The escape of gas from the wound of entrance, after rectal insufflation of hydrogen-gas, afforded positive evidence of perforation existing somewhere in the gastro-intestinal canal, and on this evidence alone was laparotomy performed. The perforations were so situated as to put this diagnostic measure to the severest test. It was found reliable, and further experience will prove that it is as infallible in the human subject as Senn has found it in animals. It never once failed.

In conclusion, we come to the medico-legal aspect of this case. The man who did the shooting has been committed for trial. The symptoms present were only presumptive of the existence of perforation, until rectal insufflation was made. Had an exploratory laparotomy been performed with the above fatal result, and no intra-abdominal lesions sufficient to warrant such a grave operation been found, the position of the surgeon would have been very embarrassing. The defence might affirm that the surgeon ought to be held responsible for the patient's death, and not the defendant. Naturally, this would deter one from operating; but if the surgeon can demonstrate, by rectal insufflation of hydrogen-gas, the presence of diffuse tympanites due to escape of gas through a perforation into the peritoneal cavity, even without the escape of gas through the external wound, he may rest assured that perforation exists somewhere in the gastro-intestinal canal, and he can then safely proceed to the necessary operative treatment without incurring any medico-legal responsibility.

Dr. William J. Taylor, in the same journal, reports the successful use of this means of diagnosis in another case.

ANTISEPTIC AMMUNITION. — According to the *Medical Press* of May 9, a useful suggestion is being carried out by the Netherland Government, by which provision will be made for supplying each soldier, during the time of war, with a cartridge containing some antiseptic dressings. Each cartridge will be made of convenient size, namely, about three inches in length by two in width, and will be secured at one end with a safety-pin. The dressing contained in each will consist of a bandage about three yards long, and two pieces of gauze, all of which have been rendered antiseptic by a sublimate solution. Hence, in the event of wounds being received, a ready means would be at hand for the immediate application of antiseptic dressings. Soldiers, in the case of slight injuries, would probably at once avail themselves of the dressings, and the latter could not fail to be of much use to the surgeons. The idea is well worthy of the attention of the military authorities in this country, and might even with advantage be adopted, as it has been for years past in the German army. In the wars in which, during the past few years, England has been engaged in tropical climates, the early application of antiseptics to the wounds received by the men was admitted to be a matter of the utmost importance by the army medical officers attached to the forces.

A MEDICO-LEGAL CASE. — The following case of suicide, which recently occurred in Jamaica, presents features of considerable interest and no little importance. A colored man, after murdering his sweetheart, entered his house, and cut his throat with a razor. Some of the neighbors who had witnessed both deeds rushed into the house, but were unable to find him. After a search, his dead body was found under the house, which was a small one, built on supports, raising it about two feet from the ground. After cutting his throat, the man must have walked or run to the back entrance, a distance of sixteen feet, and then have crept through a hole in the partition, and have crawled on all-fours to the spot where his body was found, exactly beneath the room where he cut his throat, and therefore a further distance of sixteen feet. The throat was cut from ear to ear by a clean sweep, both carotids and jugulars being severed, as well as the trachea and œsophagus, the wound reaching back to the anterior portions of the bodies of the cervical vertebræ. A blood-stained razor, which was deeply notched, was found in the room, and marks of blood were traced from the room to the back entrance, by which the man must have gone out. Remarkable instances of the retention of voluntary power after wounds of the carotid artery, have been occasionally recorded; but *The British Medical Journal*, June 30, in commenting on the case, says that they know of no occasion on which the vessels on both sides of the neck were divided, where so much power was retained by the subject of the injuries as in the present instance. The case should serve as a perpetual warning to medical men not to be too dogmatic as to what is, and what is not, possible, even in the presence of the most rapidly fatal wound.

VACCINE VS. BOVINE VIRUS. — The fear of contracting disease has to a great extent done away with the use of vaccine virus taken from the arm of a vaccinated child, and caused physicians, oftentimes against their judgment, to confine themselves to bovine virus. That this latter virus is not always innocuous is well shown by a report of the Royal Bureau of Hygiene at Berlin. Virus which was obtained from a vaccine-farm at Eberfeld produced in those who were vaccinated with it eruptions of the skin, and in some instances pustules formed. Among children, several deaths occurred. In one of these cases post-mortem examination revealed an abscess. Considerable constitutional disturbance followed the occurrence of the eruptions. Contagion seemed to be promoted by schools and the occurrence of the harvest. By order of the government, the vaccine-farm was temporarily suspended, all instruments and appliances were destroyed, the buildings most thoroughly disinfected, and the heifers destroyed. Vaccine-lymph subsequently produced at this farm was excellent in its results. The physician in charge sent a specimen of lymph to Berlin for examination. The microscope showed isolated bacilli, and numerous micrococci which multiplied in chains and did not liquefy gelatine. No control experiments by inoculation were made.

THE MICROBE OF DYSENTERY. — Chantemesse and Widal report the discovery of a specific bacterium in dysentery (*Progrès Médical*, April 21, 1888). Working in Cornil's laboratory, they have studied five cases of tropical dysentery, and have found the same microbe in the lesions and stools of a fatal case and in the stools of four others. The bacteria were found in colonies in and between the tubular glands of the intestine, in the lymph-glands, and spleen. The organisms develop rapidly at the ordinary temperature, thriving on all the usual culture media. They are bacilli, with rounded ends, and somewhat thicker in the middle than toward the extremities. They grow luxuriantly in sterilized water from the Seine. Fed to guinea-pigs, pure cultures produce intestinal inflammation and necrosis, the stomach itself being affected. The lesions are more marked when the gastric contents are rendered alkaline. Intraperitoneal injections cause death in two or three days with peritonitis, pleuritis, and pericarditis. The liver is affected in these animals, necroses with colonies of bacilli being found in the portal areas. All the lesions in the experimental cases furnished pure cultures of the bacillus. From these facts, and the absence of the bacillus in the fæces of healthy men, Chantemesse and Widal feel justified in claiming specific properties for this bacillus. In commenting on this paper, the *Medical News* says, that, although the observations made are too few in number to bring absolute proof, they are of interest as being the first in which so much has been accomplished. Numerous other investigators have described micro-organisms in dysentery; but none, up to this time, have succeeded in cultivating them. Further developments will be awaited with interest.

ELECTRICAL SCIENCE.

The Danger of Alternating Currents.

THERE has been a warm discussion before the Board of Electrical Control in New York as to the relative danger of continuous and alternating electric currents. Communications, most of them of a partisan nature, have been addressed to the board, and statements of a directly contradictory character have been made. Mr. Harold P. Brown, who champions the continuous-current side, has put the matter to a practical test by experiments tried at Columbia College July 30 and Aug. 3. He has killed a number of dogs, using both types of current, and he draws the conclusion that the alternating current is much the more dangerous. On July 30 only one dog was experimented on. The continuous current was first tried, the electro-motive force being increased from 300 to 1,000 volts, and the result was not fatal; then an alternating

current of 330 volts was turned on, and the dog was killed. Further experiments were prevented by an agent of the Society for the Prevention of Cruelty to Animals. This was unfortunate, as the result was distinctly unfair to the alternating side of the question, since a dog that had been subjected to a 1,000-volt continuous current was hardly in condition to stand very much more, no matter under what form the shock came. On Aug. 3, however, the experiments were repeated on a number of dogs, before Dr. Cyrus Edson and a number of physicians and electricians. The main results are embodied in the letter to *Science* published Aug. 10. In this letter three cases are mentioned, in each of which a strong and healthy dog was killed by alternating currents whose voltage varied from 340.5 (the highest) to 234 (the lowest). In some further experiments given by Mr. Brown in the *Electrical World*, a number of dogs were killed by alternating and by continuous currents. The maximum alternating-current voltage that was taken without death resulting was 500; continuous-current, 1,420 volts. Minimum alternating current that caused death was at 188 volts; continuous current, 800 volts. The physicians present expressed the opinion that a current which killed a dog would be fatal to a man under similar conditions.

If these experiments were conclusive, they would mean that alternating currents would destroy life at less than half the voltage that would make continuous currents dangerous. This is partly due to the fact, that when we measure alternating electro-motive forces by a Cardew voltmeter, such as was used in Mr. Brown's experiments, we measure the mean, not the maximum, electro-motive force; which last is, very roughly, half again as much. Still, as we always consider the mean electro-motive force, and as the alternating system uses a mean electro-motive force of 1,000 or 2,000 volts, whichever it may happen to be, we must drop the distinction between mean and maximum, or we must carry it into our practical work. Both these experiments are contradicted by the statements of various people that they have taken alternating electro-motive forces as high as 1,000 volts without inconvenience. Still, until these statements are more definite as to the conditions under which the shocks were taken, we may consider that Mr. Brown has the upper hand.

But, whatever may be thought of Mr. Brown's experiments on dogs, they add to the evidence pointing to the fact that an alternating current of 1,000 volts electro-motive force would be fatal. Such a pressure is far above the limit set by M. d'Arsonval, and few fair-minded persons will doubt its danger. This being the case, the question arises, Should a system using such a pressure be allowed for house-to-house distribution in crowded cities? Under certain circumstances, this could be safely done; under others it could not. If the wires can be taken over head, and if the converters may be placed on poles in front of the houses, the low-pressure secondary circuit alone entering the house, then the system, if properly installed, is reasonably safe, and should not be objected to on that score. If it is necessary, on the other hand, to put the wires under ground, and to bring them into houses to supply converters in the cellar, say, then the system is not safe, nor will it be economical; for the trouble and expense of keeping a network of high-potential mains in order, leaving out the danger, will take from the economy and popularity of the system. The rational and safe way of using the system, in a city where overhead wires are not allowed, is to have a number of sub-stations in the district to be lighted, to which the high-potential mains are taken, and from which current is distributed to the houses at a low potential. On this latter plan, there is no reason that the system should not be used in New York or anywhere else. The high-potential conductors are less dangerous than the arc-light circuits; for they are tapped at fewer places, and the current is not taken into any house at a pressure high enough to cause death. It is, in fact, the only safe method of alternating-current distribution under ground. We hope that it will be tried, and that it will succeed.

A NEW ELECTRO-DYNAMOMETER. — M. Pellat has devised an electro-dynamometer which seems sensitive, and whose constant may be determined with accuracy from measurements. It consists of two cylindrical coils of wire, one within the other. The axis of the longer and larger one is horizontal, that of the smaller is vertical, and the two axes intersect at their middle points. If, now, a current be sent through the coils, — the outer one being fixed, the inner movable, — the axis of the latter will tend to place itself parallel to that of the former. The smaller coil is at one end of a scale-beam, and its tendency to move is balanced by weights added to the pan at the other end. The current is calculated from the weight in the pan and the dimensions of the two coils, the latter being in the form of a constant. The current is conducted to the inner coil by two silver wires joining the support with terminals on the scale-beam, to which the ends of the coil are taken. The two most difficult measurements that have to be made are the diameter of the cylindrical coils and the distance apart of the turns of wire. The former, M. Pellat states, can be made with an accuracy of 1 part in 5,000; the latter, within 1 in 3,000; and, as we measure the square of the current, the last error would only appear as 1 in 6,000 in the result. In discussing all the sources of error, M. Pellat reaches the conclusion that the results of measurements are correct to at least 1 part in 2,000. The currents that can be measured are not greater than .6 or .8 of an ampère, the difficulty lying in the fact that in getting the current to the inner coil very fine wires must be used in connecting the stationary with the movable parts, otherwise the sensitiveness will be decreased. To allow for the effect of the earth's magnetism, the current is sent first in one direction, then in the other. The difference in the weighings is due to the magnetism of the earth. In calculating the current from a weighing, we have very simply $i = A\sqrt{p}$, where A is a constant calculated from the dimensions of the instrument, and p is the weight in the scale-pan. The sensitiveness of the instrument allows measurements to be taken within 1 in 10,000. M. Pellat proposes to use this instrument for calibrating other current-measuring apparatus, for measuring electro-motive force (using it in connection with a resistance), and for determining the horizontal component of the earth's magnetism (employing it with a tangent galvanometer).

A LIGHT-WEIGHT PRIMARY BATTERY. — In France M. Renard has experimented for some time past on a navigable balloon. In order to obtain the power necessary to direct it, he has attempted to find an electric battery that is very light for its output, the question of economy not entering. None of the primary or secondary batteries in use would answer his purpose, and a new one had to be invented. After a number of experiments, he found that the best results were obtained by a cell in which the metals were zinc and platinized silver, while the liquid was a mixture of hydrochloric and chromic acids. The liquid is not very stable, but it can be kept for several days if it is not exposed to light. There is no local action in the cell if the chromic acid in the solution does not fall below one-seventieth of the equivalent for the hydrochloric acid present. The cells are made tube-shaped, the diameter being about one-tenth of the height. The potential is 1.2 volts; and from cells weighing thirty-three pounds, 200 to 250 watts per second have been taken for two hours and a half. For a storage-battery of the same weight, the energy could not be taken out at a rate of more than 75 or 100 watts, and this at a low efficiency.

MENTAL SCIENCE.

The Effect of Practice upon Reading.

INASMUCH as all education is in essence mind-building reduced to an art, the strictly psychological study of mental phenomena must in the end yield results of high practical import. It is this conviction that has brought the psychologist and the educator into such close sympathy, and has brought the latter to eagerly await the results of the former's somewhat specialized and technical studies. To no topic is this more applicable than to the study of the times taken up by various simple psychic processes, and of the causes influencing such times. We here touch upon the very powers that the teacher aims to develop, and, if we can acquire a method of testing these powers, we are sure to learn more of their real nature. A very promising contribution in this direction has been recently published by Dr. G. O. Berger (*Philosophische Studien*, v. 1), an account of which will probably be of interest to American students.