APPARATUS FOR THE PREPARATION OF BONE SPECIMENS AND FOR ARTERIAL AND OTHER INJECTIONS.

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THE apparatus which I figure and describe below has been in use for the past five years at the Harvard Medical School and was devised by me to simplify and improve as far as possible our processes of bone preparation and the injection of the arterial or venous system, as a whole, for dissecting purposes. It is already familiar to many here and, thanks to Dr. H. P. Bowditch, Dean of the Medical School and Dr. A. Brenner of Vienna, also known in Germany and Austria. The best process of preparing osseous specimens, is, in itself, so simple that the present paper is published chiefly in answer to many inquiries from students and practitioners as to the way in which bones for preservation should be treated. In this account I shall consider only those processes of preparation which we have adopted for general use.

MACERATION OF BONES.

For the rapid preparation of osseous specimens certain quick chemical processes such as boiling in caustic potash solutions are very convenient and where a particularly fine specimen is not desired, answer very well, but solutions which thus rapidly affect the soft parts also attack the bones and they thus eventually assume a dull chalky color and consistence. When we wish to obtain a bone with a fine ivory color, consistence and polish, there is but one way to treat it, as far as my experience has gone, and that is with a constant current of warm water which should never be raised above a temperature of 110 F. The soft parts are thus rapidly macerated and removed by the action of the constantly renewed volume of water and after from five to seven days are so thoroughly separated that but little scraping is needed after removing the bones from the water to make them perfectly clean. The water

to be described. In order to thus macerate bones some sort of a tank with supply and waste pipe is necessary, and this for medical school or laboratory purposes should be of a size to fit it for treating either

FIG. 2.

a few or a large number of bones, and so placed as to be ready of access and easily emptied and cleaned. To get the best possible specimens only bones free from fat should be taken, as by thus avoiding the defatting treatment a finer color may be obtained. Fig. 1 shows a macerating tank as I have constructed it. It is placed in our macerating room and slung upon supports so that its contents may be decanted into the adjacent sink. The tank which is made of copper, tinned within, is four feet long and eighteen inches in diameter. Into the bottom opens the attachment for the supply pipe and also a large waste pipe with stop-cock through which the tank may be emptied upon the drained asphaltum floor if necessary. A strainer of perforated galvanized sheet iron is placed over these pipes at the bottom, although for the supply pipe this is not essential as the current keeps its orifice clear. The supply pipe comes by a double connection from the hot and cold water pipes, and below the T joint I have inserted a thermometer for convenience in regulating the

FIG. 1.

kept at the temperature indicated also melts and thus removes much of the fat from the bones, but this can only be done effectively by treating the bones as later

temperature which should never, of course, get high enough to "cook" the soft parts. At the lower end and back side of the tank a handle is attached for convenience in tipping, which, by the proper balancing of the tank, is readily done. The waste pipe comes out at the top of the tank in front and its orifice is also guarded by a strainer. On to the two-inch-wide rim of the tank a heavy cover with corresponding rim is fitted. If much maceration of material uninjected with preservative fluid is done this cover should be kept tight with clamps and tapped with a pipe at its centre for ventilation. Before bones are thus exposed to maceration as much of the soft parts as possible should be removed.

After the maceration has been completed the bones should be cleaned and then allowed to drain and dry and those having the least suspicion of fat about them should have it removed. Again, without considering the various methods for doing this I will describe the apparatus which I have devised for the purpose and which, as far as I know, furnishes the most effective and safest means. By the use of this apparatus, what has before been a very primitive, tedious and disagreeable process, may be rendered easy, rapid and sanitary,

denser built on the cover. This condenser is built upon the usual principle. The starting point of the vapor pipe is at the centre of the cover within. This pipe then coils up through the large condenser and terminates at its upper part where it has attached to it the small glass control condenser above. The cold water is carried from the hydrant faucet to and from the large condenser by means of rubber hose pipe, and a similar supply and waste attachment is made for the small condenser. Now, when the bones and benzine have been introduced, the cover is screwed down tightly on to the tank, a felt washer being interposed. This is done by means of nut and screw placed at intervals as shown in the figure. The steam is now turned on until the benzine is heated enough to make its vapor come up through the glass condenser. The need of the latter is now soon seen, for, by watching it, the heat supply can be so regulated that the vapor will be condensed in its lower part and then a short column of benzine always kept in sight there and no vapor allowed to escape. If the benzine were not in sight here, on the other hand, it would be impossible to tell how high the vapor column were reaching and whether or not all the bones were being exposed to its action.

FIG. 3.

and a bone collection, where it is used, need only be limited by the supply of material.

BENZINE DEFATTING APPARATUS.

This arrangement as seen in Fig. 2, also consists of a copper boiler three feet by eighteen inches, on to the cover of which is built a large condenser. This boiler is also tin-lined and has entering at its lower part a steam pipe which makes after entering the boiler a single coil and then emerges close to its point of entrance. When ready for action two or more gallons of benzine are poured upon this coil of pipe in the bottom. This part of the apparatus differs from the only other which I have seen for the purpose, in the construction of its condenser and by having a coil of steam pipe substituted for a heating lamp below. This is, of course, only possible where a steam supply is available and is a great or rather absolute element of safety. Below the steam coil and at the bottom of the boiler in its centre a large waste pipe with stop-cock is placed for draining away the benzine when the apparatus is cleansed. In the interior of the boiler a perforated galvanized iron diaphragm is placed, according to the number of bones to be treated, either on shoulders projecting from the sides just over the steam coil or at the centre. On this diaphragm, after the benzine has been poured upon the coil, the bones are placed for treatment. The rest of the apparatus, as aforesaid, consists of the con-

HYDRAULIC INJECTING SYRINGE.

This syringe I have designed chiefly for the injection of subjects for lecture and dissecting room. It is operated by the hydrant pressure and can be used with the hot or cold water pipe according to the nature of the mass employed. For dissection we generally used a cold starch mass colored with vermillion or indigo and adopted here for that purpose by Dr. Mixer, Demonstrator of Anatomy. This injection mass, the formula for which may be found in Wilder and Gage, may be made by stirring starch in water to the desired consistency with enough alcohol or carbolic acid added to keep it from molding. Vermillion, indigo or other coloring matters are then added as required. This mass answers very well for purposes of demonstration or dissection, but it is not suited for permanent preparations. The construction of the hydraulic syringe is pretty evident from the figure. The double pipe above is for the driving current to force the piston down by turning on the pressure stop-cock with the other on the exhaust pipe closed. In drawing the piston this current is shut off and the exhaust pipe stop-cock opened. Thus the piston is forced up by the stout springs at the sides, or drawn by hand when the springs are not used. As the piston is drawn up the syringe is filled through the supply pipe going from the injection mass to the "two-way" cock. This pipe for

filling was suggested to me by Dr. Mixter and originally tapped into the lower end of the barrel, but I found it much more convenient to have instead the two-way cock, as proposed by the maker. The great advantages of this syringe are that what was before very laborious work with the hand-syringe can be done with it very easily. The rapidity of injection can be regulated with the greatest nicety by only turning on the pressure-pipe current so as to make the piston run down very slowly, thus avoiding rupture of the vessels from sudden distension. The syringe can be filled without being disconnected and can, if desired, be immersed with the subject or part in hot water for injection as it will work just as well under water.

Clinical Department.

CASE OF OPIUM POISONING.

BY GEORGE C. MCKEAN, M.D. (HARV.), SPRINGFIELD, MASS.

J. D., twenty-three years old, short but muscular, at 12 o'clock midnight swallowed with suicidal intent somewhat more than an ounce and a half of laudanum, obtained from a druggist the previous evening. He lay down on his bed without undressing. Between 2 and 3 A. M., his mother in an adjoining room was awakened by his breathing and tried for some time to arouse him without success.

I reached him at 3.30 A. M., found complete coma, respiration stertorous, pupils pin-hole, face dusky, lips and tongue nearly black, pulse full and slow, extremities cold. He had not vomited. I at once introduced a stomach tube and attached an Allen pump; not much fluid and no evidence of food in the stomach was found. Fluid strong with the drug. I pumped warm water in and out, shaking and kneading the stomach meanwhile, till it came back clear and odorless; then pumped in a bowl of hot black coffee, and for no particular reason, reversed the pump and withdrew a portion, which to my surprise was so strong of laudanum that I noticed it at quite a distance, indeed stronger than the first fluid withdrawn. Taking the hint, the stomach was well washed out with coffee and it was afterwards repeated at intervals until it returned without the odor of the drug.

Meanwhile cold douche and flagellation were used with no effect. His respiration became intermittent and pulse slower. Three hypodermics (each of atropia sulphate, one-thirtieth,) were given at half-hour intervals. The pupils responded, but slowly, first the left began to dilate and afterwards the other, but respiration did not improve and about 5 o'clock became still worse and stopped entirely. Artificial respiration was then employed with success. Patient would breath for four or five minutes, then stop, starting again in response to the artificial means. This was repeated from twenty to thirty times.

At 8 A. M. the fight was declared in favor of the doctor and the patient showed the first sign of sensation, and consciousness slowly returned under persistent shaking, rolling and shouting. In an hour or two he was put upon his feet and started on the customary tramp between two men. He was kept moving most of the day, relapsing at once if left quiet. The following night he was allowed to sleep, being awakened at intervals.

The effect of the drug passed off slowly: at a visit forty-six hours after it was taken, he went to sleep while talking, but roused and went on when touched. I was summoned on the third day and found him with pneumonia of one side, perhaps due to exposure, perhaps to the repeated artificial respiration. He passed safely through this and is now convalescent.

The case is reported not only on account of the large dose retained, but to record the good effect of the coffee, which it seems probable, stimulated the mucous membrane of the stomach, caused it to throw out its secretion, which was heavily charged with the drug, and thus a large quantity was withdrawn, which otherwise would have remained for absorption.

Reports of Societies.

BOSTON SOCIETY FOR MEDICAL IMPROVEMENT.

GEORGE G. SEARS, M.D., SECRETARY.

REGULAR meeting, Monday, February 10, 1890, DR. W. L. RICHARDSON in the chair.

DR. C. W. TOWNSEND read a paper on

NOTES ON THE INFECTIOUS NATURE OF PNEUMONIA.¹

DISCUSSION.

DR. F. I. KNIGHT: I suppose we all pretty thoroughly agree with the ideas of the reader. I was thinking as I came in whether this season I had come across any striking instances which suggested infection, and I only remember one household which I visited. That was in Cambridge. In that instance the father, mother and one servant all died within three weeks. I remember seeing in Lynn a few years ago, a family where there were, I think, four cases within four or five weeks.

DR. C. E. STEDMAN: My attention was first drawn to this subject in 1864, when I was stationed in the Navy Yard in Charlestown. There was an epidemic aboard the receiving ship Ohio and it proved very fatal. The men were slung in hammocks and the ship was crowded with recruits waiting for draft. I think the next time I saw anything to give me a suspicion that the disease was of infectious nature was the case where the husband of a newly married couple, husband about fifty, wife about thirty, living in a good house with plenty of space around it, and so far as known well drained, had a sharp attack of pneumonia which carried him off, and the young woman who was a very healthy person, followed in a few days. I do not think that I ever had more than one case in a house after that till six or seven years ago. A husband and his wife and four children living in a good double-house with a yard around it, on the corner of two good streets, were taken almost simultaneously and were all exceedingly ill of what appeared to be the asthenic type of pneumonia. They all recovered in the usual time and in the usual way without complications or relapses, but the gentleman's mother, who drove over from Roxbury daily to see them, was attacked with pneumonia and died. She was between sixty and seventy years old. The house was thoroughly inspected by the Board of Health and by experts, and it was found that some trap in the cellar was broken,

¹ See page 291 of the Journal.