MEDICAL SCIENCE

ISSUED MONTHLY | VIDEO MELIORA PROBOQUE | TORONTO, DEC. 1, 1887

CONTENTS

MEDICAL SCIENCE

VIDEO MELIORA PROBOQUE

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ORIGINAL ARTICLES.

HÆMATOZOA OF MALARIA.

BY WILLIAM OSLER, M.D., F.R.C.P.

Extended Abstract of Monograph kindly given by the author.

(Continued.)

Types of Malaria Studied.—Of the seventy cases examined, a majority were instances of ordinary intermittent fever, chiefly quotidian and tertian, with two quartan cases. There was one case of remittent fever, one of comatose pernicious malarial fever, and the remainder were cases of malarial cachexia or chronic paludism, with occasional outbreaks of fever, with or without chills. In all the cases, with the exception of seven, one or other of the forms above described was found in the blood.

Influence of Medicines on the Organisms.—Quinine invariably caused the pigmented bodies to disappear. In acute cases, which were usually studied during two or three paroxysms before the administration was begun, this observation was repeatedly confirmed. In a few cases the corpuscles were entirely free; in several instances, the crescents appeared before the blood became normal.

Nature of the Organisms.—It is very evident that we are dealing here with structures unlike any others which have been described in human blood, and with bodies which have no relation whatever to the spirilla, micrococci, and bacteria of certain acute diseases. I would call attention to the remarkable unanimity in the description of these parasites by Laveran, Richard, Marchiafava and Celli, Councilman, Golgi, and myself. Laveran's original description is well-nigh complete, and subsequent workers have done little else than confirm his results, though to Marchiafava and Celli is due the credit of insisting upon the amœboid character of the intra-cellular form.

Relation of the Parasites to the Disease.—The same difficulty meets us here as in so many affections in which micro-organisms have been found: Are they pathogenic, or are they merely associated with the disease, which in some way furnishes conditions favourable to their growth? As evidence of their pathogenic nature may be urged, with Laveran, the constancy of their presence, their absence in other individuals in malarial regions, the destructive influence upon the blood-corpuscles, and their abundance in the graver forms of the disease. But even these considerations, weighty as they may appear, will not carry conviction at all, in the absence of experimental demonstration such as can be afforded in the case of certain pathogenic schizomycetes. Attempts to isolate and grow these hæmatozoa outside the body have failed. Marchiafava and Celli have shown that the inoculation of healthy persons with blood from a case of malaria is followed in a variable time by genuine ague paroxysms, in which the blood contains the parasites; but in regions where malaria is prevalent such experiments are not wholly free from objections.

To my mind, two facts in connection with these hæmatozoa point significantly to their etiological association with malaria. First, the positive anatomical changes which can be directly traced to their action, changes upon which one at least of the most marked symptoms of the disease depends; I refer to the destruction of the red blood-corpuscles, which can be followed in all its stages, and is as well-defined an alteration of tissue brought about

by a parasite, as any of which we know. The second fact is the action of quinine upon the parasites. The simultaneous disappearance of the symptoms of the disease and the hæmatozoa suggest that the specific influence of the medicine is upon the parasites, though it may be urged that the quinine, while curing the disease, simply removes the conditions which permit of their growth in the blood.

Practical Considerations.—An interesting practical point is the diagnostic value of the presence of these bodies. There were six or eight cases in which the examinations of the blood proved of great service in determining the existence of malaria. Some of these are worth mentioning. One of the first was a man aged 37, who had been under observation on three or four occasions with anæmia and an enlarged spleen. He had had three attacks of hæmatemesis. There was no history of malaria, and, from the gravity of the case, I was led to regard it as one of severe splenic anæmia. On his fourth visit, however, a careful examination of the blood revealed the presence of the parasites, and I gave, in consequence, a more favourable prognosis in the case which has since been justified. In an instance of pernicious malaria admitted to the Philadelphia Hospital, under the care of my colleague, Dr. J. H. Musser, the diagnosis rested on the discovery in the blood of the characteristic changes in the corpuscles.

Melanæmia.—These researches on malaria throw light on the formation of pigment in the blood and various organs in the chronic cases. Evidently the primary change is in the red blood-corpuscle, which is gradually destroyed by the amœboid form of the parasite. Every stage of this process can be readily traced, and these observations bear out the more recent views on the origin of the pigment in the blood itself.

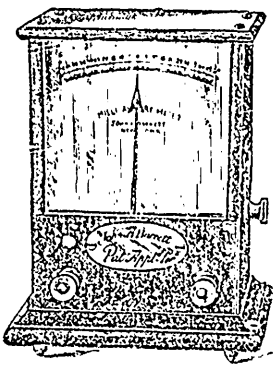
RECENT ADVANCES IN ELECTRO-THERAPEUTICS.

BY A. M. ROSEBRUGH, M. D., SURGEON TO EYE AND EAR DISPENSARY, TORONTO.

Read before the Toronto Medical Society, November 3rd, 1887.)

I DESIRE to call your attention this evening to some new apparatus recently devised for regulating, controlling and registering the voltaic current when used in medicine or surgery. These are 1st, the Milliampère meter or galvanometer; 2nd, a new rheostat; and 3rd, a new form of electrode.

As the apparatus is here to speak for itself, any lengthened description on my part will be unnecessary.



Vertical Milliampère meter (Barrett's), for indicating strength of current. The scale is graduated in milliampères, and ranges from 0 to 50 milliampères direct reading, and, by moving a switch, which multiplies by 10,—from 0 to 500 milliampères.

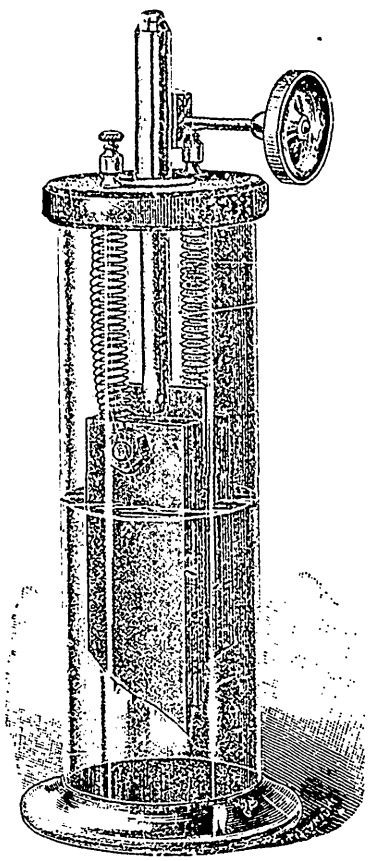
The introduction of the Milliampère meter marks a new era in electro-therapy. It has produced a true therapeutic revolution by substituting mathematical precision for the vagueness of impiricism. What is the Milliampère meter? The Milliampère meter is a modification of the galvanometer, and indicates, firstly, the presence of the galvanic current; secondly, its direction; and thirdly, the strength of said current. The value of the electric unit was definitely fixed by the International Congress of Electricians which met in Paris in 1881, the Ampère being adopted as the unit of current strength. In the new galvanometer the scale is divided so as to indicate the thousandth part of an Ampère, hence the instrument is called a Milli-Ampère meter. This instrument having been accepted by the profession as the standard for measuring current strength, "it becomes to the electric current what *the gramme is to weight, the second* to time, and the *metre* to length."

According to the law of Ohm, we obtain the strength of the voltaic current by dividing the electromotive force of the battery cell by the resistance of the circuit. Now, if in the case of a given cell, the electromotive force is exactly one volt, and the resistance of the circuit exactly one ohm, the strength of the current is exactly one Ampère.

This is the unit of current strength, - thus one volt divided by one ohm equals one unit or one Ampère. Currents of this strength, *i. e.*, one Ampère, may possibly be used in electrolysis, but as this is very exceptional the true electro-therapeutic unit may be said to be one milliampère.* Thus

$$\frac{1 \text{ volt}}{1 \text{ ohm}} = 1 \text{ or } 1 \text{ Ampère.}$$

$$\frac{1 \text{ volt}}{1000 \text{ ohms}} = 1\ 1000 \text{ Ampère, } (.001) \text{ or } 1 \text{ Milliampère.}$$



The Bailey Rheostat or Current Regulator. This new rheostat supplants the commutator or switch-board. It imposes equal work upon all the cells of the battery.

2. The rheostat or instrument for regulating current strength now coming into general use is the water-rheostat. The function of the rheostat is twofold, namely, firstly, it enables the operator to increase and diminish the strength of the current gradually, and without causing any shock to the patient; and, secondly, when the rheostat and milliampère meter are both used, there is no necessity for using a commutator or current selector, and moreover, when the rheostat is used the risk of breaking the circuit abruptly is reduced to a minimum.

To illustrate my meaning, I will take an example. In one of the public institutions which I visited in New York recently, there was a battery of 60 cells placed in a closet adjoining the consulting room. From this battery of 60 cells a cable containing 61 wires was conducted to a very complicated and formidable looking switch board erected at one side of the room. On this switch board was a double commutator, so arranged that to those initiated into the mysteries of certain plugs and switches, either one cell or any number of cells up to 60 might be brought into circuit as desired. Now by the use of the rheostat and the milliampère meter all this parafernalia may be dispensed with when only two wires from the battery will be required, the one being connected with the positive, and the other with the negative pole of said battery,—the strength of the current being regulated wholly by the rheostat, that is, by interposing an artificial resistance into the circuit which may be increased or diminished at pleasure.

The new rheostat which is here exhibited was devised by a Mr. H. L. Bailey, an American electrician. Two large wedge-shaped plates of carbon are insulated from each other and made to dip into a tall glass jar containing water which half fills the jar. To each of the inferior pointed ends of carbon is attached a pyramidal shaped piece of sponge. When immersing the sponges or when withdrawing them, a very small column of water with very high resistance connects the two carbon plates through the water into which the sponges dip. When the plates are fully immersed, there is no artificial resistance or obstruction to the flow of the current, but when the plates are withdrawn from the water the resistance is so great that we may say that practically no current flows through the circuit. By this ingenious arrangement any desired resistance from a few ohms to millions of ohms may be gradually interposed or removed from the circuit atpleasure. This is a feature attained by no other instrument. The rheostats

*When this becomes generally understood, it will be correct to say of the current strength, "10 or 15 units" instead of "10 or 15 milliamperes."

now in use do not interpose a resistance of more than about 500 ohms, which is much less than the resistance of the body, hence when these instruments are used a commutator is also used to prevent a shock to the nervous system when the current is applied or removed.*

3. In the means and methods of applying the electric current improvement has been made in two directions. Firstly, by increasing the size of the electrodes; and secondly, by making the electrodes so that they may be more accurately adapted to the surface. For instance, in applying the galvanic current to the head, instead of using an electrode only 1 or 2 inches in diameter, a concave electrode is used, large enough to cover the whole of the upper part of the head, while the other electrode called the "indifferent electrode," also large, is placed either on the sternum or on the spine. By this means strong currents can be applied with greater safety and less discomfort than formerly. Again in passing strong currents through the uterus, as, for instance, in the Apostoli treatment of fibroids, the abdominal or indifferent electrode is very large, and is constructed with a view to adapting itself accurately to the unevenness of the surface. The large electrode distributes the current over a large surface and permits the passage of very strong currents without pain or vesication, and moreover, so reduces the resistance of the circuit that currents may be used of a strength far beyond any current strength attainable with ordinary electrodes. The adominal electrode now on the table is one devised by Dr. Martin, of Chicago. It is a metal disc about 9 inches in diameter, concave-convex, and covered with animal parchment. The space between the concavity of the metal and the parchment is filled with a solution of salt in water.

This communication will perhaps be less incomplete if it includes some reference to the batteries now in use. For stationary or Cabinet batteries there are two forms of cells in use, viz., the gravity or telegraph battery, and the Laclanchè or telephone transmitter battery. Of these the Leclanchè is to be preferred, as there is no local action in the cell when the battery is not in use, and it is, moreover, much more cleanly than the gravity or Daniel cell (of which it is a modification.)

*The resistance of the body varies from 1000 ohms to 5000 ohms, according to the moisture of the skin, and the part of the body operated upon.

The stationary batteries are placed in a closet or in a cellar from which wires are conveyed to the consulting room. The cells of the Cabinet battery are placed in a cabinet or office desk, on the top of which stands the milliampère meter, rheostat, &c.

Among the portable batteries are the following, namely: 1, the small Leclanchè cell; 2, the chloride of silver cell; and 3, the zinc carbon cell. All of these batteries are in use for ordinary electro-therapeutic purposes: and, so far as the electric current is concerned one battery answers the purpose as well as another. There is this difference, however: the gravity cell and the chloride of silver cell have a comparatively low electro-motive force, and when either of these batteries is used it is necessary to use a larger number of cells than when the Leclanchè or when the zinc carbon batteries are used. The electro-motive force of the gravity and the silver cell is about 1 volt per cell, that of the Leclanchè, about 1 ½, and that of the zinc carbon, about 1 ¾ volts. Hence, if in a given case, we require an electro-motive force of say 30 volts, 17 cells of zinc carbon battery would be used, 20 cells of the Leclanchè, and 30 cells of the gravity or of the chloride of silver battery would be used. Large cells maintain their strength longer than small cells, but the electro-motive force is no greater, that is, if we take two cells of the same kind, say a large Leclanchè, such as is used with the telephone transmitter, and a small Leclanchè, such as is used in the portable batteries, the electro-motive force of the latter is exactly the same as that of the former, and, while it lasts, it is quite as efficient.

When, however, the battery is for electrolytic purposes, the case is very different; in this case we require a battery with large cells, or what is practically the same thing, a battery with low internal resistance. Either the zinc carbon or the large Leclanchè cells may be used for this purpose. The zinc carbon battery has the advantage of being portable and moreover it maintains its strength much longer than the Leclanchè, nor does it become polarized, when in use, as readily as the latter.

This may be demonstrated in the following manner:—Connect a large Leclanchè cell with a faradic coil. The vibrator will act vigorously possibly for five minutes, when its strength will be perceptibly weakened and in about ten minutes it will fail to operate the vibrator,—whereas a small

zinc-carbon cell will operate the vibrator for several hours. When unusually strong currents are required as for instance from 250 to 1000 milliampères this is the battery I would use, although I believe that in treating uterine fibroids Apostoli uses the large Lechanchè cells.

There are several forms of portable zinc carbon batteries in the market. They all belong to the variety known as the "plunge battery," the plates being immersed or plunged in the exciting solution to set the battery in action. My preference is in favor of a recent modification of the McIntosh battery. It is simple in construction, easily managed, and does not readily get out of order. This is the battery, *par excellence*, for electrolysis, and may be used for all other purposes as well. For purely neurological work the Leclanchè or the chloride of silver battery is rather more convenient.

Having thus briefly described the new electrotheraputic apparatus I will conclude with a few words regarding the dosage of electricity, and I do not know that I can introduce the subject better than by referring to cases now under treatment.

Case 1. Torticollis.—Dr. Oldright's patient, a little girl aged 8. Electrical treatment. Central galvanization galvanization of contracted muscles and faradization of the weak antagonistic muscles. From 5 to 6 milliampères are applied to each cervical sympathetic, 8 to 10 to the head, and 10 to 12 to the nape of the neck—with the positive pole—the negative being applied by means of a large electrode to the sterum. 10 to 12 milliampères are passed through the upper part of the spine and about the same strength is passed through the contracted muscles. The application to each part lasts about three minutes, and the current is gradually increased from zero to the maxium and as gradually decreased, by means of the rheostat, very great care being taken that there shall be no interruption to the current, especially when at the maximum. In galvanizing the cervical sympathetic nerves, it is usual to make the application by means of a narrow electrode pressed against the spine in front of the sterno-mastoid muscle. In the case of a child, I prefer using the ends of the fingers of one hand, the other hand being made to grasp the sponge electrode connected with the positive pole of the battery, and the current passed through my own body. In this case an assistant works the rheostat, while I watch the milliampère meter.

Case 2 Hemiplegia—Dr. Burns, patient. In this case the patient has nearly recovered from paralysis of the left side, leaving however, secondary contraction of the arm and forearm. The electrical treatment is the galvanic current to the flexors, and the faradic current to the extensors. From 15 to 20 milliampères are applied continuously to each set of contracted muscles, for about five minutes at a time, three times a week.

Case 3. Sciatica.—Same patient but sciatica on the right side. Treatment, twenty-five milliampères for five minutes, negative pole on sacrum and positive on popliteal space. In chronic cases, 30 or 40 milliamperes may be used and it may be repeated twice a day.

Case 4. Locomotor Ataxia.—Dr. Mewburn's patient. The electricial treatment is the application of the galvanic current to the spine and the faradic current by means of the dry electric brush to the back and limbs. 12 or 14 milliampères are applied to the spine for five minutes every second day and the electric brush (faradic current) is applied at home daily.

Case 5. Opacities in Vitreous.—Dr. Fisher's patient, Wiarton. Electricial treatment: 8 milliampères daily for five minutes; the positive electrode being applied to the eyes and the negative applied either to the hand or cheek.

Case 6. Parenchymatous Inflammation of Cornea.—Electrical treatment 10 to 12 milliampères for ten minutes with negative pole, the positive being applied either to the cheek or to the hand well wetted.

Case 7. Atrophy of Optic Nerves.—A young woman. Electrical treatment 6 milliamperes for five minutes to each eye (positive pole) with the negative pole either to the nape of the neck or to the hand. In the report of these seven cases I have given the electric treatment only. It is to be understood of course that this was not the only treatment. With the exception of the case of sciatica, the electrical treatment was an adjunct only to other treatment. The cases are reported here simply with the object stated, namely to give some idea of the dosage of electricity.

I may add that whatever battery is used I put the entire number of cells in circuit (usually about 30) and I modify the strength of the current by the rheostat. My arrangement is as follows: The rheophore

or insulated wire attached to the positive sponge-electrode is connected with the first plate (carbon) or positive pole of the battery. The negative rheophore is connected with the milliampère-meter: this latter is connected with the rheostat, and this in turn is connected with the last plate (zinc) or negative pole of the battery. The circuit is then made up as follows, viz., from the positive pole of the battery through the rheophore and sponge-electrode to the body, and from the body through the negative sponge-electrode and rheophore to the milliampère meter, from the latter to the rheostat, and from the rheostat to the negative pole of the battery. The apparatus need not necessarily be corrected up in this order, however, and it is of no consequence whether the current traverses the rheostat before or after passing through the part of the body to be operated upon. Great care is taken to make all the connections firm, so that there shall be no accidental break in the circuit while the patient is being operated upon.

ADVENTITIOUS AND INTRINSIC ALBUMIN.

BY WM. SATTERSS, M.D., M.R.C.S., ENG.

THERE are various causes for the presence of albumin in the urine, some of which are unimportant and lead to no serious results; others are indicative of very grave lesions of the kidneys, while again there may exist very serious diseases of those organs and yet ordinary testing will not reveal the presence of albumin.

Albuminuria is not a certain sign for the diagnosis of renal disease absence of albumin in any given sample does not necessarily prove absence of renal disease. Dr. Fothergill says, "It is not proper to assume that albuminuria indicates Bright's disease. A medical man has no moral right to alarm a person by assuming Bright's disease merely on the discove of albumin in his urine."

Bright's disease, however, may be present and no albumin detected as in interestitial nephritis or in chronic diffuse nephritis with large white kidney where albumin varies from none to abundance.

In order, therefore, that the presence of albumin may have any clinical significance it is necessary that urinal examinations be made thoroughly, scientifically and with an intelligent understanding of what its presence indicates. If albumin be found a microscopical examination is then necessary to discover further evidences of a renal lesion. If no albumin be found and kidney disease suspected from general symptoms, fresh samples of urine should be obtained from time to time and carefully tested.

If albuminuria is not always diagnostic of kidney disease how shall we account for its presence in the urine and how estimate its clinical value? Prof. Porter in his *Treatise on Urinary Analysis* makes the division *adventitious* or false albuminuria and *intrinsic* or true albuminuria, the former having its origin in intestinal indigestion or incomplete hepatic digestion from errors in diet, as the too free use of eggs or abstinence from salt, or it may be from certain forms of indigestion during the severe fevers or a form of cyclic albuminuria all of which possibly denote some change in the blood but do not indicate any renal disease. It is scarcely possible that digestion can always be so perfect and so complete that some of the albuminates either in the form of derived albumins or of peptones may not enter the blood and appear in the urine.

Such, no doubt, is not an infrequent occurrence and the presence of small traces of albumin in the urine persisting for some time without serious consequences and disappearing on a regulated dietetic treatment must mean something far less serious than any one of the diseases of the kidneys commonly included under the term Bright.

In the intrinsic variety the albumin found in the urine is chiefly serum-albumin and as this is not as a rule excreted by healthy kidneys we must regard its presence an evidence of some structural change either in the parenchyma or interstitial tissue, or in both, or some obstruction to the renal circulation together with a change in the blood itself. The causes which produce these changes in the kidneys, in the blood, and in the circulation are very numerous and vary according as they belong to the different forms of Bright's disease in almost all of which albumin appears as a symptom.

The two chief features in connection with this subject of albumin in the urine are:

Firstly.—How to detect its presence.

Secondly.—To estimate its clinical significance.

Tests for Albumin.—There are a great many methods for detecting albumin in the urine. Some are very delicate, a number of them more or less

accurate, while many of them are so complicated and the reagents so difficult to obtain and keep that they are of little practical use to the busy practitioner.

The scientific analyst no doubt finds them of great service for many delicate reactions and for estimating in a comparative way the volumetric amount.

The following list comprises some four or five of the most satisfactory tests:

(1) *Heat.*—Fill a long test-tube two-thirds full of the urine. Hold the test-tube by the bottom and apply the flame to the upper third until it reaches the boiling point. If this produces no precipitate it indicates either the absence of albumin or alkalinity of the solution so that the serum-albumin is not precipitated. Add a drop or two of nitric acid and again heat. If it still remains clear there is no albumin present. Should a precipitate form and not clear up but become more decided on the addition of a little more nitric acid albumin is present.

Before applying the heat it saves time to test the reaction of the sample with litmus paper and if found alkaline acidulate with a few drops of nitric or acetic acid.

(2) *Heller's or the Nitric Acid Test.*—Take a drachm of nitric acid in a test-tube and holding it obliquely with a dropper allow the suspected urine to flow gently down on the nitric acid. The urine being less dense will float on the surface of the acid, and if albumin be present a white cloudy segment will form at the junction of the two fluids. The action of the acid on the coloring matter of the urine will produce a colored segment at their junction. This, which is a variable *brown* according to the quantity of coloring matter and urates in the urine must be carefully distinguished from the *white* precipitate of albumin.

Any liability to error may be avoided by the following:

(3) *Nitric Acid with an equal volume of water.*—This is a modification of Heller's test. Pour in a drachm of nitric acid and then carefully add half a drachm of water. The fluids being of different density will remain for a time separate. Now add the urine as before. It will filter down through the water and striking the nitric acid the white segment of precipitated albumin will form with very little appearance of the brown marking.

This is a more delicate test than Heller's.

(4) *Xanthoprotein Reaction.*—Add strong nitric acid to the sample to be tested and then boil. After allowing the liquid to cool add ammonia. If there is albumin present it will produce an orange color.

(5) *Robert's Acid Brine Test.*—A standard solution of this test is made by adding one ounce of dilute hydrochloric acid to fifteen ounces of a saturated solution of sodium chloride.

Taking a drachm of this solution you treat the urine in precisely the same way as in Heller's nitric acid test.

A white segment will form at the line of junction if albumin be present.

This test has some advantages e.g., a solution can be kept on hand, does not stain and can be carried with less danger than nitric acid.

We have said the foregoing are the most satisfactory tests but even these will not enable us to distinguish the adventitious variety of albumin from the intrinsic. A reliable and practicable test of this kind is yet to be found, therefore we must decide which variety of albumin is present by the process of exclusion. If albumin has appeared in the urine for some considerable time without any of the prominent physical signs of renal disease such as oedema, dimness of vision, headache, contraction of the pupils, nausea and vomiting loss of appetite, asthma, etc., being present or the still more positive exclusive evidence furnished by the microscope in the absence of all *casts* and cast *débris* it is reasonable to suppose it is of the adventitious form.

On the other hand, the history of the case, the presence of albumin, the development of physical signs and the discovery of casts, etc., will usually leave little room for doubt and less for favorable prognosis.

EDITORIALS

STATUS OF THE MEDICAL PROFESSION.

J'ai fait un peu de bien: c'est mon meilleur ouvrage.
—*Voltaire.*

SUCH were the words of the greatest mocker of his century, of "the greatest of all *Persifleurs*," towards the close of a life so successful as to have given him the homage of the greatest intellects of the time, to have made him the adored of princesses and the companion of kings. *To have done a little good* he felt to have been his best work; and such perhaps would be the verdict passed upon his own life-work by many of those who have been the most illustrious members of the profession of Medicine. Whatever of greatness is attained by men, the permanent and ultimate value placed upon it, either by its possessor, or by his worshippers, is measured by the *ethical* qualities inherent in it. The great Faraday in these days of marvellous discovery is forgotten as to his experimentations, yet says his admiring disciple, "His work excites admiration, but contact with him warms and elevates the heart." Carlyle says, "The science of the age, in short, is physical, chemical, physiological, and, in all shapes, *mechanical*," and further on, adds, "There is a science of *dynamics* in man's fortunes as well as of *mechanics*. There is a science which treats of, and practically addresses, the primary, unmodified forces and energies of man, the mysterious springs of Love, Fear and Wonder, of Enthusiasm, Poetry, Religion, all which have a truly vital and infinite character: . . . . in former times the wise men, the enlightened lovers of their kind who appeared generally as moralists, poets, or priests, did, without neglecting the mechanical province, deal chiefly with the dynamical: applying themselves chiefly to regulate, increase, and purify the inward primary powers of man. . . . . But a wide difference is manifest in our age."

We hope that to none will the subject of our remarks seem so foreign to the evident references in our quotations, as to cause them to ask the question, "whether we have been reading Dr. Hughlings Jackson's last address on the "Phsychology of Joking"; for should it appear to them that the status of the profession is chiefly to be regulated by "curious checking and balancing, and other adjustments of profit and loss to guide them to their true advantage," it need only be said that we speak not to them. To us the serious questions are: "Do present professional methods, both of teaching and practice, tend to the elevation of the profession in those things which have ever given it nobility? And if not, then: "is the *Pig-philosophy*, so-called by Carlyle, to increasingly be cultivated and become the higher good? Clearly we take it, we have but the two propositions, and no sort of casuisty by which the worse may be made appear the better reason will avail to modify the weight of logical conclusions. Recently a note appeared in a Hamilton paper which was "dittoed" by a morning daily as regards Toronto, to the effect that there are more physicians in these two cities than could make a decent living. When the daily press begins the chronicle of such facts, it would seem that what for some time has been too apparent to the profession itself, requires serious consideration from the standpoint of *status*. How this has come about may be explained partly by the fact of a general diffusion of wealth and intelligence amongst our people, making it possible for many to take a course in Medicine with a view to social elevation and a more polite vocation; and partly by the fact that the avenues to the profession have been and are easy of access. Some may reply that this overcrowding exists in every line of business from that of the tradesman upwards; but we insist that the *fons et origo* of Medicine being the existence of physical ills, its very character as a noble profession requires not only the limitation by itself of what makes it a necessity, but also lessening of work for the performance of which it draws its sustenance. To say that Law and other vocations where noble ends are avowed ought similarly to be self-destructive financially can in nowise affect the force of our argument: suffice it for us to realize wherein our true ministry consists. If our premises be correct, then it must be evident that the maintenance and elevation of the *status* of Medicine, as a ministry of charity in its highest meaning, demands first, the lessening the numbers of those, who, entering an over-crowded profession, must, in order to live--with regret do we say it—

make practice; and second, the equipment, in the highest degree which the present position of medical science renders possible, of those who enter the profession, with every accomplishment and all the skill available for the prevention of physical and mental ills, and the cure or amelioration of ailments actually in existence.

Many have been the proposals intended to deal with this difficulty, but in spite of a class of *ultra* economic philosophers who so deify freedom as to say, "Let trade in Medicine be free, and let a discriminating public select their leeches and take the consequences of their own selection," it seems evident to the careful observer, even from the standpoint of results to the patient, that we must have starting points on a higher principle than at present exists with regard to medical education, both in its aims and methods, before any ideal status can either be reached or maintained. Some have said that too much knowledge makes men impractical, but the same has, time and again, been said regarding scientific farming, which now as in cattle-breeding, butter-making, bee-culture, is proving itself to be the only hope of Canadian agriculture. Without speaking pragmatically, it may fairly be said that a liberal education is the first step toward giving those practicing Medicine and those who may be sufferers, true ideas of what the scope of the science is; while the physician will be much more likely to seek the accomplishment of the noble purposes of his profession with less regard to its financial aspect, and the patient, realizing what is involved in the attainment of professional status, will be more ready to recognize his financial obligations. It is true that many of the *trade* ailments would proportionately be reduced to a minimum; but if the physician were recognized primarily rather as a conservator of health than as a curer of aberrations from it, he would be placed in his true position, and the proper status of the profession might be in some degree attained. Should anyone characterize such an ideal status as utopian, we answer that from the moral stand-point it is the only position which is unassailable. Let it be once claimed for Medicine that it originated and exists as a business which must be pushed like any other money-making occupation, that where business does not exist it must be made, that while we do not necessarily create disease, it is not our business to prevent it, and we may then without any scruples, following the avenues sought out by charlatans of every *cultus*, ply our trade. Let us, however, no longer hypocritically parade our pretentions to being the benevolent custodians of the mysteries of Hygeia, or her son Æsculapius, but affix to our sign-boards, "Licensed by the State to alleviate the woes of a needy vendor of potions!" This brutal *trade aspect* of our profession is being forced upon us by ourselves. The days when, with a rapidly multiplying population, new fields for the benificent practice of Medicine were opening up, have gone by, since during the last decade, the total population has been added to but slightly in a relative sense, many rural municipalities having a less population in 1887 than in 1881; while special organizations in the interests of public health have been everywhere instituted. In spite of these facts, and with positive statistics to the effect that the prices of farm-lands, the basis for the calculation of values, have depreciated, we have, settled in the different parts of the Province, probably over five hundred more practioners than there were ten years ago. What mean the unseemly bickerings and jealousies of men, the representatives of a time-honored profession; what indicate the innumerable clubs, lodges, societies, and other co-operative associations worked at a dollar a head? Are the first owing to over-anxiety to benefit suffering humanity; or the second due to an exuberance of charity, seeking to let gleams of sunshine through the narrow windows of the *protégé* of St. Crispin of exiguous means? To the answer that the race is to the swift and the battle to the strong, that it is undoubtedly in the interests of the people, the profession and Medicine that our medical schools prepare, and the Council license, as many neophytes as can be moulded in the press which gives the required stamp, we reply that it seems to us better that the public and profession should at once understand each other, and that their relations be brought at once down to the vulgar level of profit and loss. But to those who still hold to the illusion of the innate nobility of the true physician, we quote immortal words: "When we can drain the ocean into our mill-ponds, and bottle up the force of gravity, to be sold by retail, in our gas-jars; then may we hope to comprehend the infinitudes of man's soul under formulas of profit and loss; and rule over this too, as over a patent engine, by checks, and valves, and balances!"

PRACTICAL WORK IN PUBLIC HEALTH.

ELSEWHERE will be found admirably defined the true meaning of hygiene, a word which has only within recent years begun to have a definite meaning and to contain the expression of certain fundamental ideas with regard to health. A modern writer of fine discrimination says, "The tree of hygiene, plunging with its roots into the fertile soil of our physiological medicine and drawing its nourishment from the whole domain of practical medicine should raise its life giving branches throughout all parts of the vast human domain." . . . . "Hygiene is not only allied to the mother-science (of medicine) which has given it life, but also to each of the special branches of practical medicine, since it owes to them an attention all the greater that it is forced to watch the first indications of the invasion of a disease and that it should seize this intermediate and hardly determined stage between the normal state and the pathological manifestation which is not the first, and still is not the second. It ought to hold the eyes constantly fixed on the two faces of human life and of human life in all its protean manifestations of modern times." . . . . "Embracing all medicine theoretical and practical, the auxiliary sciences comprised, on the one hand, and on the other the innumerable manifestations, normal and abnormal, of all ages and of all human occupations, there is truly enough to frighten the spirit the most intrepid, the most athirst for knowledge."

None, we think, viewing the proposition so well enunciated will fail to see that wide views regarding the extent and importance of this subject must prevail if we are to accomplish in any notable degree the objects which manifestly are associated with what are with but partial correctness, signified in the term preventive medicine, for as Arnould says, "while the special purpose of hygiene is the struggle against diseases and if possible their extinction," still, "to be but such is not sufficient. Rightly we seek not only to preserve health, but further, to augment it."

In Canada, but notably in Ontario, it may with much truth be said that in certain particulars the first portion of Arnould's statement has been, and is being in some degree exemplified; since the history of public health legislation from the indefinite and general powers laid upon municipal councils under the old statutes to those contained in the public health acts from 1882 to 1887 and whose execution falls upon a Provincial Board and on some six hundred Local Boards, shows that a notable advance has been made toward the attainment of ends, manifestly obtainable by some such system. The mere statement of the progress of health legislation must, however, set forth with still greater acuteness, some points as peculiar, as, to some, they may appear new or unexpected. To men engaged in varied avocations, with almost no conceivable relations to the special work of hygiene, except as they are personally affected by obedience to or contravention of her laws, have been by law delegated, as Health officers, the task of investigating the causes which promote or lead to disease, of determining what interpretations must be given to them under the law as regards the question of nuisances, and of dictating the measures to be adopted for the prevention or investigation of diseases. Not only, however, are they to do this without remuneration, as also may practically be said of their medical health officers where such exist, but without any technical or experimental knowledge even, and in the absence of any opportunities for having by competent persons, investigations carried on, they are required by law to express *ex cathedra* opinions on many matters, presenting phases, which to the most skilled are often of the greatest difficulty. To further demonstrate this anomalous condition of practical hygiene the statutes empower—from the jurors and magistrates upwards—a set of men in large measure wholly untrained in the methods of experimental science and incapable through a lack of scientific knowledge of appreciating the true bearing of many well-known scientific facts, to adjudiate upon matters of the highest interest and far-reaching importance as affecting individuals, families, whole communities and even whole Provinces.

But it may be stated, and we are not prepared to impugn its partial truthfulness, from what has been taught in the past from the diversity of opinion of medical men as regards matters of fact of a sanitary character that the aggrieved or injured person is very likely to occupy the position of the old man and his ass in the fable, should he expect at their hands a unanimous opinion as to the degree of a nuisance, or the necessity for its removal.

If this be a fair statement of the present position

of *lay* and *medical* opinion in regard to questions of individual and public hygiene in Ontario, it becomes apparent that the supreme importance of a question affecting the first and highest interests of two million people, forces its consideration upon all in positions to discuss the application of a remedy. During the past five years, since the first step toward the solution of this problem was taken by the Ontario government, a Provincial Board of Health, has existed whose duties are defined in the following terms:—

To accomplish all that is therein required, a Board is established which meets one or two days quarterly, and is supposed to establish by *sitting upon it*, any questions affecting the health and lives of any portion of the community, which its secretary may present to it as correspondence. The secretary, the only permanent officer to attend to the interests of a whole province, is not expected to devote his whole energies to the investigation and elucidation of these knotty and scientific questions, but is supposed by a process of *induction* or *evolution* to be in a position to decide off-hand and without personal investigation matters affecting both the vital and medical interests of individuals and communities. He becomes in fact much more of an administrative or legal officer than a scientific investigator. Such then are the conditions under which practical hygiene in Ontario is expected to advance. We propose in a succeeding number to present the position of experimental public health work in other countries and to indicate some of the ways by which it might be advanced in Ontario.

INHALATION TREATMENT OF DISEASE.

THE question of inhalations in the treatment of disease, which has advanced and receded during the past twenty years, has again been brought into prominence by several new methods both as regards the mechanical appliances and the nature of the substances inhaled. Probably the most recent in these two respects are the *pneumatic Cabinet* and the method of *pneumatic differentiation* invented by J Ketchum, Esq., of Brooklyn, N.Y., and *Tuberculose pulmonaire, sa medication par le humage des vapeurs hyd'ro-sulfureuses* by M. Dr. René Serrand. This, which seems to us a more practical method than by injections into the bowel of gaseous enemata for obtaining the beneficial effects ascribed to sulphuretted hydrogen, is credited by Serrand with the following results: — (1) Hydrogen sulphide inhalation gives certain effects in several chronic respiratory affections and particularly in pulmonary tuberculosis; (2) This method of treatment impresses upon the organism general, as well as local, *potent modifications*; (3) It often counteracts respiratory weakness in the narrow-chested and in those predisposed to pulmonary tuberculosis; (4) Finally in such inhalations great attention should be paid to the quantity of gas inhaled, its temperature, its humidity and the degree in which the patient is agected.

Serrand speaks of special apparatus for such inhalations made by Prof. Frébault of Toulouse, but it may be assumed that, given a well-prepared gas, the effects would have to be in every case watched by the physician in attendance.

The general question of inhalation has hitherto been mixed up with sprays, naso-oral respirators, compressed air, vaporizers, medicated cigarettes, etc., all of which have had special advantages for special medicaments and special apparatus. Regarded generally they have largely been failures as far as the lungs are concerned except when the substances are in a gaseous or vaporized state: but when in such a condition general testimony agrees that such have been frequently very beneficial.

Sajous in his work on the nose and throat describes a simple and very effective *inhaler* in which air is drawn in by a tube beneath the level of the liquid, while the patient inhales by placing his mouth over a spout, the temperature of the steam being regulated by a thermometer inserted in the cork. The writer has found that very good results may be obtained from a simple sauce-pan shaped inhaler with a funnel-shaped top, turning off into a spout. An inner fixed cup of much smaller dimensions is used for receiving the medicament. Water to a convenient height is placed in the outer vessel and a teaspoonful of the medicament on a little water in the inner cup. By this means the volatile medicament is not only economized but it comes off mixed with a much larger proportion of water vapour than if it floated upon the whole water surface. The water is vaporized by placing the inhaler on a small Bunsen gas-burner or coal-oil stove when gas is not available. The patient may then sit or lie in bed, and by means of a Cash's towel thrown over the head, or a tent

arranged over the head, inhale warm vapors medicated to whatever extent is found agreeable. The extent to which such may be used will be indicated when it is said that its effects are found similarly beneficial in acute stages of colds, in chronic catarrhs of nose, throat and lungs; while its influence for good in diphtheria and pulmonary phthisis at least as a palliative measure has been most potent. While many might ascribe these generally recognized benefits to the medicament, the writer is inclined to give a first place to the warm saturated atmosphere in which the respiratory organs are continually bathed. It may be of interest to state the apparent reasons for this beneficial influence. While the body is capable of sustaining dry heat at a temperature exceeding the boiling point, a saturated atmosphere cannot be inhaled much above 130° 140° F. Our practice has been to keep the water in the vaporizer boiling and to regulate the temperature by distance from the patient. The patient's whole head is to some degree bathed in a saturated atmosphere, as in catarrh, while in others, as diphtheria and pneumonia, less vapor is found sufficient. The warm atmosphere being saturated does not produce cold by evaporation, while its warmth promotes a free flow of arterial blood in the arterioles previously chilled and followed by a venous stasis and the plastic exudations are rendered soluble watery, abundant and easily removed, thereby lessening the condition of free exudation, due in part according to Baker, to excess of chlorides in the congested mucous tract. This becoming cleansed and the concretions removed, the medicament readily reaches the mucous tract when, by its astringent, stimulating or alterative action, it gives a healthy tone to the mucous membrane throwing rapidly off by the afflux of blood, exudates and abundant cell products.

For a general purpose as applicable to catarrhal conditions the following of M. M. Fileau and Petit, is generally available:

Acid carbolic, 2 grammes (parts); spirits turpentine, 50 grammes; essence tar, 20 grammes; eucalyptol of Merck, 30 grammes; chloroform ½ grammes.

Equal parts of creosote, oil of pine and comp. tincture benzoin are similarly good. The beneficial effects in diphtheria have been so frequently remarked by the writer that they deserve some reference. In this septicaemic disease we wish to cause free elimination of the poison at that point toward which it directs its most evident effects. By increasing, as under a tent, the temperature, with accompanying moisture, both skin and mucous surface are kept freely secreting at a temperature, say of 80° F. In consequence of the access of blood to the part, it is probable that the microbes of the disease and ptomaine products are similarly freely eliminated, and antiseptics as lactic acid and carbolic acid, obtain their fullest effects. How important is this eliminating influence will be seen when it is stated that in different cases it has been noticed that a child in whom the toxic effects of the poison had created so extreme a typhoid state as to create absolute indifference and disgust for food, will within a few hours after such inhalation has been instituted, become so relieved as to show some relish for food.

INDEX OF PROGRESS

SURGERY.

The Development and Repair of Bone.

(Continued from MEDICAL SCIENCE for November.)

"*Proposition F.—The periosteum does not initiate the reproduction of bone.*"

If an adult, healthy bone be removed subperiosteally *without previous irritation*, very little new bone is formed. If a matured bone be *submitted to irritation* for some time and then removed subperiosteally good sound bone is reproduced.

Wherein lies this difference? In the former the periosteum is perfectly healthy and only small nodules of bone are formed. These are found at the opening of the Haversian canals where the connective tissue surrounding them in being stripped carries with it some formative osseous cells.

In the latter the periosteum though not so healthy *appears* to be the source of production of new bone. It is not from the periosteum, however that this new bone is formed but from the osseous cells, or osteoblasts which the continued

irritation has caused to be poured out of the Haversian canals and spread over the surface of the bone, the periosteum acting as a limiting membrane only.

Again, the bone is destitute of periosteum at those points where tendons are inserted, and yet after removal of dead bones new osseous matter develops as readily from these points as in any other part, and it has already been observed that when the periosteum has been stripped from a portion of bone, fresh cells are thrown out from the interior of the bone and a new layer of bone formed as well as of connective tissue which becomes periosteum.

The author states he has performed subperiosteal excision of the elbow at least sixty times the periosteum being raised from the olecranon and the distant extremity of the humerus in order to preserve the aponeurotic and muscular connections.

Generally a number of small osseous plates are found adhering to the under surface of the periosteum and if allowed to remain produce more or less new bone which restricts the after movements of the elbow joint. If these be carefully removed, as is now the custom of this surgeon no new bone is formed from the periosteum.

He has also observed that the amount of callus thrown out, in cases of fracture is always greater when the periosteum has been much torn away from the bone than when it remains pretty well intact the periosteum in these cases acting as a limiting membrane. Callus thrown out from a fracture may in certain cases be superimposed on the periosteum, hence not produced by it.

"*Proposition G.—Bone may be regenerated independently of the medulla, which may itself be reproduced.*"

A case recorded in support of this proposition is that of a lad *set ten years* who had, besides complete destruction of the ankle-joint and bones of the foot, a chronic osteomyelitis of the tibea.

The interior of the shaft was filled with a dark chocolate pulp mixed with pus which extended from the upper tibeal epiphysis to the lower. The cancellated tissue had disappeared and the whole cavity filled with the fluid which flowed out when the shaft was opened into. The cavity was washed out leaving it entirely empty with only a shell of bone representing the cortex, and this shell was composed for the most part of young bone.

In a few months this external layer had become much thicker and a new medulla had formed in the interior. At the end of eight months the shaft was strong enough to bear the weight of the body while walking and when the patient was questioned four years afterwards it was found he could walk for long distances on it with ease.

"*Proposition H.—The histo-genetic phenomena support the foregoing observations, showing that the periosteum does not generate bone.*"

It is acknowledged that the perichondrium which surrounds the cartilage in the long fœtal bones does not produce the cartilage. Cartilage grows from the cells and these cells secrete the intercellular substance or matrix. In the ossification of cartilage the process commences at the middle of the shaft of hyaline cartilage and extends towards the extremities. There is first a proliferation of the cartilage cells and calcification of the matrix. This calcified material is absorbed and blood-vessels grow in. Medullary spaces are formed which are filled with cells, and from these osteoblasts thin layers of osseous tissue are produced and cover the trabeculæ between the spaces and as these layers thicken the trabeculæ are absorbed. Giant cells absorb portions of the intervening traebeculæ and thus form the medullary canal.

A layer of cartilage persists at the epiphysis until growth in length has ceased. The perichondrium becomes changed in *name* to the periosteum but it has nothing to do with generating bone.

The author concludes this exhaustive and exceedingly interesting paper in the following words: —"It may be stated that a study of the whole subject, from histogensis to experimental inquiry and pathological observation, shows that bone is produced and regenerated by proliferation of osteoblasts, and its development and reproduction can take place independently of the medulla and periosteum. The periosteum acts as a shield, as a protecting limiting membrane, through which the bone receives some of its blood supply, a very important portion being provided by the nutrient vessels. The cells of which the bone is composed are capable of living, separated form periosteum and medulla; they possess the power of proliferation, and consequently of regeneration of osseous tissue."

"These couclusions, if accepted, indicate to the

surgeon the value to be attached to the various elements, entering into the formation of bone. While not underestimating the periosteum, as a medium through which blood vessels reach the bone, and as a limiting and protecting membrane, of great use in many pathological conditions, he will no longer regard it as the structure which can secrete or reproduce bone. He will not trust the periosteum to regenerate bone unless it has adherent to it sound osseous plaques, the elements of which have the power of proliferation, and from these alone can osseous regeneration proceed. He will not discard injured osseous tissue under the belief that it must necessarily die, merely because it is divested of periosteum; but he will regard it as a tissue, possessed of great independent vitality, which, if placed in suitable media, where blood serum is plentiful, and where blood vessels can quickly be thrown out, is capable of living and growing. With that belief limbs, which otherwise would be sacrificed, may be saved."

MEDICINE

Some of the Rarer Symptoms produced by Gall Stones.

Ord ("Brit. Med. Jour.") took this subject as the basis of a paper read at the last annual meeting of the British Medical Association. He first drew attention to the circumstance that gall stones, might exist without producing symptoms, as was evident from the number frequently found post mortem in cases in which their presence had not been suspected during life.

Gall stones may be passed without symptoms. Two or three illustrative cases of the kind were briefly related. One was in a woman who had had no previous signs of gall stones, and who, the day after her confinement, passed a gall stone of such an enormous size that its passage was attended with almost as great difficulty as a second labor, and it was hence dubbed "the twin." Gall stones may give rise to pain, vomiting, etc., without causing jaundice. A patient was subject to irregularly recurring attacks of pain in the region of the gall-bladder with associated vomiting and faintness. She never had jaundice nor passed pale stools. She was seen by many physicians, and various diagnoses were made excepting the correct one. The patient died in an attack a few months later, and was found to have had a large biliary calculus, which had made its way through a perforation in the gall-bladder into the peritonæum. Gall stones may produce intermitting pyrexia. Both Murchison and Charcot have drawn attention to this, the former attributing to it a nervous irritation, the later to a uroseptic fever. Ord's attention was first called to this complication by some remarks of the late Dr. Murchison having reference to the case of a distinguished Indian medical officer, who, after his return to England, was attacked with paroxysms of shivering, followed by fever and sweating, at regular weekly periods. He was supposed at first, to have a recurrence of an old intermittent, and, later on, to have hepatic abscess, till at last his symptoms indicated, and the necropsy proved, that his actual and only disease was a gall stone so impacted as to produce great irritation, but not complete obstruction, of the common biie duct. A case of glycosuria came under the author's observation which seemed to be due to a gall stone, and which disappeared, as well as the concomitant symptoms of emaciation, thirst, etc., on the passage of the gall stone. In another case an attack of pneumonia developed in the subject of biliary calculus, and to the author it appeared to be in some way dependent upon it. The co-existence of gall stone with malignant disease of the gall-bladder and the parts immediately adjoining has been recorded frequently enough to give rise to the speculation as to how far the presence of gall stones would be capable of causing malignant disease. The author has met with a few cases in which the evidence was of an affirmative nature. He has seen two cases in which the passage of gall stones was attended with sharp hæmorrhage preceded the passage of a large gall stone without biliary obstruction. The bleeding might have been due to the tearing of the opening between the gall duct and the bowel. In the second case considerable hæmorrhage occurred directly after an attack of biliary colic and jaundice. After the cessation of hæmorrhage, a ragged gall stone of such size as might have allowed it to traverse the gall-duct was found in the fæces.

Antiseptic Treatment of Purulent Otorrhœa.

Quite remarkable results have lately been obtained by the strictly antiseptic treatment of purulent otorrhœa suggested by Dr. W. Chrystie. Specula have all been kept in a 1 to 20 solution of

carbolic acid, after having been carefully washed in hot water, and cotton carriers are in each instance heated to a red heat before being used. The external canal and fundus of the affected ear are first carefully dried out with ordinary absorbent or borated cotton on sterilized holders, and the fundus is then mopped absolutely clean with a 1 to 40 carbolized solution using cotton tufts. This is in turn gently dried out, and a powder consisting of iodoform 1 part, boric acid 6 parts. is then insufflated. By this method the duration of treatment has been shortened to two or three applications in many cases, and an average of about eight treatments is sufficient to cure most cases, even when of some years' duration. Thorough treatment of the always diseased naso-pharynx is carried out with great care in all cases of purulent otitis.—*Polyclinic.*

The Therapeutic Value of Blood-letting.

An editorial in the *New York Medical Journal*, June 25th 1887, thus summarizes present medical opinion on this subject :—

Blood-letting should not fall into utter disuse. Weighty accusatious have been brought against it, but let us allow only what is confirmed by modern scientific research—namely, its powerlessness in inflammations and in fevers, its dangers in chronic affections, and the obscure rôle it plays in neuroses and in eclampsia ; while physiology, in spite of its gaps, teaches the therapeutist that the blood is always being renewed, that the stability of the circulation is not hindered by a moderate blood-letting, and that, although a powerful modifier of the circulatory equilibrium, this great agent had no other dangers than those that arise from its over-abundant employment, its excessive repetition, and its inopportune use. Physiology teaches us also that the philosophy of this therapeutical measure, around which too much majesty and solemnity have gathered, is found not in systems, but in the modest aphorism : "Use, do not abuse !"

THERAPEUTIC.

Electro-Therapeutics.

In order to fully understand and appreciate the reasons on which some of the statements made in connection with electric science are based, it will be necessary to discuss the *polar theory*. In the language of this theory the electric force is supposed to be made up and transmitted by molecules, the respective halves of which are positively and negatively electrified. Thus if we make a row of 7 or 8 o's, and darken the right halves of each, letting the dark half of the molecule represent the negatively, and the light half the positively electrified portions of the same, we see how the respective halves or *poles* are in connection with their opposite electricities, the same as in the case of the sealing wax and disk, the unlike were attracted and the like repelled ; now if the ends of the above series of molecules were swung round until the negative end touched the positive end, we would have a circle or *circuit*, and this is exactly the condition of things supposed to exist in a battery when the two poles are connected. The two electricities are equally developed and constantly tend to neutralize each other. The way in which this is prevented and the necessity of having a fluid which is decomposable and acts chemically on one of the plates in the battery, as well as the probable action of the platinum or copper plate, is explained in this way. If a plate of zinc be placed in some hydrochloric acid the parts of the metal in contact with the fluid become positively electrified while the distant parts of the metal are negatively electrified, at the same time, the chlorine and hydrogen atoms, in the layer of molecules of H Cl in contact with the metal, become respectively negatively and positively electrified ; so long as we have but one metal, not in contact with any other, in the liquid nothing ensues but this state of electrical tension. If now we connect a platinum plate with the zinc, the platinum plate will become charged with electricity by induction, and the molecules will be arranged in it just the same as if we added another 5 or 6 o's with light and dark halves, to our row above mentioned, the light or positive halves of the platinum being towards the dark or negative halves of the zinc, this leaves the negative portions of the platinum in contact with the liquid when it is immersed in it ; now as the negative chlorine atoms of the H Cl molecule were in contact with the positive portions of the zinc, the positive hydrogen atoms will be nearest the negative platinum. This arrangement will be propogated through all the molecules in the liquid between the two plates until finally the positive hydrogen comes in contact with the negative platinum. Electrical action will now ensue. This will rise so high as to

decompose the H Cl, the chlorine will combine with the zinc to form zincic chloride which will be dissolved and removed from further action. The atom of hydrogen set free will combine with the adjacent chlorine which will leave another free atom of hydrogen. This change will be propogated throughout the whole mass in every direction until finally there will be a freed atom of hydrogen contiguous to the platinum plate, this will give up its excess of positive electricity to neutralize the negative platinum and then escape as gas. Now as the electric current is established by the constant attempts of the different electricities to neutralize each other and establish an equilibrium, and as the electric force in its endeavor to establish equilibrium, generates the current which decomposes the battery constituents, the current will be generated, so long as the poles of the battery are connected, until either the zinc or the fluid is used up.—[W.B.N.]

The Stenocarpin Fiasco.

We have just received a letter from Parke Davis & Co. which gives the result of their investigations on the nature and properties of gleditschin or stenocarpin. They wrote to Dr. Seward for a sample and he referred them to Messrs. Lehn & Fink of New York, from whom alone he said was it possible to obtain a solution of this alkaloid. Below we give the condensed results of their chemist's (Mr. F. A. Thompson, Ph. C.,) work on the subject. He received about a fluid ounce of this solution, it had a sweetish odor and sp. gr. of 1.016 at 59. F., which caused the immediate suspicion of there being present more than two per cent. of any alkaloid. The following is a fac simile copy of the label on the bottle :

GLEDITSCHIN
$C_{20}\ H_{21}\ No_3$
SO-CALLED
STENOCARPIN.
A new local Anæsthetic.
The salt not being permanent, this 2% solution is recommended.

The name Stenocarpin was given this alkaloid by Dr. Seward, its discoverer, because of the close resemblance which the leaves from which he prepared it bear to those of the Acacia Stenocarpo, they have since been identified as belonging to the Gleditschea Triacantha.

Recent investigations have proven that in many cases it is preferable to Cocaine, and in ophthalmic diseases superior to Atropin.

LEHN & FINK, - - NEW YORK.

He sums up his work thus: 1. That the solution, claimed to be a two per-cent of gleditschine, is not what it is represented, and that those introducing it as such are guilty of fraud.

2. That the solution likely contains some coloring agent, differing from that obtained from the drug in which the alkaloid is isolated, or that the color may be due to the presence of an alkaloid, or the substance supposed to be in combination with the cocaine.

3. That the peculiar action of the extracted alkaloid to chemical tests, appearance, taste, and odor, suggest it to be none other than cocaine.

4. That the presence of chloride and sulphate indicates positively that a sulphate of one alkaloid and a muriate of another are present; and the presence of cocaine being estabilshed, which is without doubt in the form of muriate, the sulphate can be accounted for only by assuming that it is in combination with *atropine*, or some other mydriatic alkaloid, such as *duboisine*.

5. The solution contains 6.85 per cent. of alkaloid, calculated as cocaine muriate instead of 2 per cent. of Gleditschine (!) as stated on label.

6. That the dilatation of the pupil of the eye was thought to be more lasting than from cocaine, and less so than from atropine,, indicating the possible presence of some myotic, modifying the action of the mydriatic. Experiencing no dryness of the throat or any hallucinations from the hypodermic injection of the solution. It is possible no *mydriatic* except cocaine is present.

7. That the statement made, that the salt was not permanent, and finding the salt of the alkaloid in this solution quite so, leads one to suppose that this *is not the reason for making such an assertion*.

8. That having had placed at my disposal through the firm of Parke, Davis & Co., several pounds of leaves from which I am unable to produce as yet but a trace of alkaloid giving precipitates with the usual alkaloidal reagents, and which applied to the tongue, produces no sensation whatever, and the existence of a volatile constituent very probable, and a large amount of resinous-like substances having strong astringent properties being present, I question the existance of an anæsthetic or mydriatic alkaloid in Gleditschia triacanthos.

Keratin and its Uses.

We merely wish to draw the attention of the profession to this unofficinal compound, as we consider its chief property, insolubility by the gastric fluids, although easily soluble by intestinal juices

—to be a most valuable one. Its preparation is simple and easy. Horn turnings are digested with artificial gastric juice until all the soluble matter has been removed; the residue is then allowed to lie for some weeks in ammonia or glacial acetic acid. When it is all dissolved the solution is evaporated to a mucilaginous consistency. This mucilage can be used for coating. The medicines, which have been made up in pill form, are first given a coating of cocoa-butter and then one, or better, two coats of keratin. As to the many instances in which its properties are especially valuable to us we can enumerate but a few: first, where we wish to give medicines which are irritable to the stomach or where we have to continue their presentation for a long time, such as arsenic, salicylic acid, creasote, copaiba, chrysarobin, ferrum (iodide and chloride), mercury, (protiodide and chloride), phosphorous, quinine, and all anthelmintics (especially valuable), as we can give such substances as kousso, malefern and santonine, in very concentrated form, and place them where they will act directly on the parasites, we also have in this a means of direct intestinal medication. Then there are those substances which impair digestion by forming insoluable precipitates with pepsin and peptones as tannic acid, alum, lead acetate, bismuth subnit, nitrate of silver, and lastly, substances which have their medicinal properties destroyed or rendered inert by the gastric juices, as, ox-gall, alkalies, calcium sulphide, nitrate of silver, iodies of mercury and iron, etc. We would like to see some manufacturing house make up a line of these preparations, only the fact that many of such preparations, that we have already, are not dissolved by the gastric juices, (or any other,) makes it almost unnecessary.

Cocaine in Gonorrhœa.

There is no medical man but has heard a most graphic description of the suffering which a patient with gonorrhœa undergoes whenever he attempts to micturate, and how helpless he has been to save that patient pain previous to the period at which he has been able to alkalinise the urine. We have had the pleasure of overcoming this difficulty by injecting half a drachm of a 4% solution of cocaine. Whenever the patient desires to micturate he injects half a drachm of the solution in the same manner that he would make an ordinary injection retaining the fluid for five or six minutes, after which he will be able to micturate without any uneasiness.—W. B. N.]

Iodoform Instead of Opium.

In those cases among children of intestinal pain and irritation in which opium only increases the restlessness, much benefit may be obtained by administering iodoform in 3-5 grain doses.

Saccharine Tabloids.—(*Querry.*)

We find advertisements in all the English journals of this new substance (which is some 300 times sweeter than sugar) put up in the form of tablets, for use in sweetening food for diabetics. Why don't our pharmacal houses import some? Surely our diabetic patients deserve all our attention in the way of making life as pleasant as possible for them.

GYNECOLOGY.

Boracic Acid in the Treatment of Leucorrhœa.

Dr. Schwartz' manner of using it is as follows: Having first irrigated the vagina with water at as high a temperature as can well be borne by patient, a cylindrical speculum is introduced and the vaginal walls very carefully dried, first with a soft sponge, and then with absorbent cotton. This done, boracic acid in crystals is poured into the mouth of the speculum and pushed up against the uterus and vault of the vagina with a clean cork caught in a uterine sponge carrier, sufficient acid being used to surround and bury the intravaginal portion of cervix, filling the upper part of vagina. A tampon of absorbent cotton is then firmly pressed against the packing and held *in situ* until the folds of the vaginal walls close over it as the speculum is withdrawn.

This should be allowed to remain three or four days or even longer, as after this time there still remains some undissolved particles of the acid, nor will the tampon seem at all offensive. The ostium vaginæ, if examined in twenty-four hours, instead of being besmeared with leucorrhœal secretion or discharge, presents a clean appearance, and bathed in a watery fluid, which begins to appear several hours after the packing has been placed, and in my cases this was the only discharge noticed afterwards.

However, a second or even a third repetition may be necessary, but in none of my cases, numbering nearly a score, have I found more than a second packing called for, and in many one sufficed; and in no instance has its use occasioned pain, not even inconvenience.—*Medical Bulletin.*

OBSTETRICS.

Mammary Abscess.

Dr. Henry T. Bahnson, in the New Orleans medical and surgical journal, recommends the following method of treating a mammary abscess, or an inflamed breast liable to terminate in an abscess:—He applies a square piece of rubber tissue such as is used by dentists, sufficiently large to cover the whole breast, by tying a tape to each corner. Two of these tapes are passed round the waist and tied at the back, the two upper ones are passed, one under the axilla on the same side as the affected breast, the other over the opposite shoulder and also tied at the back. A small opening may be made for the nipple and the milk drawn off by the breast pump or the child. He concludes as follows:—"I have applied the tissue after the establishment of suppuration and seen the pus absorbed. Abscesses threatening to involve the whole breast, have contracted to such an extent, that when opened a day or two after the application they discharged perhaps a teaspoonful, and the cavities healed by first intention. No form of support is so comfortable to the patient by thoroughly relieving the dragging weight of the inflamed breasts, while its equal pressure promotes absorption and prevents extension of inflammation or burrowing of pus. The tapes may be tied to the corners of the tissue. The gathering at its corners assists in adapting it to the contour of the breast, and, besides, the tissue is easily torn if punctured by a pin or needle. Care must be taken to remove the rubber as soon as the signs of inflammation disappear, or the secretion of milk will be permanently arrested."

[We have recently tried the above plan of treatment with marked success. Mrs. F. first seen on Oct. 6th, arrived in Toronto the previous day. She had just crossed the Atlantic and while on board ship caught cold and had one or more marked rigors. When first seen she presented the following symptoms:—Pulse, 130; temperature 103.2 F.; the breast immediately above the nipple was swollen, inflamed and painful and a large abscess pointed markedly at this spot. This was freely incised and poultices to be changed every two hours ordered. She was seen on the three subsequent days and appeared to be progressing favourably, the breast had assumed a more healthy look and the discharge lessened very much in quantity. As their means was limited they requested that the visits be discontinued and promised to send at once if any unfavorable symptoms developed. For eleven days nothing more was heard of he On the twelfth day she sent and asked for further attention. Her appearance when seen was a pitiable one. Pulse very weak and rapid, temperature high, face pinched, cheeks flushed, and every appearance of blood-poisoning. On examination of the breast it was seen that pus had burrowed through three-fourths of the whole organ and thirteen discharging openings were counted. Three of these were enlarged and the rubber tissue applied having first covered the breast thickly with tarred jute or tow.

This dressing was changed at first twice a day, later, daily. She was also ordered to take three grains of quinine every three hours, one ounce of whiskey every two hours and a milk diet. Within the first 24 hours she began to improve and the progress towards recovery was steady and uninterrupted until at the present time (just three weeks and three days from the first application of the pressure) her pulse and temperature are normal, 12 of the 13 openings have not discharged any pus for four or five days, though a small quantity still exudes through the original incision.

The mistake made in the treatment of this case was in not applying the pressure at the time of incising the abscess, even though the latter was circumscribed and pointed plainly at one spot, and apparently progressed favorably for the first few days after being opened.—Ed.]

NEUROLOGY.

What is Nervous Irritability.

In the last issue of Medical Science were summarized the results of the existing views regarding the nature of *Nerve Force*. In these days, however, when the term *neurasthenia* has become as common a term almost as its popular equivalent nervousness, it is of great importance for the clinician to be able to apprehend with some degree of clearness what are its physio-pathological relationships. It has been shown that while nerve force is not an electrical phenomenon, yet everyday experience in practice makes evident the point that the degree of conductibility in nerve tissue varies greatly according to the general *tone* of the system. This

tone condition in nerves, which may be intensified by a galvanic current, has been called an *electrotonic* state; while perversions of it as regards sensibility are, as Jaccoud says, "both *quantitative* and *qualitative* as regards the excitability of nerves, . . . perverted or erroneous, which are purely subjective," and various forms of *anesthesia* observed especially amongst the hysterical. Says Prof. Putnam, "neurasthenia has come of late into general use to indicate certain states of the nervous system of which the anatomical basis is unknown, but which are characterized on the one hand by a lack of vigor, efficiency and endurance, affecting usually a large number of the nervous functions, and on the other hand by signs of active derangement." That such conditions, if not at present thoroughly understood, are at least dependent upon physical variations from the normal is seen from such considerations as the fact that, as Bartholow says, "in the pathological state when the sensibility is diminished, more energetic contractionsare obtained with a descending (galvanic) current, while in the normal condition . . . the inverse or ascending current produces the strongest contractions."

Taking but one other illustration of this point, we remember Bernard's experiment in cutting the cervical sympathetic when a great afflux of blood takes place on that side of the head through paralysis of the muscular arterial walls, accompanied with augmentation of temperature and sensibility; and how, conversely if the same is stimulated by an induced electrical current, the pupil dilates, the globe of the eye protrudes, the bloodvessels of the part contract, the temperature falls below the normal, secretion of tears is lessened, etc.

From these illustrations we may fairly say that if we do not know what the minute histology of the changes is, we at least know something of the modes by which the pathological conditions are produced. Perhaps we will be most nearly correct if we call neurasthenias inadequate nutution, whether due to mere starvation, to exhaustion, or perversion.

In a very practical paper read by ———— on *migraine* in Children, the writer points out the causes to be hereditary in a marked degree, to be induced by bad air and food, overcrowding and high-pressure in schools, and to unhealthy stimulation by bad company, and the mistaken kindness of taking the young to theatres. Such stimulation of a certain portion of the nervous system resulting in early puberty and, often, associated vice, too frequently, along with many additional exciting causes, if long continued, carries the nervous irritability beyond physiological limits, and results in pathological conditions, or a *neuritis*. A realization of the fact and all that a neuritis involves, ought to be sufficient to make the physician, though often in vain, preach eloquent sermons against the many irritating influences, emotional and intellectual, which to-day are creating what is rapidly becoming a type. The almost unlimited symptomatology and its serious and often permanent manifestations would seem to teach that in many a true *neuritis* is often developed, which, while it may often be secondary, is certainly not infrequently, according to Jaccoud, spontaneous. He says, "I am convinced that a good number of paralyses and circumscribed neuralgias which pass for essential or rheumatic are really an inflammation of the corresponding nerves." After describing the pathological anatomy of the inflammation of nerves, in which are the usual ecchymoses, abnormal hyperæmia, softening, exudation serous or sero-fibrinous, with varying termination, he speaks of the symptoms belonging mostly to functional troubles. Their nature makes it apparent that it is quite impossible to draw by means of them a line between functional disturbance and actual disease. They are pain along the course of a nerve, increased by pressure, or by the slightest superficial irritation of the nerve. This pain is lost late as the lesion lessens conductibility: tactile sensibility may gradually be dulled while spontaneous pain remains. In mixed nerve lesions, jerking and painful muscular *contractures* are present, gradually to be followed by abolition of reflex movements and electrical contractibility. Lesions of nutition are not absent, as *erythema*, *herpes*, or other vesicular pigmentation or bullous eruptions, and even pigmentatre and arthropathies. Taking this symptomatology, and who does not recognize many of the symptoms as those present in what are often erroneously diagnosed as neurasthenias. For lessening this ever-increasing class of *insane* and *neurasthenics*, the removal of such exciting causes, as those mentioned, and the correcting of the beginning of these evil are clearly taught and urgently indicated.

LARYNGOLOGY.

The telegraphic reports of the condition of the Crown Prince of Germany, appearing regularly in our daily papers, have created amongst all classes, a profound interest in the case, on this side of the Atlantic. Those reports have gradually become more serious until now it appears to be most generally conceded that the disease is of a cancerous nature, and it has been suggested by some eminent physicians that *laryngectomy* should be performed. The deep interest which we know the medical men of Canada take in the case and the anxiety which they feel for the welfare of so eminently popular and prominent a man as the Crown Prince, lead us to give a brief outline of the operation which has been suggested and the statistics bearing upon it.

The operation, though a modern one, was conceived of even as far back as the beginning of the present century, and in 1829, by way of experiment, Albers removed the entire larynx from two dogs. Czerny of Heidelberg, was the first to completely demonstrate that not only was it possible to remove the entire larynx in dogs but that it was practicable on man. This was in 1870 and three years later, Billroth found opportunity, in his Vienna clinic, to make the first attempt on a living patient. The operation was quite successful, the patient recovering and in due time one of Gussenbauer's artificial substitutes supplied.

This patient died one year afterwards from cancer returning in the cervical glands. Heine, Maas, Schmidt, Schonbrum and many others have since performed the operation until now it has been done nearly a hundred times, and of this number over thirty have survived the operation more than two months and of these some have lived for years, others for only a few months but all much longer than would otherwise have been possible.

The Operation.—If tracheotomy has not already been rendered necessary, evidence seems strongly in favor of postponing this operation or of merging it in the graver one the surgeon being prepared to do it at any moment should the emergency arise. The preliminary skin incision should be a long one, extending even from near the chin to the sternum along the line of safety. By this long incision any lateral cutting is unnecessary. From above the hyoid bone to a level below the larynx, this incision should be deepened until the deep fascia covering the respiratory tract be divided. The lateral attachments of the muscles are now to be separated by the handle of the knife or by an elevator and any spouting vessels to be caught by the hæmostatic forceps. When necessary any vessels of sufficient size must be ligated twice before cutting. The isthmus of the thyroid should be treated in the same way before cutting. The larynx is now freed anteriorly and laterally but to free it posteriorly is probably the most difficult part of the operation. Remembering that the anterior wall of the œsophagus commences at the level of the cricoid cartilage the separation must be made with extreme care and probably the fingernails are the best instruments te be used for this.

The larynx having now been completely loosened, the thyro-hyoid membrane exposed and all hæmorrhage checked, the next step in the operation is its removal either from above or below. To proceed from below seems to have the preference, as it provides for the proper care of the trachea at once. Having decided at what height the division shall be made, whether just below the cricoid, or between some of the upper tracheal rings, as circumstances will dictate, the section is made quickly, the upper portion lifted out of the way and a tracheal cannula inserted.

This is well packed around to prevent blood from entering the trachea and the anæsthetic continued at this point. The surgeon must now quickly decide how far up he shall go. It is usually deemed advisable to remove the epiglottis as it is afterwards found to be a detriment rather than an advantage. The thyro-hyoid membrane is now divided, also the folds connecting the epiglottis with parts above, as well as any remaining connections, and the diseased mass lifted out.

The surrounding tissues are carefully examined and any that may be diseased, removed, e.g., part of hyoid, base of tongue, cervical glands, thyroid gland, etc. Hæmorrhage is not usually severe and if kept out of the trachea will not give much difficulty.

The wound is a very large and formidable looking one, presenting a large pharyngeal opening, the upper gaping end of the œsophagus and the divided trachea. The edges of the wound should not be brought together but left to close naturally, the trachea being prevented from retracting by suturing it to the margin of the wound.

In dressing the wound, the cannula and the packing around it are removed, the trachea cleared and the tube reinserted, packing it around with antiseptic gauze, so that no secretion can pass it, and then the balance of the wound filled nearly full with the same gauze. A separate strip of gauze should be used to plug the œsophagus so that it can be removed from time to time for feeding without disturbing the rest of the dressing.

The wound is allowed to granulate and as cicatrization follows preparations should be made for the introduction of some artificial substitute for the larynx, A very ingenious apparatus is the one devised by Gussenbaur of Prague, a model of which is shown in the "Reference Handbook of the Medical Sciences."

BACTERIOLOGY AND EPIDEMIOLOGY.

Micro-Organisms in Air a Measure of Healthfulness in Tenements and School Rooms.

Although the special work of municipal hygiene is relegated to local boards of health, nevertheless by the provisions of the Public Health Act of 1887, as well as of previous school regulations certain very important duties are laid upon boards of trustees and teachers with regard to contagious diseases. Apart, however, from these special duties, a still greater demand is made upon the teacher in the way of obtaining a special knowledge of the everyday conditions of the school rooms, as they specially affect the health and comfort of both himself and his pupils. In no one point does this become of such vital importance as in the matter of ventilation and heating of school rooms. Before, however, they can seriously engage in this work they must thoroughly realize the dangers which the ordinary conditions of school rooms imply. With a view of aiding in the acquisition of such knowledge, and of supplying to medical health officers who by law are medical inspectors of schools, we propose to give the results of some very remarkable experimental researches on vitiated air recently conducted by Professor Carnelley, of Dundee, and J. S. Haldane, Esq., of Dundee, aided by Dr. Anderson, Medical Health Officer.

The first series of observations was made on the air of buildings. He says, "The fact that an enormously increased mortality prevails amongst persons who spend much of their time crowded together in ill-ventilated rooms is universally admitted, and recapitulation of the argument be deemed unneccessary." One of the first requisites for success in the endeavor to procure pure air is a knowledge of the nature and amounts of the various impurities present in vitiated air, and their sources. While carbonic acid is easy to estimate in air, it is now well-known that its estimation is in no sense a certain measure of the impurities which are directly or indirectly communicated by human beings to air in other ways than by respiration.

Of the other impurities of vitiated air perhaps most interest attaches in view of recent advances in pathology to the micro-organisms, and especially to the bacteria. It has lately become possible to estimate the latter with relative ease and accuracy, thanks to methods of research introduced by Professor Koch and Dr. Hesse. There are still other impurities, some of which we can detect by the sense of smell. We know little as to their chemical composition, and, if possible, less as to their hygienic significance. They may be roughly set down as "organic matter." They indicate their presence by several chemical reactions, one of these being the bleaching of solutions of permanganate of potash. For the purposes of our research Dr. Carnelley introduced a process dependent on this reaction, by which the relative amounts of the bleaching action in different specimens of air could be rapidly estimated. (Carnelley and Mackie, Proc. Roy. Soc., Vol. XLI., p. 238.)

Our observations on the air of buildings relate chiefly to dwellings and schools in Dundee. The main part of our work consisted in making a large number of simultaneous estimations of carbonic acid, "organic matter," and micro-organisms; but we endeavored in addition to throw what light we could on the sources of each constituent.

THE AIR OF DWELLINGS.

The analyses of the air of dwellings were made during the night, between the hours of one and five in the morning, as we considered that at this time the air would contain about an average amount of the impurities existing in the air during the presence of the inhabitants. We examined the air in sleeping rooms of eighteen of the better class of houses in Dundee, in thirteen two-roomed, and in twenty-nine one-roomed dwellings. The results were as follows :—

	One-roomed houses				Two-roomed houses				Houses of four rooms and upwards			
	No. of Cases	Lowest	Highest	Average	No. of Cases	Lowest	Highest	Average	No. of Cases	Lowest	Highest	Average
Persons per house (per room in last class)	29	2	10	6.6	13	4	10	6.8	18	1	3	1.3
Space per person	29	104	528	212	13	148	395	249	18	391	4206	1833
Temperature (F.°)	21	43	61	55	9	50	59	53.5	13	42	63	54.5
Carbonic acid	29	6.3	32.1	11.2	12	7.1	13.2	9 9	18	4.5	11.7	7.7
Organic matter	29	7.8	38.1	15.7	11	5.0	30.2	10 1	18	1.1	12.0	4.5
Total micro-organisms.	28	6.0	240.0	60.0	13	8.0	128.0	46 0	18	0.5	22.0	9.0
Bacteria	19	6 0	120 0	58 0	11	6.0	118.0	43.0	16	0.5	16.0	8.5
Moulds	19	0.	5.0	1.2	11	0	10 0	2.2	16	0	1.0	0.4

On each night similar analyses of outside air in the streets were also made for the purposes of comparison. If we subtract the amounts found in the air outside from the above quantities, and take the corrected averages for the air of the better class of dwellings as unity, we obtain the following table :—

	Houses of four rooms and upwards	Two-roomed houses	One-roomed houses
Cubic space per person	1	0.13	0.11
Carbonic acid	1	1.5	2.0
Organic matter	1	1.6	4.4
Micro-organisms (total)	1	5 1	6.7
Bacteria	1	5.1	6.9
Moulds	1	5.5	3.0

These tables show clearly the enormous differences in the purity of the air of different classes of dwellings.

The fact that the increase in death-rate runs parallel with the increase in air pollution does not prove that the former is the cause of the latter. But we may argue from other evidence that the pollution of the air is one very potent cause, and probably the chief cause, of the increased mortality.

THE AIR OF SCHOOLS.

We examined during winter at least two rooms in each of the Board schools and several denominational and private schools in Dundee, besides several lecture rooms in University College. The rooms examined may be classified in the first place according to the means of ventilation, as this was found to make an enormous difference in the results. A certain proportion were ventilated by ordinary means, such as fires, open windows, and ventilators in the roof. The rest were ventilated mechanically by blowing air by means of fans over hot pipes, and thence into several rooms by means of shafts. The following table gives the results obtained with the two kinds of ventilation :—

	Schools							
	Naturally ventilated				Mechanically ventilated			
	No. of cases	Lowest	Highest	Average	Average	Lowest	Highest	No. of cases
Per cent. of windows open	...	...	...	22	3	...	...	...
No. present, including staff	39	27	191	92	64	20	170	20
Space per person	39	56	427	168	164	119	228	20
Temperature (°Fah.)	35	44	65	55.6	62	58	69	18
Carbonic acid	39	7.9	37.8	18.6	12.3	7.0	19.6	20
Organic matter	38	5.0	40.3	16.2	10.1	3.4	19.0	20
Tot'l micro-organ'ms	35	8	600	152	16.58	0	58	18
Bacteria	28	8	600	151	16.0	0	56	18
Moulds	28	0	4	1.1	0.58	0	2	18
Or above outside air:								
Temperature (°F)	25	3	31	16.8	21	22	23	3
Carbonic acid	39	4.1	34.3	15.1	8.8	3.5	16.1	20
Organic matter	38	0	31.4	7.8	1.1	0	5??	20

Or, if we take as units the average cubic space, the average excess over outside air of temperature, of carbonic acid, and of organic matter, and the average micro-organisms, in mechanically ventilated schools, the comparative results for naturally ventilated schools may be expressed as in the following table :—

	Mechanically ventilated	Naturally ventilated
Cubic space per person	1	1.0
Temperature in excess of outside air	1	0.66
Carbonic acid " "	1	1.7
Organic matter " "	1	7.0
Micro-organisms " "	1	9.2
Bacteria " "	1	9.4
Moulds " "	1	2.0

We now come to some of the most unexpected and interesting of our results. Wishing to test more thoroughly the results of mechanical ventilation, we made a number of comparative experiments on different days in the same room. The circumstances

were as nearly as possible the same, except that on some days the mechanical ventilation was in operation, and on other days not, open windows, &c., being used instead. We found, to our surprise, that whereas the carbonic acid present in the air was increased from 12·6 to 18·6 volumes with the mechanical ventilation not in operation, the average number of micro-organisms remained almost exactly the same. Even when the mechanical ventilation was kept off for a week this had no distinct effect in increasing the number of micro-organisms. These anomalous results did not lead us to doubt the effects of mechanical ventilation in diminishing the number of micro-organisms in air, as we found the number very small even in rooms where every other condition except the ventilation seemed to favor a large number. We were, therefore, forced to conclude that while the ventilation at the time is the decisive factor in influencing the amount of the gaseous impurities, it is, other things being equal, the habitual state of the ventilation which influences the micro-organisms. This led us to inquire into a number of points regarding the sources of the micro-organisms.

It had previously been proved by Tyndall and others, that physical disturbances of any kind, such as those caused by the presence of human beings, have a great effect in disseminating micro-organisms in air, and that air left perfectly still gradually deposits its micro-organisms. We naturally, at first, expected that varying amounts of physical disturbance would very much obscure other differences. It turned out, however, that this is not the case. Although the influence of difference in physical disturbance is well marked, under ordinary circumstances other influences have a much greater effect, as we shall see.

That the micro-organisms do not come from the breath, but are on the contrary filtered off by respiration, we showed by means of some experiments, the details of which need not be described here *(see* "Phil. Trans.," vol. 178, B, page 92.) That they do not come in any large number directly from the clothes or skin of the persons present in a room was shown by a number of observations made in the two chemical lecture rooms. Even during a course of crowded popular lectures there was found to be an average of only four micro-organisms per litre, as compared with an average of about three when the room had remained empty. Nor did the number rise beyond six per litre when the room was left unventilated during the lecture, and the carbonic acid rose to nearly 40 volumes per 10,000. This conversation alone shows strikingly, I think, that the carbonic acid is no measure of the number of micro-organisms in the air of a room.

The micro-organisms thus do not come to any large extent from the bodies of the persons present at the time. Nor do they come from the outside air, which is comparatively free from micro-organisms during winter, as shown both by our own experiments and by the more recent and systematic ones of Dr. Percy Frankland. We must therefore conclude that they come from the floor and other parts of the room itself. If this is really so, the state of a room as regards cleanliness ought to have an effect on the number of micro-organisms. This was found to be actually the case, as shown in the following classification of both schools and houses:—

		No. of cases	Average space per person	Average carbonic acid.	Average organic matter	Average micro-organisms
One-roomed house...	Clean	1	275	8.0	13.1	18
	Dirty	7	200	9.9	18.1	41
	Dirtier	13	221	10.7	13.5	49
	Very dirty	6	220	11.0	15.1	93
Two-roomed houses.	Very clean	2	273	12.5	10.8	10
	Clean	4	251	9.3	7.7	22
	Dirty	7	233	9.4	11.2	69
Naturally ventilated Board Schools	Cleaner	12	167	19.7	18.1	91
	Average cleanliness	12	166	14.2	16.2	125
	Dirtier	12	191	22.5	15.2	198
Mechanically ventilated schools and college	Cleanest	7	191	12.5	12.7	3
	Clean	11	155	12.8	8.3	10
	Less clean	4	152	10.8	9.8	30

We next classified the schools according to age and obtained the following results :—

	No. of cases	Micro-organisms per litre
Opened before 1866	7	211
" 1875-1880	20	150
" 1881-1885	5	38

This was not at all what we expected to find. One would rather have anticipated that the micro-organisms, like the ordinary dust particles in a room, would very soon reach a maximum, depending on how often the room was cleaned. But the causes under the action of which a room becomes infested with micro-organisms are evidently no merely temporary ones, but have a gradually cumu-

lative action. Further investigations on this point are now being carried out by Professor Carnelley at Dundee.

At the time when the results of our analysis led us to this important result, we were unaware of the very interesting research made recently by Dr. Emmerich of Leipzig; I think the results he obtained may throw a great deal of light on this cumulative infection of the air by micro-organisms. At any rate his research was such an important one, that I need not apologize for shortly referring to it.

He made a large number of analyses of the damping material used for filling up the space between the ceiling of one flat and the floor of the flat above. He found an almost incredible pollution of this material. His analyses show that, to use his own words, "there exists nowhere in nature, not even in the neighborhood of human dwellings, a soil so highly contaminated with nitrogenuous organic substances and their decomposition products as the damping material under the floor of dwelling rooms." The amount of chloride of sodium found in this material was on an average seven times greater than that found in the ground under leaky cesspools, and twelve times greater than that in the soil round a dung hill, although this soil was visibly soaked with filth. When the coarse pieces of stone were separated from this material, it was found that the finer dust and sand which was left, contained even more nitrogenuous matter than human excrement. "In the damping material of a single room, there was usually more excremental matter present than in a large cesspool." That all this filth is alive with micro-organisms, is shown by the amount of the products of decomposition which result from their activity. Thus under the floor of one single room Emmerich found that there were more than 6 cwt. of nitric acid in the form of nitrates. He also showed that the carbonic acid in the air of rooms left shut up and empty increased, although all other known sources of carbonic acid, such as sub-soil, air, &c., were excluded. The chief cause of this contamination was undoubtedly the soaking of fluids and shaking of dust through the fissures and spaces between the boards in the floor. Often, however, the rubbish which was used as damping material was contaminated from the beginning, having been taken from old houses, or rubbish heaps, such apparently as many houses in this country are built upon.

Emmerich's paper is such a remarkable one, and contains so many points of interest, that one is surprised at not having heard something of it in this country. It is well worth the careful attention of everyone interested in questions of public health. There seems no reason to doubt that a very similar state of pollution exists in the damping material of English houses.

Emmerich followed up this research by another no less interesting one in connection with the same subject. In a prison at Amberg there had persistently occurred for years epidemics of croupous pneumonia. The last of these had attacked every seventh, and killed every twentieth prisoner. As is well-known, the late Dr. Friedländer, of Berlin, discovered the presence in cases of croupous pneumonia of a species of bacterium, cultivations of which, when inhaled by, or inoculated into, certain animals, produces a similar disease in them. There can thus be little doubt as to the casual connection between this organism and the disease, or at any rate certain forms of it. Emmerich examined the damping material from the infected rooms in the Amberg prison. He not only found this material full of organic matter as usual, but actually discovered Friedländer's bacterium in enormous numbers.

To return to our own researches, it seems very likely that the progressive contamination of the material in the floors, and perhaps elsewhere about the room, may be connected with the progressive contamination of the air with micro-organisms. Emmerich's researches throw a vivid light on the manner in which this progressive contamination may affect the health of the inhabitants. A glance at our table of statistics will show how the mortality from croupous pneumonia, for instance, increases from 3·5 per thousand in the better houses to 6·6 in the three-roomed, and 12·5 in the one and two-roomed. Probably the mortality would be even larger in the latter class were it not for the influence of hospital treatment, which is very frequently taken advantage of in cases of croupous pneumonia, and is of great benefit.

In what manner exactly mechanical ventilation reduces the number of micro-organisms in the air seems still rather obscure. The explanation may perhaps lie in the more efficient sweeping out with the air of the particles of suspended organic matter which would otherwise have formed a pabulum for

the growth of micro-organisms. Or perhaps the growth of the latter may be prevented by the greater dryness of the rooms mechanically ventilated.

Let me refer to one or two further points before leaving the subject of school ventilation. We classified the schools according to the cubic space per child at the time of our visit. It will be seen that increased cubic space up to 300 cubic feet brought with it no diminution in the pollution of the air. With mechanical ventilation, on the other hand, there was a diminution, at any rate in the number of micro-organisms, with increase of cubic space.

Cubic space per person	Naturally ventilated				Mechanic'ly ventilat'd			
	No. of cases	Carbonic acid	Organic matter	Total micro-organisms	No. of cases	Carbonic acid	Organic matter	Total micro-organisms
Cubic feet								
50-100	6	21.5	16.2	119				
100-150	14	15.5	19.6	128	7	14.0	7.8	23
150-200	5	18:9	12.3	150	8	11.4	9.6	14
200-250	9	21.1	16.8	188	5	11 8	12.3	10
250-300	4	17.1	9.5	187				
300 and upwards.	4*	15.1	11.8	12	6	13.0	3.7	2

* Three of these were in a private school

We also divided the naturally ventilated schools we examined into two classes, according as they were heated and ventilated by fires or by hot pipes respectively: and we obtained the following results. The data for mechanically-ventilated schools are added for comparison.

Description of School	No. of rooms examin'd	Carbonic acid	Organic matter	Total micro-organisms
Ventilated mechanically, and heated by hot air blown into the rooms	20	12.3	10.1	16.5
Heated by fires, and ventilated in the ordinary way	18	16.9	15.7	169.
Heated by hot pipes in the room itself, and ventilated by windows, ventilators in the room, and in some cases by a few small Tobin's tubes.	21	20.0	16.5	92.

The following table shows the result of a comparison of a number of pairs of rooms. The rooms in each pair were as similar as possible in every respect (such as age of children, &c.) except that one was occupied by girls and the other by boys:—

	Space per person	Temperature (°Fahr.)	Carbonic acid	Organic matter	Micro-organisms
No. of rooms compared...	30	[illegible]	20	16	30
Boys	275	60	15.0	7.9	92
Girls	382	58	12.3	6.7	65

The general result of our investigations has, I think, revealed a state of matters in schools urgently calling for improvement. The amount of loss of life and death resulting from the vitiated state of air is, in all probability, enormous. Captain Douglas Galton dealt with this subject in his admirable inaugural address at the Newcastle Congress of this Institute. Let me only recall one of the facts mentioned by him: that the mortality among teachers in elementary schools was found to be about 20 per 1,000, as compared with five per 1,000 in two classes where the average age was presumably about the same—the police and navy—and 3 per 1,000 amongst prisoners.

We can afford to provide abundance of fresh air for criminals, and surely we might do as much for our children. It is not only abundance of ventilation that is required for keeping the air of rooms pure, but the room itself must be prevented from becoming contaminated with dirt. For this both personal cleanliness is required, and the means of keeping the room itself and everything underneath and about it absolutely clean. I do not doubt that engineers and architects can devise not only satisfactory and sufficient methods of ventilating and warming schools, but also floors which will be incapable of becoming polluted in the manner just referred to.

HOSPITAL NOTES.

From New York Hospitals

BY HUGH M. MACKAY, WOODSTOCK, MEMBER OF PROVINCIAL BOARD OF HEALTH.

To the Editor:—I would like very much to be able to send you something interesting for MEDICAL SCIENCE, but I have not taken full notes of clinics, and as you may suppose I have not much time to prepare anything specially for publication.

Perhaps the best thing will be to send you a condensed report of the operations I witnessed this afternoon. Some points noted may be of interest to some of your readers. The Polyclinic bulletin this morning announced operations by Dr. Gerster, at the German Hospital at 12. a.m., and at Roosevalt by Prof. Sands at 3.30 p. m.

Dr. Gerster, you will remember as he who delighted us all with his paper and discussions at Ontario Medical Association meeting in Toronto last summer. He is a very good operator and may be represented in his work as *cleanliness* personified. I have not in the city seen nor heard any reference to Listerism as applied by spray, but asepticism by cleanliness is practiced in all operations. Prof. Sands being also a favorite operator, we decided to make the operations of both our afternoon's programme.

At 11.45 a. m., while Dr. Gibney, Prof. of Orthopædic Surgery at Polyclinic was dilating in a most interesting and instructive manner on the importance of rest in chronic arthritic troubles, we had to quietly slip away, catch the *elevated* train and reach the German Hospital at twelve.

On arriving, we found everything in readiness for the operation.

Case, Hydrocele: Patient anæsthetized, scrotum shaved and thoroughly washed with soap and water, then disinfected by *perchloride* solution; sac. laid open and carefully examined lest some cysts might escape notice, or there might be congenital communication with the peritoneum. None of these complications being present, it was washed out with carbolic acid solution; a drainage tube introduced and wound stitched with cat-gut, and dusted with iodoform; drainage tube secured by a *disinfected* safety-pin; aseptic pads slipped beneath the ends of pin, and the whole covered with oil-silk, and over this several pads of aseptic crinoline and absorbent cotton, and over all a thick pad with hole in the centre for penis, and all firmly bound down by a double spika bandage. The dressing is to be undisturbed till ninth day, when tube will be removed and wound re-dressed.

I give minute details in order to give some idea of the extreme caution exercised by Dr. Gerster to avoid the possibility of the wound being contaminated from without. I omitted to state that the douche of perchloride was repeatedly turned on wound during the operation.

Case 2.— Removing an atheromatous tumor from above and external to the outer angle of the eye, in a child two years old. What was most noticeable about this, ordinarily considered a very simple operation, was that the Doctor exercised the same care and precautions as if it were the most difficult and dangerous. The head of the child was carefully wrapped in a towel steeped and wrung out of an antiseptic solution, lest the fingers of some assistant touching the hair might infect the wound; and a drainage tube of cat-gut ligature was used, and dressing applied as securely as in the last operation.

Case 3— A man, aged 60, had phlegmonoid inflammation of elbow, arm and forearm, and pointing at inner condyle Patient being anæsthetized, same cleansing process was gone through as in the other cases; abscess was opened, and a large quantity of pus escaped. On examining the joint some caries was found to be present. It was scraped away and the joint opened in three places, each supplied with a drainage tube. Then the whole of the inflamed surface on arm and fore-arm was punctured, literally peppered with punctures, and the aseptic solution kept playing upon it until bleeding ceased, when the arm was carefully put up in aseptic dressing.

We now hurried away to Roosevalt Hospital which was reached at 2.40 p. m. This Hospital has the reputation, among students, of having good operations, and Prof. Sands is among the favorites. He is a middle aged man, stout, and of medium height, is baldheaded, has sharp, dark eyes, and wears a heavy moustache.

We were fortunate in securing a seat giving a

good view of the operation, and were just in time to see the Professor make his first incision in excision of the knee on a nice-looking young woman apparently about twenty years old. By elevation and Esmarch bandage, the limb was rendered anæmic and the operation bloodless. Patient took the ether well and the operation was quietly and deliberately performed. The usual incisions and dissections were made, the ends of bones removed, and the patella showing signs of disease was also removed. The Professor was very careful in removing with scissors every portion of synovial membrane that he could find, and remarked that this is one important factor in the success of the operation. Finding that the parts co-apted nicely, the next step was to attend to the blood-vessels, and a dozen or more artery forceps being in readiness, the tourniquet was removed and all bleeding mouths readily secured and ligated with cat-gut. After irrigating with aseptic solution (did not ascertain which,) flaps were stitched, neither iodoform nor drainage tube was used; but all the dressings were scrupulously aseptic, and limb laid upon an inclined plane at an elevation of about 30°.

Case 4.—Removal of a tumor from the axilla of a woman, aged 55, who said that Dr. Mason had removed a tumor from her breast seven years ago. Mammary gland had not been removed, and is now quite healthy. Prof. Sands had no doubt, however, but that the present tumor was recurrent, although the Germans maintained that if there be no recurrence for three years after removal it may be considered as a cure.

The removal required the exercise of great care and caution, as it had to be dissected from the nerves and axillary arteries. The Prof. adopted the method recommended and practiced by the late Sir William Ferguson 18 years ago when operating in such dangerous proximity *i e.*, use fingers and handle of scalpel, and do very little cutting.

When removal was completed, the cavity was literally filled with artery forceps, and very little blood had been lost. Tumor was about size of a hen's egg, and on section presented a hard, glistening surface, from which the knife scraped a suspicious, gruelly looking fluid. The Prof. ventured no opinion as to the character of the growth; a drainage tube was introduced, and wound stitched with continuous suture and covered with oil-silk aseptic dressings.

Case 5—A young girl aged 14 with double talipes varus, soles of feet completely turned up, and a thickened bursa on dorsum upon which she walked. The bursa was dissected away, bones laid bare, and with an ordinary carpenter's chisel portions of scaphoid and cuboid bones were removed. The operator had succeeded in getting the foot pretty straight when we left to meet another engagement, as it was five o'clock.

I have given the above details off-hand as they impressed me at the time; no doubt important skilful touches by the operators have been overlooked, but these given may serve to supply a general idea of the methods practised.

Kingston City Hospital.

On the 17th of Sept. last a young woman *æt* about fifteen years, came to me to have her tonsils excised on account of chronic enlargment. I removed the right one with a tonsillstome; the bleeding that followed the operation was slight; and she went home by my advice to wait till that wound was healed before excision of the other tonsil. On the 7th Oot. she returned to have the left one removed. This one was very much larger than the right one had been, and presented almost a "head and neck" shape. I removed this one without the least difficulty; bleeding was slight while she remained in my office (and I kept her some time for safety) but on her way home she began to spit blood in mouthfuls, and to swallow it, and finally getting sick vomited it in large quantities.

As soon as she got home I was sent for but when I arrived the bleeding had ceased purely from failure of the *vis a tergo*, she having been for some time in almost a constant faint, and as white as a human being could be. By quietness, care, and nourishment suitable, she has slowly recovered from the very edge of the grave. She was certainly the nearest death from bleeding during about six hours (except in two or three cases of epistaxis) of any person I have ever seen who recovered. But the peculiarity to which my attention has been drawn is the interference with the deglutition of liquids which the absence of the tonsils has produced. The young woman was in my office yesterday, looking well, but yet quite weak, and the

trouble she complained of, and which she has suffered ever since the wound healed, is, that whenever she swallows any liquid, unless she does so very slowly and with the greatest care, it enters the glottis and causes strangling and coughing to such a degree as to render drinking a very undesirable task. Solid matter gives her no trouble in swallowing it.

The throat is now very open and the isthmus roomy; no sign of tonsils to be seen, and the mucous membrane presents a health appearance.

In former times it was once believed that excission of the tonsils in the male was sometimes followed by atrophy of the testes; and it has also been taught that excessive mental depression with a tendency to suicide, has followed their removal; but the difficulty to which I refer is not noticed by any author whom I have been able to consult. I have an opinion why this trouble has followed on the absence of both tonsils, but I would like to learn more of the matter from some of your scientific readers. I am inclined to think that this difficulty of swallowing fluids, is not a mere coincidence, but in some way or other dependent upon the absence of the tonsils. Yours very truly,

THOS. DEPUIS, M.D., M.R.C.S., ENG.

Kingston, Nov. 22, 1887.

MEETINGS OF SOCIETIES.

American Public Health Association.

The fifteenth annual meeting of this association has, like those of past years, been a great success, and apart from its regular work has been of more than ordinary interest, meeting as it did in a city which ten years ago was swept with the greatest plagues of modern American history. Memphis, as referred to in various addresses, owes to the A. P. H. A. a debt of gratitude greater than does any other place, and from the many acts of hospitality and courtesy extended to the association, we can only say that the city remembers her benefactors. The receptions were unique, their exuberance of hospitality being signalized by a reception and ball on Wednesday evening at which various grave and worthy seniors distinguished themselves.

The president, G. M. Sternburg, M.D., U.S.A., called the meeting to order Tuesday, Nov. 8th, and the roll for new members was opened. Various papers were read and discussed during the day sessions, one being by Dr. Hunt, of New Jersey, on "The Origin of Certain Diseases," in which he drew attention to the changes brought about by evolution, fixing the type of disease, and to the hybridization in disease. His remarks regarding individual prophylaxis by antidotal medicinal agents were severely criticized by various eminent sanitarians.

J. S. Billings, M.D., U.S.A., read a paper on "Vital Statistics," as applicable to the needs of Health Departments of cities and was followed by the report of the committee on disinfectants, a most voluminous document. The report which was ordered to be published in full, dwelt mostly with the limiting power of heat on pathogenic organisms. The general conclusions were that 100 C is fatal, and with several a number of degrees less, to all organisms without *spores* and all *spores* even, tested are destroyed at 100 C maintained for a few minutes.

The President's address, as might have been expected, was an admirable effort. After referring to the good offices of the association in aiding Memphis during the yellow-fever plague and complimenting the city on its advance in sanitary matters, it dealt with the question of the necessity for a Central Health Board. He urged it on the broad grounds of public necessity and the needs of preventive medicine.

Further, in pointing out as in the case of the yellow-fever, how epidemics are often blessings, he accentuated the need of not yielding to a state of inaction and false security, because for several years our foes have been kept at bay.

Regarding the results of the International Sanitary Conference at Rome in 1885, he pointed out that there are strong grounds for local sanitation, based on the argument of the British sanitary authorities, that cleanliness at home is the best preventative against epidemic diseases. He illustrated the hardships of old-time quarantine methods by stating his experience in journeying from Brazil to New York, where passengers were practically shut out from West Indian islands be-

cause the ship came from Brazil where yellow fever prevailed.

In closing he urged that everywhere our sanitarians press for original investigations.

The committee of State Boards presented several important resolutions, following which the eminent secretary, J. A. Rauch, of Illinois, read a paper on "Cholera and Quarantine." He detailed the deficiencies of the New York quarantine, and expressed the opinion that the Federal government should take charge of quarantine in general.

Dr. F. Montizambert, Chief quarantine officer of the St Lawrence, thereafter pointed out how thorough the recent regulations have made Canadian quarantine and urged that similar regulations be enforced at Atlantic United States ports.

Dr. Oldright, in discussing the subject presented resolutions of the Provincial Board, Ontario, urging the necessity for American protection to Canadian interests and introduced a resolution in favor of a dry-earth system for railway trains, to protect against the dangers of epidemic diseases being spread thereby. Amongst other very important papers was one by the redoubtable New Orleans sanitarian, Dr. Joseph Holt, chief quarantine officer of the Mississippi. Eloquently diffuse, his paper on the rise and progress of the Mississippi Quarantine, was, as he always is, most interesting and practical.

An interesting paper on the "Disposal of Garbage" and "Destructors," was read, Dr. Oldright taking a prominent part in the discussion thereon.

The subject of "River Pollution" was introduced in a paper by Dr. C. A. Lindsley, and was discussed very generally, the importance of the subject developing much interesting information. Amongst the members of special committees, Dr. Bryce, Ontario, was appointed on the Committee of State Boards and that on "Animal Diseases and food." Dr. Hewitt, Minnesota, was elected this year's president and the next meeting fixed for Milwaukee.

Toronto Medical Society.

STATED MEETINGS, *Oct. 27th, 1887.*

Pathological Specimens.—Dr. McPhedran showed the lungs and heart from a man who died at 70 years of age. There was consolidation of the lungs of long standing, and also an insufficiency of the tricuspid valve that accounted for the murmur which had been detected during life. Also the sternum from this subject,—a beautiful specimen of senile fragilitas ossium.

Dr. W. H. B. Aikins exhibited several specimens from the intestines of typhoid fever cases, showing the condition of the solitary glands, Peyers' patches and the mesentery glands, at different stages of the fever. He believed that the ulcerative process was due alone to the passage of the infected feces over the Peyers' patches, and urged complete rest of the bowels as a necessary part of the treatment.

Nov. 3rd.

Some interesting cases were reported on rapid pulse rate. Dr. Graham gave notes of a case, a painter *æt 60*, in perfect health, suddenly experienced an attack of vertigo. He was taken to the hospital and for four days his pulse ran from 100 to 180 per minute. The exhibition of digitalis with rest gradually effected a cure. Another case recorded by Dr. Atherton, where the pulse stood at 200 for a day or two. This occurred several days after an abdominal operation. Recovery ensued.

An interesting discussion on the therapeutic uses of antipyrin followed. Dr. Reeve believed it a valuable substitute for morphine as an anodyne, and has tried it in iritis, supra-orbital neuralgia, etc. He had administered it in capsules, in doses of ten grains, to be repeated in one or two hours until relieved. Dr. Nevitt had tried it in recurrent migraim with good results. For lumbago he had not been so successful. Others had used it in typhoid fever for reduction of temperature with satisfactory results, though its depressing effects were sometimes well marked. Ten grains every four hours given in half an ounce of whiskey to counteract this depression was recommended.

Dr. Rosebrugh read an exceedingly interesting paper on *Electro-Therapeutics.* (See MEDICAL SCIENCE, page 34.)

Nov. 10th.

Dr. Machell showed a dwarfed infant delivered at about the eighth month. The following history was given: The os uteri was flattened transversely. The placenta, which was thin and flattened, had to be detached with the fingers. There was a constriction met with at both the external and internal os when the hand was introduced three-quarters of an hour after the birth of the child. The child was alive when born. The limbs were dwarfed; in fact,

all the long bones were twisted and bent. The head was large.

The stomach, liver and intestines from a recent case of hepatic abscess were shown by Dr. Peters. The left lobe of the liver was gone, and its place occupied by a quantity of dirty yellowish fluid. The stomach contained a scirrhus enlargement at its pyloric end, but the orifice was quite patent. The body of the pancreas contained a cancerous mass. The lymphatic glands of the neighborhood were enlarged. The cancer appeared to be primarily in the pancreas. The abscess seemed to have resulted from the cancerous ulceration of the stomach upwards, as a perforation existed. It was noticed that the duodenum was not affected, bearing out the observation that scirrhus of either end of the stomach always spreads in an upward direction.

A case was presented for diagnosis: A child two years old with paresis of the right arm. Atrophy of the muscles of the right shoulder and ulceration of the humero-scapular ligaments. Little history could be given. The child had seemed well enough up to a few days ago, when the inability to raise the arm was noticed. There had been no convulsion, or no knowlecge of any injury. The mother thought the right leg had been a little weak about the same time, but was not certain.

Quarterly Meeting of the Provincial Board of Health.

Nov. 1st and 2nd, 1887.

The Board met at 2 p.m. The minutes of the last meeting were read and confirmed, after which the Secretary presented a large number of communications for the consideration of the Board.

Dr. Macdonald then read the report of the committee appointed to investigate the St. George Mill-pond nuisance. The report was adopted.

Dr. Bryce presented a report from the committee on epidemics, containing a large amount of tabulated statistics regarding the prevalence throughout the Province, of typhoid and diphtheria. The report was received.

At a subsequent session the report from this committee was completed by the report of Dr. W. H. B. Aikins, on his experiments upon the blood of animals which had died of anthrax. The report after stating the methods of experiment and their results, by which the disease was shown to be without doubt anthrax, contained a recommendation, which, after stating the success of the extensive governmental measures taken in France and Germany for limiting this disease which has in past years caused great economic loss, urges the adoption by the Board of measures sanctioned by government, for the protection by inoculation of such animals as might in the future be liable to infection on the suspected pastures.

On motion, Drs. Oldright and Cassidy were appointed provincial delegates to represent the Board at the coming session of the American Public Health Association convened at Memphis for November 8th.

On motion, the Secretary and Dr. Macdonald, members of the committee on sewerage, were instructed to make, with the sanction of the Minister, an investigation into the case of the Niagara Falls Muddy Run nuisance, and report to the Board.

Dr. Bryce read the report of the Delegates to the International Conference of State Boards at Washington.

The report contained an interesting reference to the paper by Dr. Dominguez Freire, of Brazil, on his experiments on preventive inoculation against yellow fever. The report stated that the total inoculations in 1885-6 were 6,524; total deaths after inoculation, 8; death rate was 1 to 1,000; the total deaths amongst those inoculated, 1667; death rate was 10 in 1,000.

The inoculations he stated were made in infected localities and in infected houses and in those the inocculated had shewn an immunity from the disease. The report was adopted.

Dr. Cassidy referred at some length to the report that Dr. De Wolfe, medical health officer, of Chicago, had found clothing from infected places in Italy, which had passed ocean ports uninspected. He thought that local attention should be drawn to the matter. It was then moved by Dr. Cassidy and seconded by Dr. Macdonald: That in view of the disclosures made by Dr. De Wolfe, medical health officer of Chicago, about clothing from Palermo having been introduced into Chicago, thus exposing the people of that and other cities to the danger of infection, this Board would draw the attention of medical health officers in Ontario to the fact, and desire them to take the necessary steps to prevent similar dangers to those within the field of their own jurisdictions. —Carried.

Dr. Yeomans further moved, seconded by Dr. Covernton: That the Provincial Board of Health, then assembled, desires to draw the attention of the American Public Health Association to the rumors circulated through newspapers, to the effect that cases of cholera have been reported in the New York Official Bulletin as measles; and also, that articles of clothing packed in Palermo and exposed to cholera infection, have been distributed at various points in the country, without having been subjected to disinfection at New York. In view of the fact that such reports create uneasiness and apprehensions of danger in the public mind, this Board requests the Provincial delegates to bring the matter to the notice of the meeting of the American Public Health Association at Memphis, on 8th instant, in order that enquiries be instituted, and the accuracy of said reports ascertained.—Carried.

Dr. MacDonald thereafter moved, seconded by Dr. Cassidy: That the report of the committee on epidemics be received and adopted, and that the committee be instructed to draw up a form of regulations to be forwarded to municipalities in relation to milk supplies and milk inspections, with recommendations for the adoption of said regulations.—Carried.

Dr. Oldright appeared before the Board and thanked it for its kindness in appointing him its delegate to Memphis. The Chairman stated that the opinion was unanimous, that none could more worthily represent the Province at the meeting of the Association.

STATE MEDICINE.

OUTBREAKS IN FOREIGN COUNTRIES.

Typhoid at Vienna Hygiene Congress.

M. Brouardel, Paris, addressed the Congress on typhus abdominalis. He said it is far more dangerous to man than cholera and that it is still an open questtion whether it owes its origin to the decomposition of organic matter, or whether it is a specific virus. His opinion that in eighty cases out of one hundred it is caused from polluted water, is borne out by the experiences of Vienna when typhoid has entirely disappeared since the town has been supplied with pure water. In this connection it is of interest to note that the congress was an eminent success, having brought together some 3000 delegates. The next meeting will be in London 1891.

Chamberland discussed the statistics of anthrax inoculations and contended that the practical results therefrom, showed the wisdom of governmental support in extending the practice in France.

The Crown Prince Rudolph of Austria, in his address of welcome to the Congress, said:—

"Man is the most precious capital of the State and of society in general, every life presents a certain value. Whatever means may be at our disposal to protect our own individual welfare left to ourselves we are powerless in the face of the general injurious influences with which nature surrounds us on all sides. Looking over the papers which will be read at this Congress, we recognize with astonishment that the science of which you, gentlemen, are such devoted disciples comprises every phase of social life."

OUTBREAKS IN THE UNITED STATES.

New York.

Professor Sternberg describes, the ceremony of disinfection at the New York Quarantine, as witnessed by himself in September last, while on a vessel coming from Brazil. I asked the ship's surgeon to go with me to inspect, when, after a detention of less than an hour, we started from the quarantine station for our wharf. We found that the man with the jug had lowered a bucket of water by means of a rope through one of the hatches between the decks. On pulling up this bucket I found that it contained two or three pounds of some powder which had been wet, probably with acid solution, and which gave off an odor of chlorine. No doubt when first lowered between decks there had been an evolution of chlorine, but in the vast space to be disinfected, it was so diluted that at the end of an hour I did not detect the odor of chlorine gas when I lifted the hatch The most curious part of the story is that I was informed that the bucket had been lowered to disinfect a quantity of hides stored in the hold. What was the object of this disinfection?

The only object I can conceive of depends upon the fact that there is a fee for disinfecting, which must be paid by the agents of the ship; at least I was so informed by one of the officers of the ship.

Small-pox in New York.—This disease has lingered for some months in New York. There having been five cases in the last fortnight. The foregoing accounts of the quarantine methods lead to the conclusion that there is every probability that it will continue to be present as long as immigrants can pass practically uninspected. Dr. Baker, recently mentioned how scarlatina is imported from Europe, but New York has at present enough without any importations.

OUTBREAKS IN CANADA.

A return contained in a recent report made to the Provincial Board by the committee on epidemics shows for nine months ending Sept. 30th.:—

Total Returns.	Returns showing Diphtheria and Typhoid	Returns showing Diphtheria only.	Returns showing Typhoid only.	Total Cases of Diphtheria	Total Cases of Typhoid.	Deaths from Diphtheria.	Death from Typhoid.	Municipalities supplying Blanks to Physicians.	Municipalitieshaving compulsory notifications.	Special measures for isolation and disinfection.
353	18	563	331	1883	864	288	135	101	99	118

Table showing the number of cases of Diphtheria and Typhoid that have occurred in the under mentioned cities for the first nine months of 1887, along with number of deaths, deaths per 1000, etc.:

	DIPHTHERIA.				TYPHOID				
	No. of cases of Diphtheria.	No. of Deaths from Diphtheria.	No. of cases per 1000 from Diphtheria.	No. of deaths per 1000 from Diphtheria.	No. of cases of Typhoid	No. of Deaths from Typhoid.	No. of cases per 1000 from Typhoid.	No. of Deaths per 1000 from Typhoid.	Proportion.
Toronto ..	428	156	3.39	1.23	127	41	1.00	.32	127169
Hamilton..	134	15	3.11	.34	47	3	1.09	.07	43,080
Guelph ...	46	2	4.38	.19	10	1	.95	.09	10,506
St.Thomas	30	4	3.92	.38	1	1	.09	.09	10,271
Stratford..	3	3	.33	.33	3	1	.33	.11	9,069
London ..	60	19	2.26	.71	5	3	.18	.11	26,569
Brantford.	63	8	4.83	.61	92	4	7.06	.38	26,560
Kingston...	18	1			14	3			13,021

Some interesting facts grow out of these tables. Assuming that the returns of health are correct in each instance, we gather the following facts regarding rate per cent. of mortality compared with cases reported:—

	Mortality from Diphtheria.	*Mortality from Typhoid.*
Total Reports for Province...	26%	15%
Toronto	36%	32%
Hamilfon	10%	6%
Guelph	4%	9%
St. Thomas...	11%	——
Stratford	100%	33⅓%
London	33%	69%
Brantford	11%	5%
Kingston	5%	21%

The questions that the physician first asks are these, so great differences in the types of diseases in Toronto for instance and Hamilton as to cause in the first instance 1.73 deaths per 1000 from diphtheria and 32 per 1000 from Typhoid, and in the other only .34 deaths per 1000 and .07 per 1000, while the number of cases reported bears nearly the same relations to the population; or secondly, is the average skill of the Toronto practitioner so limited as to make possible a death rate of 36% in diphtheria and 32% from typhoid? As we trust such cannot be the case the only alternative remaining is to suppose that the notification of disease is but imperfectly enforced. That this is the more probable fact is seen in comparing Hamilton and London. Thus, while Hamilton reports of diphtheria one case for nearly every 3000 of population, London reports one case for only every 4400, yet London's mortality per 1000 is more than double that of Hamilton. Similarly, Brantford shows one case reported for about every 2000 of population, yet her mortality is less than that of London, and but half that of Toronto.

Assuming therefore similar severity and similar medical skill everywhere, the fact stands out in plain figures that those places as Hamilton where almost perfect notification is carried out the death rate is small in proportion. Stratford interests as by showing how nominal may be the work performed by a local Board, when the cases are all swallowed up by deaths. Can anyone doubt the economic advantages of thorough public health work after the comparison of results. We congratulate some of our local Boards and their officers on the splendid showing of practical work done.

Brantford's total death-rate for 1887 is calculated at 16.25 per 1000.

Hamilton's total death-rate for 1887 is given at 17.02 per 1000.

Guelph's death-rate is 15.14 per 1000.

HYGIENE.

Public Water Supplies.

[Correspondence on this subject is specially desired.—ED.]

There is probably nothing which is a better index of the growth of the principles underlying the maintenance of individual and public health than the fact that on every side, in Britain, the United States and Canada, we have even village communities intently studying the question of how they shall be able to obtain wholesome, abundant and economical supplies of water for domestic and public purposes. In Ontario, the past, much more than any other year, has seen active works undertaken by a number of municipalities and many more are investigating the local source of supply.

In reviewing the question of public water supplies it may be said that, as usually stated, there are three sources from which we in Canada draw public water supplies. We have, more than almost any portion of the world, water supplies without limitation in our great lakes and the many smaller lake basins, situated in many parts of the country, in our rivers and in subterranean waters. Regarding the great lakes supply, with the adoption of some of the most elementary sanitary principles as regards their pollution at points near to the supply-pipe of a town, it may be said that the question of using such first-class water becomes simply an economic one; but when we enquire as to the advisability of utilizing river water for public supplies it becomes at once apparent that we have two points of the greatest importance to consider, viz.: contamination of the water, 1st, by vegetable debris; 2nd, by animal pollution from cities and towns. From past experience, both on the continent and in America, it may be said that when other sources are available they are to be preferred to water taken from streams which are either highly polluted with vegetable debris or by the sewage of towns situated higher up. While the oxidation of organic matter does go on, still evidence is daily accumulating that, where populations are yearly increasing, sufficient purification by natural processes does not take place; certainly not in those cases where the specific poisons of zymotic diseases, as cholera, typhoid, etc., are conveyed to the stream by sewage.

The third source, that of subterranean waters, had hardly begun to be abandoned after the universal condemnation of the ordinary wells in cities, towns, etc., where sources of pollution are contiguous, when local necessities have developed the fact that artesian wells are possible in many places; or, when not, natural water from similar strata may be obtained by applying steam pumping power. With the recent improvements in this class of wells, now usually called *drive* wells, many towns, especially in the western praries, have been supplied with very considerable amounts of water. Thus, out of forty-five towns in Iowa, supplied with public water, nineteen obtain their supplies from wells, some artesian and some *drive* wells. In the east the successful experiment of supplying Brooklyn with water by *drive* wells, on the *Andrew's* system, has led many inland places with no source of supply excepting streams of doubtful purity, either present or future, to examine into the merits of the system. Described in a word, this system, and others adopting the principle consists of pipes pointed, of, say, two inches in diameter, with perforated tubes, driven down until a water-bearing stratum, drawing its supplies from a considerable area, is reached. These pipes being driven at distances of a few feet apart, are all connected into a system iron mains of graduated capacity, leading to a pump. Through exhaustion the pipes are made to draw from a wide area, the amount pumped limited only by the capacity, and the extent of the water-bearing strata.

For the information of those of our readers all over the country, who, persuaded of the dangerous nature of the domestic supplies of many of our towns and villages, are seeking for a pure public supply, it will be of interest to indicate some of the requisite conditions for abundant subterranean supplies. Prof. Laveratt well points out the indications for an artesian well, which in certain particulars apply to all subterranean sources of supply. These are: (1) a pervious water-bearing stratum; (2) an impervious stratum below; (3) a second unpervious stratum above the water-bearing stratum; (4) these must be inclined; (5) there must be no adequate outlet for the water at a lower level than the water; (6) a sufficient collecting area or reser-

voir, with a porous stratum; (7) the collecting area must have sufficient elevation to act as a fountain-head; (8) there must be a continuity of the permeable bed; (9) there must be no flaw or breach in either of the confining beds. Prof. Chamberlain gives the necessary inclination of the strata as at least one foot per mile. It will at once be apparent that it is not every district in Canada that could expect to have artesian wells; but most of them may have drive wells, their capacity being strictly governed by several of the principles above enumerated. As regards cost of testing this is comparatively small. For instance, a drive well in Iowa is stated to be two hundred and five feet deep, and to have cost one dollar per foot for the first one hundred feet and two dollars for the second one hundred feet. It flowed one thousand seven hundred gallons per diem.

To show that the *drive* wells have at least similar capacity it may be stated that a system of one hundred pipes some fifteen feet apart connected with a common pumping station have proved equal in Brooklyn to supplying some five million gallons daily. Regarding the question of purity, all evidence points to the purity of such subterranean supplies since, by the very nature of the case, the filter bed is simply the extent of the area by the depth. from which the supplies are drawn. We understand that experiments are being made in St. Thomas and in Brantford with a view to ascertaining the available capacity of a *drive* well system.

Chatham council has under consideration the question of deriving her water supply from Lake Erie or Lake St. Clair, the Thames, with London above and considerable vegetable matter along its course, being thought a somewhat questionable source.

Galt, owing to her situation on the declivity, the soil of which barely covers the fissured limestone rock below, has for years suffered greatly from the pollution of wells in lower parts of the town. This year a fatal form of diarrhœa prevailed, causing many deaths. Where to get her water supply, whether from the Grand, from Mill Creek or elsewhere is the question she now is considering.

Brockville has practically decided on having a public water-supply. After much discussion as to whether an eddy in the river would cause the output of sewage to pollute the water she has decided to *take in water* and steam up.

Guelph water-supply from springs along the river Speed was this year the cause of much anxiety. When the springs got too low, river water was used. without, it is said, filtration. We understand the remedy has been applied.

Owen Sound has splendid public water, but typhoid is very prevalent there. Perhaps every householder is not a taker of public water. Polluted soil and bad drainage demand the universal use of pure water, and a sewerage system to carry it away. Modern house drains are usually worse than none at all. MEDICAL SCIENCE would like to hear from Owen Sound.

Woodstock defeated the by-law for water-works. Perhaps the idea that the company *would stock* the town with a poor water at a high price defeated the measure. Try the springs on the hill-side!

Barrie similarly defeated a by-law, but particulars are not to hand. Would someone state whether it was because the sewage output was too near the intake pipe? Sarnia could tell all about that.

Wiarton voted $8,000 for public water, to be supplied by the Holly system. This little town up on the Bruce peninsula, has shown all of its namesake's energy, without the spider-web episode. It has its eye on summer visitors!

Berlin, that formidable rival of her Trenton sister, Guelph, is to pump water from springs, situated along the declivity overlooking Shoemacher's pond, a never-failing reservoir. If as successful as those at Springbank, whence London pumps a supply for a town of 30,000, it will be an economical way of obtaining what we are sure will be pure water.

St. Catharines draws her life-giving supplies from a mountain stream, which unlike Glasgow's classic mountain supply, bears, we understand, the prosaic name of DeCoo's *Crick*. Let none suppose that its crystal purity is diminished by any such lacteal fluid as the name might suggest. On the contrary we understand the town of St. Kits boasts of her purity in this as in other respects. We trust that the use of public water is extending, as we understand that her sewerage system is being enlarged.