, and the artery with yellow; the cord is to be laid round the placenta.

Preservation. When well varnished, suspend it in a case, with a glass front and back.

A PLACENTA, FOR ARTERIES AND VEINS.

This is perhaps the easiest preparation to make with coarse injection, and should, therefore, be the first attempt of the student.

Preparation. Fix a large pipe in the vein, and a small one in one of the arteries. The difficulty usually attendant on getting the pipe into the artery is obviated in a great measure by introducing the point of the scissars into these vessels, and slitting them down for about half an inch, then spreading the artery open upon the fore-finger, and keeping it so by pressure with the thumb, by which the pipe may be carried in without difficulty. A ligature should be passed round each pipe with a needle, taking care not to puncture any of the vessels.

Injection. The usual colours are to be selected; but instead of throwing the yellow into the vein, it should be pushed into the artery, for the artery here performs the function of a vein, and *vice versa.* When there are two placentæ, there should be different colours used.

Dissection. The spongy substance is to be carefully dissected away from the injected vessels, the placenta soaked in cold water, to get rid of its blood, and then dried, curling the cord around it; and should the membranes not be much torn, they may be distended with curled hair over it.

Preservation. Varnish it well; fix its bottom in a case with a glass top.

THE HEART, IN SITU; WITH THE HEAD AND ADJACENT VESSELS.

For this purpose choose the head of a young subject, or an adult whose heart is free from fat. The liver, stomach, spleen, &c. are to be removed from the abdomen, and the aorta divided just as it gives off the cœliac artery. The incision into the chest should be carried through the integuments, from the trachea to the ensiform cartilage, the sternum sawed through, and bent one half on each side, from the extremity of the cartilages nearest the ribs; then divide one of the pulmonary veins as near as possible to the lungs, and remove a portion of bone over the longitudinal sinus of the dura mater.

Preparation. Having well soaked the parts in warm water, and squeezed the blood from the heart and vessels, by the inferior cava and pulmonary vein, put a pipe into the longitudinal sinus of the dura mater, pointed towards the occipital bone, another into the pulmonary vein, a third into the vena azygos, and one into the receptaculum

chyli, or thoracic duct. Tie up carefully the aorta and the vena cava inferior, and put a strong ligature around the middle of each arm.

Injection. Three colours are required; one for the arteries, which should be red; another for the veins, which may be yellow or blue; and the third for the thoracic duct, which should be white, to imitate chyle. Throw the red injection into the pipe in the pulmonary vein, which will fill the left auricle, ventricle, aorta, and all the arteries. The pipe in the head is for the yellow injection; by this will be filled the veins of the head, face, neck, and chest, the right auricle of the heart, the right ventricle, and the pulmonary arteries. Should the vena azygos not be injected, the yellow injection is to be thrown into it. A small quantity of white injection is sufficient for the thoracic duct.

Dissection. Remove the body by a transverse section at the last dorsal vertebra, then amputate the arms at their middle, saw away one side of the bones of the scull, and wash away the brain: then dissect away all the loose cellular membrane and fat, and expose the various parts in the best manner; dissect away the lungs, leaving the pulmonary arteries as long as possible.

Preservation. This is, when well done, a valuable preparation, and deserving of great care. Varnish it well, and preserve it in a square glass case.

A FŒTUS, TO EXHIBIT THE PECULIARITIES OF ITS CIRCULATION.

For this purpose select a still-born fœtus; and, if possible, one that died from a flooding of the mother.

Preparation. Dissect the umbilical vein from the arteries, about four inches from the umbilicus, and fix a pipe in it, taking care not to include the arteries. Throw warm water into this pipe, and wash out the blood, which will flow out by the umbilical arteries. Having drained away as much of the water as possible, tie a ligature very loose on the umbilical arteries.

Injection. The fœtus being heated, throw in gently any coloured injection. The water will come away first through the umbilical arteries; and, when the injection appears, make the ligature firm, to prevent its further egress.

Dissection. The peculiarities in the fœtal circulation are the umbilical cord, the ductus venosus, the ductus arteriosus, and foramen ovale. When the body is cold, proceed to the dissection; remove the head from the cervical vertebræ, the arms, with the scapulæ, and pectoral muscles; the inferior extremity at the articulation with the pelvis, the whole of the parietes of the abdomen, leaving the arteries running to the cord by the sides of the bladder; the anterior part of the thorax, with the sternum, cartilages, and part of the ribs, the integuments and muscles of the back. Next cut away

the lungs, and remove the pericardium; keep the diaphragm in its place, and turn up the liver, so as to expose the ductus venosus. Some dissection and care is here necessary. Dissect away the stomach and intestines, and lay out the mesenteric vessels, distend the bladder with air, and cut away any thing that may obstruct the view of the vessels. The foramen ovale cannot be exhibited.

Preservation. After having varnished it, hang it in a glass bell, with a hook at its top.

PENIS.

The penis may be injected, to show the two corpora cavernosa, the corpus spongiosum, and glans, with the arteries and veins. For this purpose any healthy penis will do, but large ones are generally preferred. Having cut through the integuments and soft parts in the pelvis, in the direction the saw is to be passed, saw through the middle of each crista of the pubis, straight down and through the ascending ramus of each ischium, close to their commencement, and thus remove the pubis, with the bladder and external parts of generation.

Preparation. Make an incision into either of the crura of the corpora cavernosa, and into the bulbous part of the urethra, as near to the prostate gland as possible; soak it in hot water, and carefully press out the blood from every part. Introduce a probe along the vena magna ipsius penis, by an incision at its root, to break down its

valves: fix a pipe in each of these incisions, and another in each vas deferens, at its entrance into the vesiculæ seminales, and secure all the divided vessels.

Injection. Four colours are necessary; those generally preferred are red, yellow, blue, and white. Throw the red into the corpus spongiosum, which will distend the glans; the yellow into the corpus cavernosum pipe; the blue into the vena magna ipsius penis; and the white into the vasa deferentia.

Dissection. Inflate the bladder, dissect away all the soft parts, and keep the penis erect against the symphysis pubis.

Preservation. In a covered box.

TESTICLE.

A testicle of an adult should be chosen free from disease, and great care is requisite in removing it from the body. First, enlarge the ring of the oblique muscle, push the testicle through from the scrotum, and separate its cellular connecting substance; then cut the spermatic artery and pampiniform plexus as high as possible, and then the vas deferens.

Preparation. When well soaked, press out the blood from the veins; put a pipe into the spermatic artery, and another into a vein; and secure all other open mouths.

Injection. Red is to be sent into the artery,

and yellow or blue into the vein, which is without valves. Then fix the quicksilver tube in the vas deferens, and suspend it in water; this done fill it with mercury, and in twenty-four hours it may be removed to be dissected.

Dissection. Cut away the tunica vaginalis, and the tunica albuginea, which requires great care; then remove all the cellular and adipose membrane, and dry it on a board previously waxed.

Preservation. In a common preparation glass, on a blue or green paper ground.

THE SYSTEM OF THE VENA PORTÆ.

Remove the liver, spleen, stomach, and intestines altogether, of a person whose mesentery is free from fat, cutting away at the root of the mesentery, behind the peritoneum.

Preparation. Cut into a mesenteric vein, as near to the intestine as possible, and secure it with a ligature passed around it with a needle, taking care not to wound any other vein. Inject warm water, and let it again run out by the divided vessels. Drain its water off, and secure all the veins, the hæmorrhoidal especially.

Injection. Throw any colour into the pipe, which will pass into the splenic, mesenteric, and internal hæmorrhoidal vein, and into the vena portæ.

Dissection. Remove all the soft parts; the stomach, spleen, and intestines; cutting the vessels

as long as possible, and dry them in the best manner, either attached to the liver, or dissect away the liver from the vena portæ, taking care to preserve some of its ramifications.

Preservation. In a covered box.

HEART.

The heart is mostly injected out of the body, to show its common and proper vessels. For this purpose, choose a lean heart. Cut through the thoracic viscera immediately at the top of the thorax; divide the intercostal arteries by drawing the knife down the pleura, over the ribs beyond their origin, separate the vena cava inferior and aorta, in the abdomen, with the cavæ hepaticæ: and remove the thoracic viscera, with the portion of the diaphragm surrounding the vessels.

Preparation. Soak the blood and coagula out of the cavities of the heart, and press the blood from the coronaries. Put a pipe into the vena cava superior, and another into one of the pulmonary veins. Then tie the lungs at their root, the vena cava inferior, the arteria innominata, the left carotid and subclavian; and pass a ligature, with a slip knot, round the sinus of the aorta, and secure all other open vessels.

Injection. The common coloured injections, red and yellow, only are wanted. Throw the former into the pulmonary vein, which will fill the left auricle, ventricle, aorta, and coronary arteries. The yellow, being sent into the superior cava, will

distend the right auricle, coronary veins, right ventricle, and pulmonary artery. In order to fill the coronaries well, the injector must stop two or three times in the course of the process, to squeeze on the injection in them with his nail; then heat the whole again, and throw in more injection. The preparation having cooled, a pipe is to be fixed at the bottom of the aorta, and some red injection, just hot enough to run through the syringe, is to be pushed along the aorta, an assistant throwing cold water on the intercostals, if the injection runs through them.

Dissection. Cut away the lungs, pericardium, and all the soft parts.

Preservation. Either in a covered box, or under a glass bell.

STOMACH. INTESTINES. BLADDER.

These are best injected with the whole subject, but may be removed and injected separately.

GENERAL OBSERVATIONS.

1. The anatomist can only succeed by having the preparation constantly heated as he is throwing in the injection.

2. The injection should be thrown in very gradually.

3. When injected, the part should be immediately immersed in cold water.

PREPARATIONS WITH MINUTE INJECTION.

BONES.

The vascularity of bones is to be demonstrated, by throwing fine injection into an extremity, cutting out the bone when cold, separating it from all the soft parts, immersing it in water for a few days, to soak out the blood, and then putting it into a mixture of muriatic acid and water in the proportion of one ounce to a quart, for three or four months, adding about, every month, a drachm of acid. The limb of a ricketty child is to be chosen.

Injection. Put a pipe into the largest artery of the extremity, and throw gradually the red injection into it, fixing the stop-cock in the pipe.

A FŒTUS.

Still-born children, when injected with minute injection, afford a number of beautiful preparations.

Preparation. No water should be thrown into the vessels. Fix a pipe with a stop-cock into the umbilical vein, and tie the arteries in the ligature.

Injection. Red injection is always chosen for this purpose; and throw it in with great care, until the abdomen and skin all over become very tumid. First mucus comes from the nose and

mouth, then the meconium from the anus, and often pure size.

Dissection. Cut off the head from the shoulders, the arms below the shoulder joint, and the legs just below the acetabulum; then preserve a small quantity of the integuments around the navel, and remove all the anterior parieties of the abdomen and chest, so as to exhibit the thoracic and abdominal viscera. Cut away the integuments and posterior part of the cavertebralis, to exhibit the medulla spinalis.

Preservation. Soak out the blood, and preserve it in proof spirit, to show the viscera and their vascularity.

From a well-injected fœtus may be obtained the following preparations.

1. If the fœtus be about seven months old, the *membrana pupillaris.*

2. If it be male of this age, the *testicle* in the abdomen, with the *gubernaculum.*

3. The *vascular* and radiated fibres of the *parietal bones.*

4. The *vascular membrane,* including the *teeth.*

5. The *viscera of the chest* separate, if better injected than those of the abdomen, showing the vascularity of the lungs, thymas gland, and heart.

6. The *stomach,* which is to be inverted, to show its vascular *villous coat.*

7. The *intestines,* which are to be separated from the mesentery, and inverted, to show their *villous coat.*

8. The *glandulæ renalis* and *kidneys* together, to exhibit their relative size, and the lobulated structure of the kidney.

9. The *uterus and its appendages,* to show the long ovaria and plicæ of the neck of the uterus and vagina.

10. The external parts of the female organs of generation, to show the *hymen.*

11. A red portion of the *skin,* to exhibit its vascularity.

12. The *medulla spinalis,* to show its vessels, and the *cauda equina.*

13. The *membrana tympani,* to exhibit its vascularity.

14. The *cavity of the tympanum,* to show its vascularity, and that of the periosteum of its bones.

15. The *vestibulum and cochlea,* to shew the membranous semicircular canals of the former, with their ampullæ injected, and the vascularity of the zona mollis.

16. The *head,* to show the natural appearance of the face, the papillæ of the lips, tongue, &c.

17. The *hand,* to show its natural colour.

Preservation. The above preparations are all to be well soaked from their blood, and preserved in proof spirit of wine.

18. A portion of *skin,* freed of its adeps, to show its vascularity.

19. The *membrani tympani,* to show its vessels.

20. The *heart,* to show the foramen ovale, by

distending the cavities with air; and, when dry, cutting away the outermost sides of the auricles, and introducing a bristle.

21. Any large muscle, freed from its cellular membrane and fat, and dried, to show the *vascularity of the muscle.*

Preservation. These are all to be dried, well varnished, and preserved in bottles. Some prefer putting them into spirit of turpentine; but this should be avoided as much as possible, for the turpentine is always oozing in warm water, and dirtying the glass.

UTERUS.

The object of injecting a uterus with fine injection is to exhibit the vascularity of its internal membrane, which furnishes the catamenia. For this purpose the uterus of a person whose menstruation has not been stopped by age or disease is to be selected.

Preparation. Remove the uterus, by dividing the vessels as long as possible, the round and broad ligaments, and as much as possible of the vagina. Tie a pipe in each hypogastric artery, and secure all the divided vessels.

Injection. Any coloured injection may be chosen, but red looks best.

Dissection. Cut away all the loose cellular membrane, bladder, and rectum, if there be any from around the vagina, and cut it open along the middle

of its superior part; continue this incision on each side of the anterior part of the uterus, so as to exhibit the posterior surface of its cavity.

Preservation. If the injection be successful, which it seldom is more than one time in ten, suspend it by the ligaments, and preserve it in the proof spirit.

AN ADULT HEAD.

Separate the head as low as the last cervical vertebra from the shoulders.

Preparation. Put a bifurcated pipe into the carotids. Secure the vertebral arteries and jugular veins, and all the divided parts.

Injection. The red injection is always preferred.

From an adult head injected in this way may be made the following preparations:

1. The upper eyelid, to show the vascularity of *Meibomius's glands.*

2. The *choroid-membrane,* exhibiting its vascularity.

3. The *retina,* suspended by the optic nerve, exhibiting its vascularity.

4. A section of the optic nerve, to exhibit the *central artery.*

5. The whole of the *cerebrum, cerebellum,* and *medulla oblongata,* with the pia mater; or,

6. The pia mater separated from the convolutions of the brain, to exhibit the *intergyral processes* and the *tomentum cerebri.*

7. One half of the nostrils, to exhibit the vascu-

larity of *Schneider's membrane*, and that of the membrane lining the antrum of Highmore.

8. The *tongue*, lying in the jaw, and suspended by the *pallatum molle*, with the posterior fauces cut away, to show the *epiglottis* and *glottis*, the *uvula* and *velum pendulum palati*, the tongue, its papillæ and excretory ducts, and the vascularity of the gums and *sublingual glands*.

Preservation. The above preparations are to be soaked well in cold water, to get out all the blood, and then preserved in proof spirit.

PREPARATIONS WITH QUICKSILVER.

Mercury cannot be coloured by any substances; it must, therefore, always present the same silver colour.

GENERAL OBSERVATIONS.

1. The part should always be injected in a proper tray, that the mercury may be easily collected.

2. A lancet, with a curved needle ready threaded, should be always at hand.

3. A bottle, whose neck is not so wide as to permit the quicksilver tube going to the bottom, when put into it.

4. When injecting, if any circumstance renders it necessary for the injector to put aside the tube with the mercury, it should be placed in the bottle, the mercury remaining in it, to be handy and prevent delay.

5. Injecting with mercury is always tedious, and frequently unsuccessful. The parts exposed must be kept moist, by sprinkling them with cold water.

A SUPERIOR EXTREMITY.

To inject the lymphatics of an arm, choose one from a dropsical subject, without fat: make an incision into the skin around the wrist, and seek diligently, with a magnifying glass, for an absorbent, into which the pipe is to be put, when the quicksilver will immediately run. The shoulder should now be placed considerably lower than the hand; and, when the mercury runs out at the divided vessels in the axilla, tie them up, and also the lymphatic, into which the pipe was introduced. Then seek for another absorbent. When the mercury ceases to run in a lymphatic, tie the vessel, and seek for another.

Dissection. Begin at the lymphatics, where the mercury entered, and trace them: removing every thing that obstructs their view, but preserve the glands.

AN INFERIOR EXTREMITY.

The limb for this purpose should also be taken from a dropsical person, and the same method adopted as with the superior extremity, seeking as near to the toes as possible for the lymphatics.

A PAROTID GLAND.

Cut down upon the masseter muscle, and seek for the Stenonian duct, which is the excretory duct of the parotid. Tie the quicksilver pipe in it, then fix the tube, and pour into it the quicksilver; and, when it ceases to run, remove the tube and pipe, and tie the duct. Be particularly careful, in dissecting away the gland, not to cut it.

Preservation. Dry it on a waxed board, and preserve it on a blue paper and pasteboard, in spirit of turpentine.

LIVER.

The lymphatics running on the peritoneal coat of the liver, and over the gall-bladder, make a beautiful preparation. The liver should be well-soaked for several days, and the pipe put into the lymphatics of the suspensory and coronary ligaments, and the mercury forced along them, breaking down the valves with the nail, by pressing on the mercury. Secure the vessels at the portæ of the liver, when the mercury gets there, and tie the lymphatics when filled. Should the anatomist's attempt to force the quicksilver beyond the valves be unsuccessful, he must fix upon the most minute obvious branch, and let it run its proper course.

Preservation. Throw some coarse injection into the cavæ hepaticæ and vena portæ, without heating the liver thoroughly; inflate the gall-bladder, and dry the whole. Varnish it, and preserve it in the

best manner under a glass bell, or preserve the injected part in proof spirit, without any wax injection.

LUNGS.

The superficial lymphatics of the lungs are to be filled from the part most remote from the root of the lungs.

Preservation. Cut away the part on which the lymphatics are filled. Dry it on a waxed board, varnish it, and preserve it in a bottle, on a green or blue piece of paper; or preserve it in proof spirit, without drying it.

HAND.

Select the hand of an aged female (separated from the arm by a transverse section, three inches above the wrist) that has died of a lingering disease. Soak out the blood in warm water; fix the pipe in the radial artery, then add the tube, and pour into it the mercury. As the mercury appears in the other arteries and veins, take them up and secure them with ligatures. Should the mercury still escape from small branches, put a cord round the arm, and with a piece of wood tighten it, by twisting the wood, taking care not to prevent the mercury passing into the hand. Then suspend the hand in a glass filled with water, and suspend also the tube and quicksilver in the manner represented in the annexed plate, for a day or two, that the

mercury may get into the small vessels. When injected, remove the pipe, and tie, by a strong string, the fore-arm; put the hand into water, until putrefaction separates the cuticle.

Preservation. Dry it carefully, and varnish it; then fix the fore-arm in a pedestal of plaster of Paris, and keep this beautiful preparation under a glass bell.

LACTEALS.

Remove the mesentery and intestines, if the former be perfectly free from fat, and let them remain several days in water, which should be frequently changed. Search for an absorbent, on the intestine, into which introduce the quicksilver, which will run on to the glands in the mesentery, where it will stop. When the lacteals are filled, the preparation will be more elegant if red and yellow coarse injection be thrown into the mesenteric arteries and veins.

Preservation. Spread the mesentery on a waxed board, inflate a portion of the intestine, clear away all that is useless: dry and varnish, and preserve it in a glass frame.

CORRODED PREPARATIONS.

These preparations are made by filling the vessels with coarse injection, and corroding the soft parts, so as to exhibit those vessels.

GENERAL OBSERVATIONS.

1. The liquor for corrosion is to consist of three parts of muriatic acid, and one of water.

2. The liquor should be kept in a well-glazed earthen vessel, with a top to it, also well glazed.

3. The part to be corroded should be carefully moved in and out of this liquor, as the slightest force may break the vessels.

4. When corroded, the pulpy flesh is to be carefully washed away, by placing it under a cock of water, the water flowing very slowly; or, in some instances, by squirting it away.

5. When the preparation is freed of its flesh, it should be fixed in the situation it is to remain in, either in a plaster of Paris pedestal, or on a flat surface.

6. If the flesh be not perfectly destroyed, the preparation is to be returned to the corroding liquor for a fortnight or month longer, or until it becomes pulpy.

HEART AND LUNGS.

These viscera, occupying less space in children than adults, are to be preferred. It is of no consequence whether they are fat or lean. The integuments should be cut from the fore part of the neck; and the trachea, jugular veins, and carotid arteries removed, and, with them, the viscera of

the thorax, carefully separating the subclavian vessels from the clavicle, without injuring them, and dividing the axillary vessels and the cava inferior and aorta, just below the diaphragm.

Preparation. Soak the whole well, to free it of its blood, and press out all the fluids ; fix a pipe in the inferior cava, and another in one of the pulmonary veins, taking care not to injure the others, by tying it. Then secure the carotids, the jugulars, the axillary vessels, the vertebral artery, the intercostals, the aorta, after it has formed its arch, the internal mammaries, and every vessel that can be found.

Injection. Red and yellow are generally preferred, but red and blue are more proper, and more elegant. Throw the blue and the vena cava inferior, which will distend the right auricle, the superior cava, the jugular veins, and great coronary vein, the right ventricle, and pulmonary arteries. The red injection will fill the left auricle and pulmonary veins, the aorta, subclavians, carotids, &c.

Preservation. Great care is requisite in freeing the injection from the pulpy flesh. When done, let the apex of the heart be placed immediately in a plaster of Paris pedestal, and cover it with glass. If the pulmonary vessels are well preserved, it forms a valuable preparation. If one good preparation be obtained in ten trials, it will amply repay the anatomist.

HEART.

A fat heart will do for this purpose. Inject it as directed in page 33, and put it into the corroding liquor.

Preservation. Lay it on some cotton, on a pedestal, and cover it with a glass.

LIVER.

The liver of a child is to be preferred to that of an adult, it occupying much less room: its vessels should be cut long, and with it the portion of the duodenum, perforated by the bile duct.

Preparation. Fix a pipe into the hepatic artery, another into the vena portæ, a third into the ductus communis choledochus, and a fourth into the vena cava hepatica.

Injection. The four injections are to be red, yellow, dark blue, and light blue. First, throw the red injection into the hepatic artery, next the dark blue into the vena portæ, then the light blue into the cavæ hepaticæ, and, lastly, the yellow into the ductus communis choledochus.

Preservation. Remove the pipes as soon as the injection will permit; and, when corroded, fix the trunks in the best manner possible, upon a proper pedestal; then wash away the flesh, dry it, and cover it with a glass.

KIDNEY.

Choose the kidney of an old drunkard. Cut the emulgent vessels close to the aorta and cava, and the ureter, very low; then remove the kidney, with its surrounding adeps.

Preparation. Soak out the blood, and press out all the fluid. Fix a pipe in the emulgent artery, another in the vein, and a third in the ureter; and tie up all the open-mouthed vessels.

Injection. Red, blue, and yellow. First throw the yellow into the vein, then the red into the artery, and, lastly, the blue into the ureter.

Preservation. Under a glass bell.

The kidneys of different animals form a beautiful exhibition.

THE END.

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