

the boiling. At the conclusion of the boiling, when the alcohol cools, a vacuum forms above it in the tube, and atmospheric pressure forces down the elongated neck of the rubber cap, automatically and hermetically sealing the tube. By means of these tubes placed in boiling water, this usually troublesome process is made extremely simple. In Fig. 1 is shown the tube and cap before boiling. In Fig. 2 is shown the appearance of the cap after being forced down by atmospheric pressure.

The method of preparing chromicized catgut is one by which it may be boiled in water, for one-half or three-quarters of an hour. This method is a modification of that used by Champlin, of Chicago. Its important point is the addition of formalin to the bichromate of potash solution, which renders the boiling in water possible. The crude gut is soaked in ether corrosive (1 to 1,000), as in the preparation of the plain gut. It is then removed and exposed to the air a short time to allow the escape of the ether, after which, while still in coils, it is transferred to a mixture of bichromate of potash, 2 parts, formalin (40 per cent.), 4 parts, water, 94 parts. It is allowed to soak in this mixture four days, after which it is removed and the excess of the bichromate and formalin solution washed off by running water. It is then wound on glass spools and boiled in water for thirty or forty minutes. It is stored in sterilized glass jars in 95 per cent. alcohol.

The boiling in water does not weaken or injure the gut in any way, it is strong and pliable.

Careful bacteriological tests have shown it to be absolutely sterile.

Medical Progress.

PROGRESS IN LEGAL MEDICINE.

BY EDWIN W. DWIGHT, M.D., BOSTON.

THE TREATMENT OF DISEASE BY ANIMAL EXTRACTS.

From *La Semaine Médicale* we learn that the government of Bosnia and Herzegovania has made the use of antitoxin compulsory, both in the treatment of diphtheria and as a preventative in epidemics.

In the *Journal of the American Medical Association* (February 19, 1897) is published a paper by Dr. C. H. Preston, read before the Contemporary Club of Davenport, Io., entitled "Medicine and the State," in which the author calls the attention of his hearers and the public generally to the importance of suitable supervision, "by the State," of the manufacture of "the various potent animal products, to which the rapid growth of so-called serum-therapy is constantly giving rise."

Dr. Preston has given the subject considerable thought and corresponded freely with the authorities in various States, and quotes from the secretaries of the various State boards of health, including our own, as to the existing absence of control, and the advisability of such supervision and control by the boards of health. The subject is not one which apparently needs much argument, and it is rather surprising that, in these days of prolific legislative bodies, some action has not been taken on it before.

There is probably no class of experimental work

that is arousing more interest at this time than treatment of disease by means of animal extracts, toxins and antitoxins. Some, as the antitoxin of diphtheria, have been clearly demonstrated to be of the highest value, both as a preventative, and in the treatment of the disease. In other diseases, as rabies, tetanus and tuberculosis, this treatment is still in the experimental stage; but the results, as published, warrant us in the belief that within a reasonable time they, too, will have lost much of their terror.

Those who have used most these various "animal products" have the fullest appreciation of the importance of their careful and reliable preparation, and the dangers which are associated with the use of those, which, by reason of irregularity in their strength, contamination, or the presence of bacteria, become vehicles of destruction rather than weapons of defence.

Fortunately, up to the present time, this method of treatment is experimental, and the solutions used for the purpose are manufactured either by the experimenter, or by others equally scientific and equally interested in the success of the experiment. When the experimental stage has been passed, and by reason of increased demands and common use these substances become of commercial importance, the conditions will change; with competition will come increased temptation towards carelessness in manufacture, and much added danger to those who will be exposed, by reason of this carelessness, to serious if not fatal termination of such treatment.

We all know with what readiness a line of treatment may fall into bad repute, as the result of a few unfortunate results. It would indeed be unfortunate if progress along the broad lines of serum-therapy should be hindered by such accidents, especially if it lies within our power to remove the probability before we have to do with the reality. Is not now the time, before the example of Bosnia and Herzegovania is generally followed, to take such steps as will at least reduce to its least proportions this probability of danger which lies at our door?

THE CAUSE OF DEATH FROM ELECTRIC SHOCKS.

In these days, in which electricity is coming more and more into everyday use; in which, after an accident, the first thought is frequently, if not usually, as to who is responsible and from whom may financial compensation be received; and in which the association of electricity and civil suits is of common occurrence, the results of the experiments of Oliver and Bolan, carried on during the past year, and published in the *British Medical Journal* (January 15, 1898), are of considerable interest. These experiments have been made with a view of ascertaining the cause of death after electric shocks, and the report includes a large amount of research into the effect upon animals of the alternating current in varying doses. The paper is illustrated by a number of records of the blood-pressure, pulse and respiration of animals; before, during and after the application of the alternating current of varying voltage.

They conclude as follows: "When an animal is exposed to electric currents of sufficiently high potential, death is practically speaking instantaneous. The animal is thrown into opisthotonos, during which breathing is suspended, and the heart's action momentarily quickened, and then arrested; if the current is strong enough it is stopped at once. On shutting off

the current there occurs a deep inspiration, usually followed by an expiratory cry. This has often been noted by workmen when one of their number has suffered a serious accident, and by it their attention is called to one who is found dead as the result of electric shock. Dogs through which an electric current has been passed may, on breaking the current, not only breathe spontaneously and rhythmically for several seconds—even a minute or two—but bark loudly; and yet all the time the heart has ceased to beat. In a few experiments death has been due to contemporaneous cessation of the action of the heart and lungs. Primary cessation of the heart's beat is, without doubt, the general rule; while under no circumstances have we succeeded in causing primary arrest of respiration, followed by failure of the heart."

They also report the testimony of workmen employed in electric generating stations; who say that it is usual for men killed by electric shock to breathe a few times after life is otherwise apparently extinct.

From the facts within their knowledge they conclude that death in the "electric chair" must be instantaneous and without pain.

The results of these experiments are interesting in a number of ways. They throw some light on those cases in which, after what is apparently instantaneous death as the result of a powerful electric shock, suit is brought for "conscious pain and suffering," based upon the account of one or more cries from the victim, associated with respiration, more or less marked for an appreciable length of time. In a number of such cases, very considerable amounts have been recovered, the juries being, not unnaturally, impressed with the belief that a distinct cry, followed by more or less natural respirations for several seconds or minutes, would point towards distinctly conscious suffering. If these experiments be accepted, we must believe that it is probable that a number of such cases are those of practically instantaneous death.

EXPERT TESTIMONY.

While it is not possible at this time to report any decisive action as having taken place, in the line of improvement in the character of "Expert Testimony," as given in our courts, or in the system which governs such testimony, it is possible to report progress in the discussion of the subject. During the past year, a great deal has been said and written on the subject, and it is noted with pleasure that there appears less difference of opinion than has been apparent before.

In the *Boston Medical and Surgical Journal*, of January 7, February 11, September 23 and November 11, 1897, appear editorials which very accurately and fully cover the present state of medical opinion, as expressed during the past year.

Action has been taken, and committees appointed, by the Councillors of the Massachusetts Medical Society, the Medico-Legal Society and the Boston Medico-Psychological Society, for the purpose of co-operating "with the committees chosen by other associations, legal and medical, to promote legislation for the amendment of the methods in vogue relative to the use of expert witnesses."

A "proposed law" has been drawn up by Regent Foster, Esq., of New York City, providing that, "on application of either party, and after reasonable notice and hearing," the court may call one or more skilled

experts, who may be examined by either party or the court.

In the very interesting paper, "On the Duties of a Medical Examiner," read before the Massachusetts Medico-Legal Society, February 3, 1897 (*Boston Medical and Surgical Journal*, April 8, 1897), by the Attorney-General of Massachusetts, the same subject is touched upon, and "the almost inevitable and often unconscious tendency of experts to help the side that calls them" is spoken of. That such unfortunate conditions exist we all know, and that it is the system rather than the individual that is at fault is becoming more and more recognized. It is to be hoped that during the present year some change for the better in that system may be chronicled.

While the system still remains at fault, we are fortunate in being able to call attention to a very interesting example of what it is possible to accomplish, even under the present unfortunate conditions. In an article entitled "Medical Expert Testimony in the Kelley Murder Trial" (*American Journal of Insanity*, January, 1898), Dr. Walter Channing reports a case in which the methods in use and the results accomplished are most unusual, if not entirely unique. The account given by Dr. Channing is replete with interest; but the points which stand out with the greatest prominence are:

(1) That by means of the opportunities offered them the three experts for the State and the three for the defence were enabled to arrive at an "unanimous opinion," in a case which presented a number of unusual difficulties.

(2) That in this case, for the first time, the question of "limited responsibility," as the result of a lack of development, is recognized, not only by the experts, but by the prosecuting attorney and the court as well.

(3) That from the absence of the "hypothetical question" and the use of methods which enabled the various experts to arrive at a fair conclusion, and to so express it upon the witness stand, they were each able to leave it "feeling that he still had some self-respect remaining, and had not unwittingly stupefied himself in giving his opinion."

While Dr. Channing is able to point out a number of details in which the opportunities for examination of Kelley might have been improved, it is evident that he was much impressed by the value of expert testimony obtained and presented as it was in this case over the methods which usually obtain in trials of this class.

The unanimity of opinion displayed by the experts and accepted by the court is of especial interest, inasmuch as the conclusions reached were not such as have been ordinarily accepted by the prosecution. These conclusions, as to character and degree of responsibility, Dr. Channing gives as follows:

"It was apparent that he was not the subject of any form of insanity, but it was equally apparent that he was quite unlike the ordinary young man of twenty-three. While he had a quick, wide-awake way of taking things in and some degree of so-called smartness, he had no maturity of judgment. His lack of moral sense was, however, the most striking indication he presented of an undeveloped mind and character. The conclusion was inevitable that he was a degenerate with congenital or acquired criminal instincts."

In the same number of the *American Journal of*

Insanity appears an article on "Modified Responsibility," by Allison, in the course of which he says: "The fact that such defectives often possess proclivities for committing unlawful acts may show simply a lack of educational advantages, and is not necessarily indicative of ingrained criminal traits. They are governed largely by habit and can easily be trained. When such cases come before the criminal courts they only forcibly illustrate what the medical profession, and especially the alienist, has long advocated, namely, that the status of the individual should be carefully considered in examining every problem of crime. The personality of the man should weigh largely as a factor in determining what disposition to make of him; whether to commit him to an educational institution, to a reformatory, or to a hospital for the insane. At the same time there should be secured the greatest personal liberty of the individual consistent with the reasonable safety of society, otherwise our charitable and penal institutions will become vast receptacles, filled with an overflowing population without educational advantages or reformatory influences and destined to increase the evil they seek to remedy."

Reports of Societies.

BOSTON SOCIETY FOR MEDICAL IMPROVEMENT.

JAMES G. MUMFORD, M.D., SECRETARY.

REGULAR Meeting, Monday, December 13, 1897,
DR. A. L. MASON in the chair.

DR. W. N. BULLARD read a paper on

THE INCREASE OF INTRADURAL PRESSURE IN HEAD INJURIES.¹

DR. H. W. CUSHING: I can add little to Dr. Bullard's accurate and graphic description. My personal observation corroborates fully what he has said. I have found, while operating, the condition he reports, but do not know its cause. I have not met at any autopsy I have witnessed lesions which I thought explained the intracranial condition.

DR. PRINCE: One or two thoughts have suggested themselves to me apropos of this subject. That the condition of affairs which Dr. Bullard described is frequently present I suppose all of us have seen; but it has occurred to me whether, after all, there might not be a possible fallacy in our acceptance of the idea of intracranial pressure. It is perfectly true, as he says, that on opening the brain after such conditions as he describes, the brain bulges and it does not pulsate, and after opening the dura it recedes and begins to pulsate. Passing by the point I was going to make first, and going to another point, it seems to me, if this is looked upon as an abnormal intracranial pressure, the explanation Dr. Bullard has offered is the only possible or probable explanation, because, as he says, if this increase of pressure is due to increase of cerebro-spinal fluid or edema, it would seem to be impossible that the pressure should cease within a few minutes after opening the dura, therefore it must be due to circulatory disturbance; and if Dr. Bullard would add increased active circulation as well as passive—[Dr. Bullard: That is included.]—I should think it would

thoroughly cover it. On the other hand, there is this possible fallacy: How do we know that this really does mean increased pressure, meaning by that an increased pressure over that which exists normally in the brain? No one has ever looked into the normal brain, into a skull not opened; and it seems to me it is very possible this condition of affairs may exist under normal conditions; that is to say, there may be a sufficient pressure, but still within physiological limits, to squeeze the brain against the surface of the skull and then stop all visible pulsation; in other words, if this pressure is due to the active circulation, may it not be due to that forcible action of the heart which so frequently does occur in head injuries and which is known as the pressure pulse? May it not be due simply to the increased action of the heart? and if so, may not that same increased action of the heart which occurs under other circumstances produce that same condition? Therefore the question would not be whether it was increased pressure, but whether it was abnormal pressure. On the other hand, the other thought has occurred to me: if this is the correct interpretation that Dr. Bullard has given, perhaps this increased pressure may be the cause of some of those unexpected endings, of death occurring in head injuries after trephining where there seemed to be no reason for death to occur.

But, however all this may be, there are other and more important conditions that must be considered that possibly may be factors in absent pulsation besides pressure. As I understand the reader, absent pulsation always means pressure, even in those cases where there is no local condition like a tumor or hemorrhage to cause it. So that whenever absent pulsation is observed we may conclude there is increased pressure from some cause. This opinion is certainly in line with the views of such surgeons as I have heard express themselves on the subject. But I am inclined to think that this conclusion can hardly with safety be drawn.

The point I wish to make is this: Before we can conclude that the absence of pulsation always means abnormal pressure on the brain we must exclude every other possibility, and it seems to me that the absence of pulsation may be due to other possibilities which must be considered. In injuries of this kind every possible causative factor must be considered. To appreciate this we must ask, What is the pulsation of the brain as a physical phenomenon? The answer is that it is a rhythmical increase and diminution of the brain substance due to the filling of its arterial vessels with blood. It is substantially the same phenomenon that occurs in any spongy or erectile body, though it is of less magnitude. This increase in volume is undeniably due to the fact that the blood enters at certain intervals of time the arteries in greater volume and rapidly than it discharges itself by the veins; and whenever this is the case there must always be a pulsation, no matter what the tissue. But, on the other hand, this pulsation may not necessarily be visible to the naked eye. The pulsation is exactly the same in kind as that which occurs in the finger or hand. Here, we know, as shown by the plethysmograph, there is always pulsation, but it cannot be detected without apparatus. With the plethysmograph graphic tracings may be made similar to those obtained from an artery. Now exactly the same conditions must exist in the brain; so long as the blood enters with greater

¹ See page 271 of the Journal.