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A LECTURE ON LIFE.[1]

BY
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To all of us mortals presents itself the question, why are we?—what is the meaning of this state of living?—what is life?—to none more often than to the physician. His duty it is to tend the lamp of life. Time and again, as day follows after day, he sees it burning low; now in danger of being blown out rudely by some all-unexpected gust; now guttering down with weak and weaker flame, flaring up momentarily, but it may be only momentarily, until the cold blue flame, scarce giving light, ushers in the darkness of death. His duty it is to keep the lamp alight and burning brightly as long as possible—to prevent that darkness. Is it surprising that he asks himself, again and again, what is life?—what is this flame to which we minister?

Think of it! Think of the countless ages—for we cannot count them —since man first became capable of abstract thought, and so became truly man! Think of the generations that have come to life, have grown up, and had their day, and passed! To each in turn this question has presented itself—to each. And direct answer has been found by none of all of them. And the generations have consoled themselves by the thought that this infinite mystery of existence, abysmal, dark, is purposeful; that it is the God who has created life, that He knows, and that suffices; He knows and we, His creatures, cannot attain unto His knowledge. The generations have had those of robust mind, those whom this philosophy did not wholly satisfy, those who have asked why this should be. Solomon has succeeded Job, Goethe has followed Kit Marlowe, the author of the "City of Dreadful Night" has followed the author of the "Rubaiyat," and Herbert Spencer, Lucretius; but no one has lifted the veil.

To-night I wish to range myself anew among the enquirers. I would not say we can lift the veil, for in such inquiries, as in all other investi-

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gations into nature, we can reach but to a certain point. It seems to me, however, that it is possible to penetrate further into the mystery now than ever in the past ages. I hold it right also that, being endowed with minds, we should strive to understand all that we can regarding that which is of so deep importance. All the same, it is with no little hesitation that I have determined to make this the subject of my talk to you this evening, and that because, however much we may desire to treat purely the scientific aspect of the subject, religion and the views we have imbibed from earliest childhood inevitably obtrude. It is not given to the majority, as it was to Darwin and to Pasteur, to separate in all humility their scientific from their religious lives and thoughts.

I can recall an open air *déjeuner à la fourchette* in a little Parisian courtyard over on the '*rive gauche,*' the sun glinting through the trees upon the napery and glassware of the table: a luncheon with Emile Roux, the great pupil of the great master. The conversation had turned upon Pasteur and his modes of work and habits of thought. That happened close upon a score of years ago, but I remember it as though it were yesterday. And Roux then traced what long years of intimate fellowship had taught him were the mainsprings of the great master's activities. He spoke of his sincerity, his earnestness, the deep-seated religiousness of his character, his attachment to the Church, and the beautiful faith which dominated the family life. It was a revelation to me, and I said as much. "No," said Roux, "M. Pasteur never alludes to these matters in his writings. He holds firmly that a man's faith and his knowledge of science are two wholly different parts of his existence which it is presumption on his part to try to harmonise. Humbly, and not with pride should we regard our scientific knowledge and acumen. The facts we have garnered are few compared with the vast bulk of hidden knowledge; the deductions we draw from those facts are at the most to be treated as working hypotheses, liable to be modified by further accumulation of facts."

We are, to paraphrase Roux's words and employ Carlyle's simile, but sticklebacks in a puddle. What can the stickleback in his insignificant pool know of the workings of the great universe? Faith is essential to, and inherent in our human nature: it depends upon, and grows upon that which is not demonstrable: the realm of the spirit is apart from the realm of science. To presume therefore, with this imperfect knowledge, to test and criticise revealed religion, or upon it to build up our faith is absurd. Keep therefore the two apart; strive ever to gain a deeper insight into the truths of the natural world, and at the same time, nourish what is spiritual within us: but do not waste time and energy in attempting to harmonize things which can only be harmonized when all is open and all is known.

Now I am convinced that in this attitude of Pasteur there is a profound truth. The blatant infidelity of the present day is, it seems to me, founded upon this futile attempt—and inevitable failure— to harmonize knowledge and faith—things which to-day cannot be discussed the one in terms of the other. Whether the attempt be made by those deeply religious, or the reverse, the result is almost equally disastrous. At the most I would say that the studies of the individual worker upon nature and natural phenomena must inevitably influence the life, and through the life, the faith also of that individual. This, however, is one thing. To go into the market-place—or magazine—and discourse dogmatically concerning these matters is quite another.

Few, however, have attained unto this philosophy, sound though it be, and thus it is with some temerity that to-night I take up this discussion of life. Too few realise that religion is assuredly not based on matter, or to put it in another form, that all things have their spiritual as well as their material aspect. Let me impress upon you that I have to deal with the material aspect of life only, and that doing so, while acknowledging its existence, I do not venture to discuss the spiritual aspect: that thus I do not come before you as a materialist, and if to some who have not reached thus far, if to those who cannot dissociate the spiritual from the material in living matter, it may seem almost impious to probe into the constitution of living matter, let me reassure them. In the old days it was accounted to Galileo as an offence against religion that he should demonstrate that the earth was not the centre of the universe; that the sun did not travel round it, but it round the sun. We all now accept Galileo's teaching, and our religion is in no whit weakened thereby. Less than a century ago our forefathers regarded as heretics those geologists who taught that fossils were the remains of living beings, and that therefore the earth's age, instead of being an odd six thousand years, as Archbishop Ussher and others had computed, must be some hundreds of thousands of years, if not millions. Everyone now-a-days accepts the geologist's evidence without thereby being accounted an enemy of revealed religion. Fear not, therefore. True religion is unaffected by results of research upon natural phenomena.

So now to come to my subject—What is life? This in the first place is to be noted, that if we analyse what we recognize as living matter, or more accurately, matter that had been endowed with life, whether we take the most minute vegetable or the largest animal—from one end of the scale to the other—from the simplest to the most complex, we gain one particular order of substances as the result of our analysis—an order only found in nature in connection with matter that has been living—and these substances we speak of as proteids, or proteins. Save for water and certain very simple salts of sodium and potassium, these proteins are the only bodies common to all forms of matter that have been endowed with life. There are plenty of other substances which we may gain from certain orders of living matter—chlorophyll, starches, fats, and so on, but these are not universally distributed. The proteins are the one order of substances derivable from all animate bodies. We may express this in another way by saying that life is immediately associated with the presence of proteins. This, however, is not absolutely correct; we are not convinced that the proteins as such are actually present in living matter—in fact when we isolate these proteins they do not exhibit the properties which we associate with life: they cannot move, they cannot grow, they are insensitive to stimuli. We only know that dead organic matter yields proteins. It is more correct to say that life is associated with the presence of *proteidogenous* matter—of matter which in dying, as again in certain of its activities while living, yields proteins.

But so universal, so essential is this association, that clearly the first step to a comprehension of living matter must be gained through a study of these proteins and their properties, or to repeat, the phenomena of living are clearly bound up with the processes of association and dissociation of bodies of this particular order. For more than fifty years the physiological chemists have been working at the problem of the constitution of these proteins. At first the problem seemed hopeless. It was found that they were formed of carbon, hydrogen, oxygen, nitrogen, sulphur, but the formula of constitution was something appalling. Common salt, Na. Cl., for example, consists of one atom of chlorine (Cl.) joined to one atom of sodium (Na.). But in these proteins the amount of sulphur to be obtained is so minute compared with amount of the other constituents that obviously the molecules are of enormous size. Take, for example, one of the proteins which since it can be obtained in a crystalline form, must be regarded as among the less complex, namely hemoglobin, the protein which gives the red colour to the corpuscles of the blood. Its molecular composition is somewhere in the neighbourhood of

712[1] 1130[2] 214[3] 245[4] 1[5] 2[6]

The molecular weight of water, formed of two parts of hydrogen to one of oxygen, is 16, the average molecular weight of the proteins has been

[1] Carbon. [2] Hydrogen. [3] Nitrogen. [4] Oxygen. [5] Iron. [6] Sulphur.

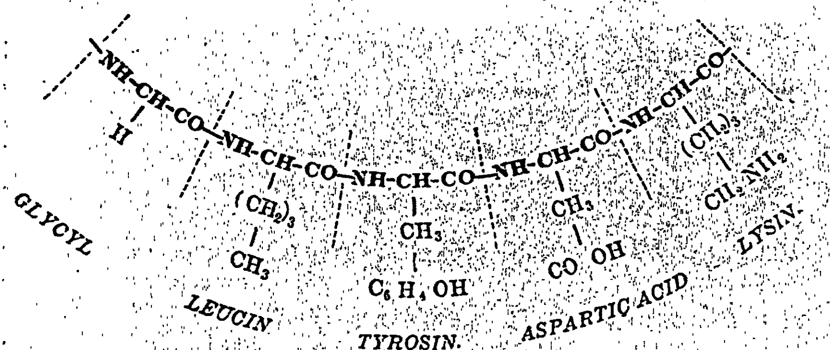
estimated at 15,000, or, otherwise, this molecule is about 1,000 times as weighty as is the molecule of water. I say in the neighbourhood of these figures, for no two samples yield identically the same results. It seemed impossible to think of building up experimentally such hugely complex bodies.

Next it was found that these molecules are, as I may express it, conglomerates. Hemoglobin, for example, can be split up into an iron containing protein, hæmatin, and an iron-free, globulin; and in the Seventies and Eighties a material advance was made in the study of the products of splitting up the molecules by the action of acids and of the digestive ferments. The peptones and albumoses so obtained were found to be less complex. In the Nineties Kossel discovered a group of proteins, the simplest so far obtained—namely the protones—bodies allied to the peptones, whose molecules are much simpler. Thus Sturin obtained from the sturgeon is

C	H	N	O
36	69	19	7

Only yesterday my colleague Professor Ruttan showed me a fat formed from the hydrocarbon C_{33} H_{66} which he had built up in the laboratory; so here it will be seen that we are within the limits of possible synthesis. Kossel showed that these can be broken down into yet simpler bodies of the *amino-acid group*, Histidin, Arginin and Lysin, C_6 H_9 N_3 O_2, etc. In fact, the researches of Curtius, Hofmeister and Emil Fischer have demonstrated that the proteins in general are composed of these amino-acids—that they are compound molecules composed of these amino-acids joined in series. I do not wish to enter too deeply into what is a difficult subject to grasp. I will only say that the amino-acids are compounds of carbon, hydrogen, nitrogen and oxygen that have the structure of fatty acids,—bodies of the butyric and acetic acid group—to which nitrogen-containing *amine* molecules (of NH_2) have become linked, giving them the remarkable property of being at the same time basic as well as acid, so that they can enter into combination at one and the same time with acids and bases. It is this particular property that would seem to be at the bottom of their striking characteristic of forming huge compound molecules. Thus, suppose we regard them as bricks, having at one end an acid affinity which will attract and attach a basic body, and at the other a basic affinity which will attract and combine with an acid body, it will be seen how thereby it is possible to build compound molecules formed of long chains of these amino-acids. And proteins are bodies of this nature.

This is no longer a matter of theory. The long-continued studies of the great German chemist Emil Fischer have in the last few years been crowned with brilliant success. Briefly, he has not only isolated a long series of these amino-acids, but following Curtius, has been able to synthesize them, that is, to make them in the laboratory from simpler substances; but also, having done this, he has succeeded in linking them together in series. In one case he linked together as many as eighteen amino-acid radicles. These *polypeptides* as he has termed them, in appearance, reactions, (such as the characteristic Biuret reaction, which we use commonly to detect the presence of proteins) and in behaviour towards acids and alkalies, so closely resemble the true peptones that, to quote Fischer, they must be regarded as their nearest relatives. And Fischer has gone further than this. In the Faraday lecture delivered by him in London in 1907, he announced that one of the bodies artificially built up by him (*l.* leucyl- triglycyl- *l.* tyrosin) has all the properties of the albumoses—of certain simpler proteins which we gain by the peptic and tryptic digestion of muscle.



Thus at last there has been accomplished the building up of these specific organic substances which in nature are found solely in the outcome of life,—nay more, form the material basis for the manifestation of life. It is the most notable achievement of the new century.

Here let me again emphasize the fact that these proteins which thus we are now in a position to build up, or if you like the term, manufacture in the chemical laboratory, are inert bodies—they are not living as we understand the term—the living matter is not proteid, but proteidogenous. Can we form a chemical or physical conception of the difference between the two? between living and dead organic matter?

"Here is a fact, the meaning of which is of far-reaching significance. "I show you two tubes. Each contains a small quantity of a white "powder—about half a teaspoonful. Each powder consists of the same "elements, oxygen, hydrogen, nitrogen and carbon. One is practically "harmless; the other contains within it the power of death to a thousand "men. The one is quinine; the other aconitia—the alkaloid which makes "so deadly the plant whose flower our ancestors called monkshood, in "the far-off days when the original was often before their eyes. It is "an almost startling fact that in this minute quantity of powder, hardly "visible to those at a distance, there is such a potentiality of death. "Picture to yourselves a thousand men. That which is in this tube "would end the life of every one of them. Here is a latent power beside "which the lightning flash is feeble, and to which the earthquake might "give place, as far as the comparison depends on lethal certainty.

"But the resemblance in the aspect of these two substances is not all. "As I said, each consists of the same elements—each is made up of "carbon, nitrogen, oxygen and hydrogen. Each consists of the elements "which compose air and water, with carbon added. Why is one almost "harmless and the other a most deadly poison? I might ask the question "regarding many other substances composed of the same elements, but "between these two the resemblance is strikingly close. The answer to "my question may be given, 'It depends upon the chemical constitu-"tion.' True, but this takes us a very little way. When we discern that "the difference depends upon the way in which the elements are arranged "in molecules, and the molecules are grouped together, we are not much "nearer an explanation. We see a little more, however, when we realize "that chemical constitution means that energy is held 'latent' (as it is "said), ready to be released when the elements form simpler, closer "compounds. *All vital function of the body depends on a like simpler, "closer union of the elements which make up complex organic com-"pounds. As far as we can see, all the energy which is released in the "animal body, is released in consequence of chemical action under the "mysterious inflence of life.* Where such closer union of the elements, "and such release of latent energy are going on, the process may be "changed entirely by the contact of molecules of allied constitution, with "latent energy on the point of release, so held as to blend with that "which is being set free in the living tissue. Blending with this, it may "augment or oppose. Remember that difference in chemical constitution "means difference in the readiness with which the elements separate and "reunite and release their energy. Remember also that minute differ-"ences in constitution enable these chemical compounds then to blend "with the vital action in one structure, or to be absolutely inert. It "must depend on differences in the vital chemistry which underlies "function, although these differences which determine *affinity* or *indif-"ference* we can discern only by the result.

"Nerve force, as far as we can see, is the result of chemical change "occurring under the influence of life in the molecules which compose "nerve tissue. Chemical processes, the breaking up of complex com- "pounds, and the formation of simpler compounds, with consequent re- "lease of the energy held latent in the former, is the constant element "in the production and conduction of nerve impulses. Some chemical "compounds may come into relation with the tissue in which the change "is occurring without exerting the slightest influence upon it. But an- "other substance may come even in amount inconceivably minute, whose "molecules are so arranged as to fit, as it were, with the changing mole- "cules of the living tissue. The energy the new molecules bear seems to "blend with that which is in process of ordered release in the living "tissue, and to blend so effectively as to derange it entirely. Such an "influence as I have spoken of seems to be exerted widely in the case of "aconitia. Its contact with some living nerve structures seems to be so "instant and precise as to induce the production of an excess of energy, "sweeping all before it; on others, to oppose the process, to induce a "sudden stillness among the changing molecules, and to arrest all action. "Among the nerves thus influenced may be those on which depend the "action of the heart, and with a sudden spasm or a sudden stillness, the "heart stops and life is ended."

I have quoted these last three paragraphs from a clinical lecture delivered several years ago by Sir William Gowers. I have not altered his words; they approach near enough to what I wish to impress upon you to serve my purpose. They lay down in a striking manner that the sole difference that we can determine from a chemical point of view, between the living, palpitating matter and protein, between "imperial Cæsar" and his own dead "clay," is brought about by chemical combination; by the entrance of certain molecules into combination with the living or *biophoric* molecules of certain controlling cells of the organism, and forthwith, from being active and reactive, these become inert—dead—protein. That some similar change takes place in connection with the death of the tissues in general is indicated by the change in reaction when any cell passes from the living to the dead state. Living matter has a feebly alkaline reaction; with the onset of death, the reaction becomes acid. Or, otherwise, in passing from the relatively unstable proteidogenous to the dead, relatively stable proteid state, the biophoric molecules either take up alkaline molecules (or ions) from the surrounding cell sap, or give up acid ions to the surrounding fluid; they surely undergo chemical change.

Now the very constitution of the protein molecules, as revealed to us by the researches of Hofmeister and Fischer, explain how this must be. These amino-acid radicles which compose the protein molecule are all built up along the same lines. They have multiple affinities. Possibly I here delve too deeply for some to follow me, but an elementary knowledge of chemistry and of chemical nomenclature is a part of modern culture, and therefore I presume to venture, and the accompanying diagrams may help to explain my meaning. From our knowledge of the constitution of the protein molecule we may regard the biophoric or living molecule as made up of a series of amino-acid radicles joined together in ring form. Fischer's studies have taught us the mode of junction of these radicles; it is by the acid carboxyl (C O) group of the one radicle to the alkaline amine (N H) group of the other. To this extent the radicles or nuclei are relatively firmly united. The other components of the different amino-acids must then form free swinging or *side chains,* and it is according to how these side chains are built up, that we obtain the different nuclei, or amino-acid components. These are capable of replacement and modification according to the ions or compounds attracted from the surrounding medium. They may be regarded as less stable, able to be detached and replaced.

In discussing what life is, we may therefore, lay down in the first place that *all vital manifestations are manifestations of chemical change in proteidogenous matter, are, in short, the outcome of arrangement of that matter with the necessary* LIBERATION *or* STORING UP *of energy.* To this extent all vital phenomena resemble phenomena of surrounding inanimate nature; they differ from those only in degree, not in kind. There is not one vital activity which can be mentioned that demands for its explanation something over and above chemical change;[1] and to this extent, inanimate and animate nature are one. There is, however, an apparent, most important difference between the results of vital and non-vital phenomena. This has been well put by Earl. "Every living organism may be regarded as a centre at which energy is being constantly transformed. It is by the nature of this transformation that we recognize it as a living organism. But," he continues, "the continuous operation of these transformations in the region of the organism is distinctive. In all exchanges of energy between inanimate bodies there is a speedy attainment of equilibrium, whereas the organism, so long as it lives, is incessantly disturbing the equilibrium which would otherwise arise between itself and its environment. In other words, living

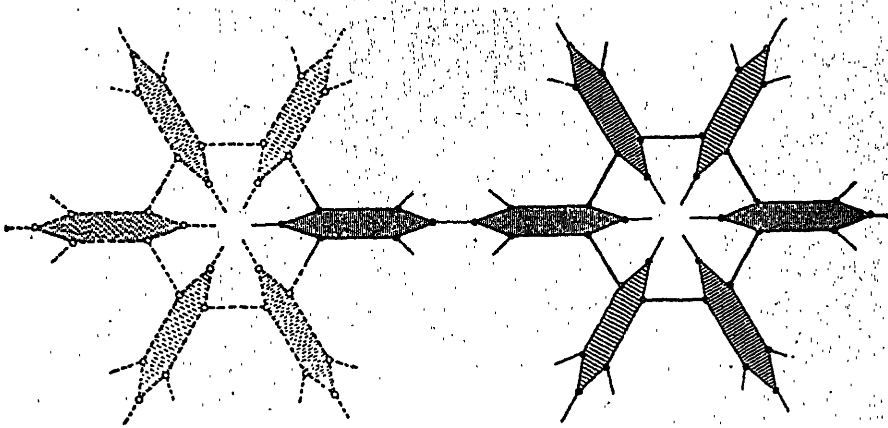
[1] Even memory has been explained by Hering and others as a reproduction under particular stimuli of particular relationships between particular molecules, so that now they set in order an identical series of reactions in the cerebral cells.

"organisms are not *ordinary conservative systems,* and the extent to "which they *diverge from the principle of the conservation of energy* "is another indication to us that in the organism, we come in touch with "phenomena which are not yet, at all events, reduced to physical laws."

I wish to discuss how far this statement is true, for if true it immediately defines the difference between phenomena of animate and inanimate creation. It will be best, I think, to study the subject by analysing that property of living matter which is the most evident outcome of the incessant disturbance of equilibrium above mentioned—I mean growth.

If we seek to test the relative importance of the various forms in which vital activity manifests itself:—motion, sensation, assimilation, excretion, reproduction, we are bound to see that one and all of these subserve growth. If the individual moves, an ultimate analysis shows that the primary object in motion is either to obtain more food, or more accurately the primary result of that movement is to approach and assimilate foodstuffs, and that food obtained is of benefit, as it can be used for further growth; or is to place itself at a greater distance from disintegrative forces. The same is true also with regard to sensation. That is of benefit primarily in order to acquaint the individual living unit with, on the one hand its closeness to food stuffs, or on the other hand, with the presence of physical or other agents deleterious to the organism. Assimilation and excretion are but the auxiliaries in the due utilization of materials which aid growth, and in removing from the organism all materials whose continued presence would disturb the process. Growth then, is the central or essential phenomenon of life, and to understand life, it is necessary that one gains a clear idea of what is the essential nature of this process of growth.

Let us then consider what growth means. It means *quantitative* increase in the individual matter endowed with life, increase in the living substance. That individual may consist of a single cell, may be an almost infinitesimal micrococcus, for example, or, at the other pole, say in the elephant or in the whale, may consist of a huge aggregate of countless millions of cells, all associated and depending the one upon the other. In this latter case it is the separate cells which, some or all of them, increase in size, and with this, increase also in number. Each cell of such a multicellular organism is, we know, derived from a primitive fertilised ovum by repeated division of the original single cell; and in this process of division, there is a partition of the bioplasm, of the vital matter. During the period of most rapid growth, in the stage of development, this increase in size of the individual cells and their multiplication is most rapid, and when we compare the adult with the ovum from which it sprang, when we know that in suitable environment, a single bacillus, for instance, dividing, can, in twenty-four hours, give rise to hundreds and thousands, not to say millions of bacilli equal in size and identical in properties to the original bacillus—one observer has estimated that in the breeding of the unicellular Rotifer, if all the possible progeny could be preserved, there would in the course of a year be developed a mass of organic living matter as large as this world of ours—we can have no doubt, not merely that growth means a heaping up, through the agency of the essential vital portion of the protoplasm, of secondary substances, not in themselves living and vital, but that that living matter itself is marvelously increased in amount. There is no other possibility open to us. But now, can we picture to ourselves the nature of such increase in the vital substance, the actual bioplasm? I think we can, and that by the use of current chemical conventions and symbols. The actual process must, I admit, be vastly more complicated than the diagram we employ can represent. But that doesn't matter. If, by the use of a simple diagram, we can depict and can grasp the nature of the process, then we have gained a great st[illegible]dvance; only, while using such a simple diagram, we must remember that it is but a symbol, it is like using the symbol π to represent that interminable fraction 3.14159265.... etc.



Thus far I have pointed out that all vital processes are manifestations of energy, and that such manifestations of energy surely indicate chemical change. Thus the substance or bioplasm endowed with life may be regarded as a single chemical substance, varying, it is true, in its properties in the different species and forms of living beings. If a chemical substance, then it is formed of molecules. I have already given you the conception of the structure of the biophore or molecule of living matter. Let us reduce this to its simplest form—as a ring of carbon containing nuclei built up after the type of a benzole ring, with which the chemists are familiar in the large group of benzene compounds. Each nucleus of such a ring may, for our present purposes, be represented by one of the more complex amino compounds already referred to. Such nuclei are polyvalent—they have, that is to say, multiple affinities which can be satisfied by the attachment of other atoms as radicles. It will be seen that to make a ring, two at least of the affinities of each amino-acid nucleus must be satisfied by junction with other nuclei, leaving, however. other unsatisfied attachments. And it is in accordance with the way in which these unsatisfied arms become satisfied—according to these side chain combinations—that the different benzene derivatives are formed.

It is interesting to note that even among these relatively simple carbon compounds—those familiar with chemistry will appreciate the virtue of that term "relatively"—we find already that there is indication of selective activity. I mean this, that once one of these bodies or derivatives has been formed and becomes partially broken down, it is found more easy to obtain new associations after the original type rather than new associations of a different order. Even among the simpler carbon compounds we see the faint origin of what, biologically, we speak of as habit. The same is true of radicles in general. Once certain compounds are formed, the adhesions or attachments are more close, more fixed. So now to continue. Let us suppose this simple annule of living matter with certain side chains already attached, floating about in a fluid medium in which, through a concatenation of circumstances, various odd ions are similarly floating free. The unsatisfied arms of the ring are liable to be satisfied, that is, to attract and fix on certain other ions. All that we have to do is to suppose this particular annule attaches to one unsatisfied arm a floating ion of carbon, that this then so attaches itself to other carbon ions until a second ring is formed in association with the first. Then this ring similarly attaches to itself side chains in the identical order seen in the first instance.

Now behold, there is built up a second annule of identical nature, which when once formed, may break loose. In place of one annule we have two, and as the properties of any chemical compound depend upon its composition, the composition determining how, and how much, energy is liberated under certain conditions, so, gentlemen, if the composition of the first annule, as we agreed, was such as to confer upon it the properties we term vital, the second annule will possess the identical properties. In place of one living molecule, we have two; in short, we have growth.

But stop, you will be saying. By what earthly right do you assume that chance ions floating in a fluid medium come to attach themselves one to the other in due and regular order, so as to form a ring with side chains identical with the original ring with its side chains, with which the first of these wandering ions became connected? You admit at the start that this original ring and side chains are immensely complicated, and that our diagram represents an absurdly simple case; how can you have the face to make any such proposition?

All I can say, gentlemen, in reply, is that I have precedent upon my side. What happens in crystallization? You have a watery solution, say of common salt. You now know that though you place solid sodium chloride, a definite chemical compound, into that water, in the very act of solution, the ions of chlorine now dissociate themselves from the ions of sodium. Molecules of Na.Cl. break up, they are no longer there as such. You now cause this solution to evaporate and become concentrated; what happens? As the water volatizes do the ions of the gas chlorine escape into the air, leaving the heavier sodium ions behind? Not a bit of it. Inevitably when the concentration reaches a certain point, some ions of the sodium, aided by some sharp point or inequality in the surface of the vessel, once more join themselves each to an ion of chlorine, and the process of crystallization begins. The very existence of one crystal clearly seems to cause other junctions to occur in its neighbourhood, and *just that one particular series of junctions necessary to form sodium chloride,* so that, although there may be present in the solution various other substances, various other ions, yet they are not attracted, they remain still in solution to a very great extent; we gain pure, or almost pure crystals of the one substance. Here we have a process of the very same order to that which I contemplated above, a process of definite, inevitable or selective attachment of ions in a certain order, given certain definite conditions. Certain particular ions unite and build up the molecules and crystals of one particular inevitable form, of one particular composition.

Here again the example is very simple; I might, it is true, have mentioned solutions of salts of a more complicated nature, but again I hold that the simplest case is good enough, nay, is best, upon which to base my contention, which is that we have to recognize the existence of this affinity or attraction, or whatever you please to call it, whereby certain freely floating ions, and combinations of ions under certain definite conditions, tend to attach themselves one to the other in a definite order, to form bodies of a definite composition. And, gentlemen, in this connection, is it not, to say the least, suggestive, that a fluid menstrum is essential for vital processes? Such fluid menstrum, we now know, is essential for the breaking up of salts into their constituent ions, so as to bring about the formation of new combinations, and that in the absence of great heat. Is it not suggestive, that we, for example, are over seventy per cent. water; that the actively functioning, as apart from the inert tissues, contain still greater proportions—and the same is true throughout living nature; that we have in the living cell just those conditions favouring alternate ionization and crystallization of the contained molecules, and that the dominant and characteristic element present in the living matter is one which we find relatively wanting in this earth of ours, save in connection with living matter, or matter like coal, which has been alive; and that element, carbon, is, unlike the majority, tetravalent, and therefore so peculiarly liable to form extensive and complicated attachments. It would almost seem as though all the carbon present on the surface of the earth inevitably becomes utilised to form and to give rise to living matter. The same is largely true, too, as regards the nitrogen.

In short, gentlemen, were I a Frenchman, I would say:—La vie c'est la crystallisation. Life is the by-play of carbon-nitrogen compounds now breaking up and liberating energy, now attaching to themselves other ions, and so storing up energy, deduplicating themselves, and undergoing growth, or as I have expressed it elsewhere, life is to be regarded as a state of persistent and incomplete recurrent satisfaction and dissatisfaction of certain proteidogenous molecules.

If we accept this view, and the more I ponder over it, the more convinced am I that it is along the right lines, where is the wide difference I quoted to you as being observed between animate and inanimate nature? Where is that violent, not to say indecent assault upon the otherwise universal and ever to be respected principle of the conservation of energy? Life and growth come under the category of chemical processes such as we are familiar with. All that we have to recognize as separating what we term animate from what we term inanimate nature is that, from the intimate constitution of carbon, it is able to form combinations of a marvellous complexity—unsatisfied compounds which, therefore, are in a state of unstable equilibrium, which easily break off certain side chains already attached, thereby giving off energy, which as easily, under certain conditions of environment, attach other side chains to them in definite order, thereby storing up energy and undergoing growth.

I would dwell for a moment upon this point made by Earl, and already referred to, namely, the remarkable condition of persistent, unstable equilibrium of living, as distinguished from non-living matter. The distinction, I would say, not so absolute as he lays down. Once more, it is a matter of degree. Non-living matter is only in a condition of relatively stable equilibrium. Our earth, for instance, taken as a unit, is only relatively stable. If astronomy teaches anything, it is that each planet, each sun, each solar system, has its periods; that each begins in a gaseous state, a state of enormous instability, enormous liberation of energy; that from the nebulous stage, as a result of the mutual attraction and combination of its elements, it undergoes a stage which is strictly comparable to that of growth and then settles down into partially —and only partially—independent systems, with a certain storage, and a certain dispersal of energy. But our earth, for instance, is subject to progressive change, and is far from being eternal. Sooner or later in the æons that are to come, our sun will become exhausted as an energy distributing centre; the system will be dead. Sooner or later in æons far, far distant, the attraction ever present between planet and sun, and sun and other suns of yet greater systems, will draw planet unto sun, and sun unto other suns, and with each act, so colossal will be the force exerted, the force of impact, that what is now solid and fixed will once more be dissipated; the equilibrium is but temporary, the return to the nebulous stage inevitable.

But true it is, all the same, that the equilibrium of living matter is most markedly unstable, and this instability is essential for active dynamic life. We are never satisfied. Render the living molecule a satisfied body, with all its side chains complete, and unable to make attachments with other ions, so that no further interactions are possible between the molecular system and its environment, and it must come to rest, and function be at a standstill, all indications of life ceasing. It is quite possible that, as Gowers indicates, certain poisons act, and thereby induce death, by combining with the molecules of certain all-important centres in such a way as to satisfy those molecules, and so arrest function and further activity. Other poisons and physical agents may likewise cause death by the contrary process of decomposing and breaking down the molecules, whereby they become so gravely disorganized as to be unable to continue the progressive series of attachments and of liberation of side chains which are the underlying features of the vital process.

I could expand this conception, and dilate for long upon its many bearings. Once we accept this chemical theory of growth, if I may so term it, it is wonderful how it illuminates and harmonizes a whole host of phenomena regarding which there are hosts of theories, having this in common, that they do not adequately explain. I could spend some hours of your time applying this conception to the subjects of evolution, of descent, and of inheritance, the inheritance or non-inheritance of acquired properties, the inheritance of disease, the immunity from disease, and so on. But I will desist; it may seem to you that I have already gone too far. But in defence of myself, I am prompted to quote some words of the good old Stephen Hales, Vicar of Leddington, near London, in the reign of George I., who was the founder of modern exact physiology, based upon accurate measurements, and quantitative rather than qualitative studies. "In natural philosophy," he says, "we cannot depend on any mere speculations of the mind; we can only, with the mathematicians, reason with any tolerable certainty from proper data such as arise from the united testimony of many good and credible experiments.

"Yet it seems not unreasonable, on the other hand, though not far to indulge, yet to carry our reasoning a little further than the plain evidence of experiments will warrant; since at the utmost boundaries of those things which we clearly know, there is a kind of twilight cast from what we know on the adjoining borders of terra incognita. It seems therefore reasonable to indulge conjecture there; otherwise we should make very slow advance in future discoveries. either by experiments or reasoning."

I have, it may be, conducted you to this twilight land on the borders of terra incognita. I shall be satisfied if I have set you thinking; if I have indicated to you, though vaguely, that life is not a thing peculiar and apart: that it is a portion of a larger whole; that animate and inanimate nature conform to the same laws, the same principles of chemical association and dissociation. Vaguely, but no less surely, we find the same laws at work throughout nature in all its aspects. The processes which determine the structure of the atom, determine the properties of all aggregations of atoms; what rules the mighty sun, rules also the less than visible microbe.

ON THE USE OF RADIUM IN PARIS.

BY

G. E. Armstrong, M.D.

One of the interesting questions in Medicine to-day is the nature of radium and its therapeutic value in Medicine and Surgery. It is, indeed, a subject in which Canadians should be especially interested and in which they might be pardoned for taking a reasonable pride. Although radium was not discovered in Canada, we have with us this evening Professor Cox who discovered Rutherford, and much of the knowledge of the world to-day was worked out by him in McGill University. In this work he was ably aided and encouraged by Dr. Eve, himself an authority on radium of international reputation, who also honours us with his presence.

It is not strange that there should have been a readiness to investigate the therapeutic value of this remarkable substance that spontaneously generates heat, light and electricity, and to determine if these remarkable powers could not be used for the relief of human ills, and, perchance, to overcome diseases hitherto beyond our control.

It was with the object of learning what had been accomplished in this direction that I visited Paris in the early part of last month, that I might see for myself what success had been attained in the use of radium as a therapeutic agent at the Radium Institute in that city.

The Institute has been organized and is under the direction of Dr. Louis Wickham, physician to the Saint-Lazare, and ex-chief of the clinique at l'hopital Saint-Louis, and Dr. Degrais, Chief of the laboratory at l'hopital Saint-Louis.

Dr. Wickham and his associate impressed me as men who were thoroughly scientific and deserving of our full confidence. They have a consulting room where they receive the patients, examine the lesion and prescribe the strength and form of the apparatus to be used, and the frequency and duration of the application. There is a large room adjoining where the patients receive their treament, and in another part of the building are three laboratories, a physical, a biological, and a pathological under the care of Dr. Dominici, who, by the way, was not in Paris at the time of my visit and whom I had not, therefore, the pleasure of meeting.

They are studying the action of radium very carefully and thoroughly and keeping very full notes of every case.

They have comparatively little to say. They show their cases, tell all they can about them and allow the observer to draw his own conclusions. They are not yet prepared to make any definite statements or to compare results obtained by the use of radium with those obtained by other means. If the question is put to them they simply reply that they have not yet sufficient experience to justify a comparison.

The first to study radium therapy was M. Danlos, and he studied its action in vascular nævi. His last memoires appeared in the "Bulletin de la Société Médicale des Hôpitaux" for Feb. 10th, 1905, in which he said that in small vascular nævi, after the application of radium for an hour, repeated, if need be, at intervals of three weeks, he had obtained a small white cicatrice, and he presented to the Society a new form of apparatus exactly similar to that now used, namely, the radium spread out on a surface and there retained by a varnish.

M. Rehns obtained a good result in vascular nævus of the arm. Among other early workers were Mr. Hartigan, who in 1904 applied it to a nævus of the face; Dr. Ekstein of Prague, who used it in a case of telangiectasis on the back of the hand; and M. Boikov of Kharkow.

As to its action and method of employment I may say that radium offers the best example of radio-active properties so far discovered. This radio-activity is one of the forces constantly liberated from radium. It manifests its energy by various phenomena. It renders the air a good conductor of electricity (the phenomenon of ionization); it impresses photographic plates; it traverses opaque bodies; it changes the colour of certain substances; and, what is most important of all to us as physicians, it modifies the cells of living tissues. It can be made to destroy them or to simply influence their evolution. It gives off a gas called emanation and rays. The rays are particularly concerned in the treatment of vascular nævi.

These rays, as probably most of you are aware, are divided into three groups, the α, β, γ. The α and β rays are the particles issuing from the disintegration of the atoms of which the radium is composed. These particles (ions and electrons) are charged with electricity, positive from the α, and negative from the β rays. They are infinitely small; those of the α are compared to the atoms of hydrogen, and those of the β rays are 1,000 to 2,000 times smaller. They travel with great rapidity; the β rays with the rapidity of light, 300,000 kilos a second, and the α 20 times slower.

The γ rays are not material like the α and β, and consist of a form of perturbation of the ether, some of shorter and some of longer undulations. They pass with extreme rapidity and infiltrate the elements of the tissues. The α, β and γ rays do not pass through opaque substances with the same facility. The α rays are stopped by a little absorbent cotton; the β rays go further and the γ rays are the most penetrating of all.

This knowledge of their penetrating power has led to the application of the principle of filtration, the α rays being filtered out by cotton, the soft β rays by mica, the hard β rays by a few mm. of lead, while the γ rays will pass through an inch of steel.

The rays are sometimes filtered through the air, *i.e.* the apparatus is kept at a distance from the patient.

In what particular way these rays modify the tissues is a question being actively studied, but which cannot yet be defined precisely.

The salt generally used at present is the sulphate combined with the sulphate of barium, and the radio-activity is measured by the degree of force with which it renders the air a good conductor of electricity (the phenomenon of ionization). The maximum force of pure radium has an activity of 2,000,000, and when one speaks of an action of 500,000 or 100,000 one thus indicates the amount of barium mixed with the radium and the figures represent the power of ionization which is 500,000 or 100,000 times greater than an equal quantity of pure uranium which is taken as the unit of measure.

The activity, then, of the apparatus depends on the quantity of radium incorporated, the method of application, the fixity of the grains, the dimensions of the radio-active surface and the permeability of the substance with which the radium is fixed.

It has been used very largely in the treatment of vascular nævi and the results have been classified, particularly with reference to the size of the lesion, the depth to which the tissues are involved, the degree of dilation of the vessels, etc., each variety requiring an apparatus especially adapted if the best result are to be obtained.

The histological changes taking place are thus exposed by M. Dominici and M. Barcat. The fibrous bundles and elastic tissues in the walls of the blood vessels are absorbed; at the same time the fixed intervascular, connective tissue cells of the vessel walls pass into a state of embryonic tissue. The embryonic connective tissue proliferates and forms a connective tissue net-work. This results in a gradual retraction of the blood spaces.

The angiomatus tissue is thus replaced by embryonic connective tissue cells between which are stretched the vessels which become relatively small and infrequent. The cells of the young connective tissues are disposed parallel with the surface of the skin and reconstitute an adult connective tissue. There is secreted new connective tissue bundles and new elastic fibres.

The new connective tissue has many characteristics different from inflammatory cicatricial tissue.

1. The superposition of the fixed cells of the connective tissue bundles and the principal elastic trunks follow a regular stratification.

2. The absence of expansion of the newly formed connective tissue beyond its natural limits, and, therefore, beyond the surface of the skin.

3. The delicateness of the newly formed connective tissue bundles.

The apparent confirmation of the cutaneous surface is in accord with this structure. The skin remains uniform, flat and soft in the zone previously occupied by the angioma.

The histological changes in the cure of the nævi consist essentially in the modification of the evolution of the vascular connective tissue produced by the action of the rays. These determine an embryonic fusing of the angiomata following the reorganization of these elements in the form of connective tissue fibres of a regular and uniform texture.

This theoretical explanation is based upon the researches which Drs. Dominici and Barcat have made with regard to the modifications impressed by radium upon the normal skin and various pathological tissues (tuberculous, cancerous, sarcomatous and telangiectatic). In all the studies of these authors the radium rays have in a similar manner influenced healthy and normal tissues.

It is remarkable that these changes are produced without any subjective sensations of pain or heat. The apparatus is generally applied and held in place by a strip of adhesive plaster. As these patients are often infants, the absence of pain or discomfort obviating the necessity of any local or general anæsthesia is a valuable feature.

Then again the æsthetic result would seem to be most satisfactory. The redness is replaced by skin of almost quite normal feeling and appearance.

Port wine stains and pendulous vascular tumours can be removed. I know of no other agent that can accomplish this.

In the treatment of pigmented nævi the action must be more severe, sufficient to cause vesication. Healing takes place in from 30 to 50 days, a normal surface results. Only small areas should be treated at one time.

The treatment of tuberculous lesions by radium has not been so satisfactory. Nevertheless some very encouraging results have been obtained in lupus vulgaris, lupus erythematosis, scrofulous ulcers, etc., but slowly and sometimes with a tendency to recurrence. Trials have been made with hypodermic injections of weak solutions of radium.

The results obtained in epitheliomata of the skin are sometimes apparently favourable. Rodent ulcers seem to yield readily. By this I mean more than the cure of an ordinary small rodent. In cases of deep and extensive destruction of tissues, cases that might be considered almost inoperable, the destructive ulceration has been arrested and the surface converted into a healing sore and in some cases apparently cured. In one such case at least, ulcerating glands behind the ear have been almost healed.

Wickham and Degrais have been very careful in their statements regarding the action of radium on epitheliomatous tissue. They say, quite rightly, that in the matter of cancer, more than in any other condition, we must be careful not to draw conclusions from a small series of cases and from too recent results. Recurrence must always be feared. A definite opinion cannot be given until a larger experience is obtained and a longer time has elapsed. There are reasons for thinking that radium has a selective action on cancer cells. Dr. MacKenzie Davidson of London, assured me that in rodent ulcers radium had a selective action and did not touch another cell. Such an opinion from MacKenzie Davidson is certainly worthy of our serious consideration.

One case of epithelioma of the tongue is reported as cured. I was told that the diagnosis in this case had not been confirmed by a microscopical section. I saw one case of epithelioma of the tongue under treatment. In this case the examination of a microscopical section had confirmed the diagnosis. It was an early case and no enlarged glands were palpable. The ulcerated area was situated on the right border of the tongue about opposite the first molar. It was quite as large as a ten cent piece. It certainly felt soft and lacked almost entirely the usual indurated feel. The base was clean, there seemed to be rather less than the usual tenderness. I was assured that the latter characteristics had appeared since the treatment by radium. The sore was certainly very far from healed although apparently improving.

In three cases of leucoplakia, two of the tongue and one of the lower lip, Wickham and Degrais obtained happy modifications. In three cancers of the lower lip one recurred after two months of apparent cure and two remain well up to date.

Dr. Dominici and Prof. Gaucher have obtained the best results in epitheliomata of the lips and mucous membrane by the use of the γ rays alone and in feeble quantity.

The rays have given admirable results in deforming cheloids, the result of trauma and burns, in eczema, impetigo, pruritis and small external hæmorrhoids.

They have not, so far as I could learn, made any attempt to apply radium to deep-seated or intra-abdominal lesions.

In Paris they are rather fond of placing an apparatus on each side of the tumour—or in the case of the cheek, of placing an apparatus inside in the mouth and one outside. This they call "cross fire."

They are exceedingly conservative in the use of radium, both as to strength, quantity and duration of application. They have had a few troublesome burns, two of which I saw during my visit at the Institute.

THE ESSENTIAL CHARACTER OF HYSTERIA.

BY

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Our regrettable reliance upon the *ipse dixit* of a great name is again illustrated by the rearrangement now occurring in our ideas on hysteria. The present "Trend of the Clinical Concept of Hysteria" (1) (*Boston Surg. and Med. Jour.*) has turned, under the guidance of Babinski, (2) towards ideas which were placed in the background by the clinical picture of the "grande névrose" drawn by Charcot. That is to say, the earlier conception of Bernheim (3) has received its due; and most neurologists in France at least, have acceded to the proposition that a "hysterical symptom is one susceptible of production by suggestion and of removal by suggestion-persuasion." Bernheim, however, (4) now considers the phenomenon of suggestibility to be normal, and the emotional attacks (les crises de nerfs) are for him the only hysteria.

In actual practice in English-speaking countries at least, the heresies of Charcot have had little influence, except perhaps among a few neurologists. The reason for this I shall not attempt to explain.

Let me recall an experiment which Joire (5) conducted in the early nineties with a girl named Marie. During hypnosis, it was suggested that she see her name written upon a translucent card. She was then asked to trace the letters she saw; and did so thus M A R I E. She was again hypnotised, and the experiment repeated; but this time, the surface of the card which she had seen was turned away from her against a window so that any letters would appear reversed as they were seen through the card. She was again asked to trace what she saw and did so as follows— "E I R A M." She must therefore have perceived that the card had been reversed; for she acted in conformity with that idea; but she did not really *see* the letters; for had she done so, they would have appeared M A R I E. This conclusively proves that she had only the *idea* of the reversed letters, which she tried to portray to the best of her ability. She had no sensation; it was not an hallucination. The ease with which she perceived that the card had been reversed indicates how cautious one should be in having recourse to metaphysical explanations of phenomena.

Bernheim (6) too showed in 1886 that the amaurosis and dyschromatopsia in hypnotic states were not sensory defects but that they were indeed simulated, as he believed, unconsciously. Again, the credulity of some observers that cortical areas could be inhibited during hypnosis by striking the skull over them with a hammer should not have been possible in face of the critique of Jules Soury, (7) who showed that the function under experiment went into abeyance in conformity with the observer's belief about cerebral localization; for instance:—Rainaldi's (8) patients lost the power of smell and taste during hypnosis when they were tapped over convolutions 01, and 02, while other observers produced this effect only when tapping over the uncus. Similar differences were evidenced in other areas, as Soury bitingly said "in conformity with the text-books read by the observers."

Such considerations should long ago have undermined the fantastical superstructure which hysteria became; but it was not until last year's discussion at the Paris Neurological Society (9) that the real destruction of the older hypotheses can be said to have occurred. There, it was unanimously decided "that among the phenomena usually included in hysteria, there is a special group of symptoms which can disappear under the influence solely of suggestion or persuasion: in particular, certain kinds of convulsive fits, paralyses, contractures, anæsthesiæ, hyperæsthesia; of modifications of the special senses and of difficulties of speech; as well as certain respiratory, digestive, and other troubles." The genesis of these is fully discussed by the present writer in International Clinics of last October. (10) They are most easily induced in states of suggestibility exaggerated by organic disease, which diminishes critical power, the faculty of awareness, which does not concord with suggestion. It is very difficult for the observer to avoid suggesting that in which he believes. Hence, the constancy with which the stigmata were found; but Babinski (11) has not during the last ten years seen anæsthesia in cases not previously examined medically. The medical manufacture of hemianæsthesia is illustrated by the case of traumatic neurosis in which Dupinet saw (12) another expert actually call forth a hemianæsthesia which had not been present before. This experiment is not too difficult to be repeated in nearly any hospital ward. The nervous crises which formerly made of the Salpetrière a pandemonium no longer occur there, because the suggestion of their occurrence no longer obtains. (13)

The finding of causative suggestions in other hysterical manifestations is entirely proportional to technical skill in the search.

It is pretty clear by now (14) that suggestion has no influence over the tendon reflexes, the true cutaneous reflexes, the circulatory and trophic functions, (14a) the disorder of which may produce dermographia, urticaria and other eruptions, ulcers, œdema, hemorrhage, or gangrene. Nor can the temperature, nor the secretions of urine, saliva, and sweat be influenced by suggestion, except in so far as they are called into action by emotion. Mobility of humour is a commonplace in hystericals; and this mobility is amenable to suggestion: hence it is theoretically possible to affect the secretions indirectly by suggestion through the emotions. But positive facts in demonstration of this have not yet been adduced convincingly. In the numerous cases hitherto presented, trickery cannot be excluded. Medico-legal literature teems (15) with mythomanic cases, such as that of the man who confessed to concealing a syringe in the rectum, and in whom, in a moment of excitement, an evacuation revealed two. The number of those cases which "could not possibly have had access to any means of provoking their symptoms" only indicates the looseness with which such negative evidence is accepted; as for instance in a case of alternating mydriasis I observed in Babinski's clinic; (16) for though the patient's father indignantly repudiated the mere statement thereof, it was found that his daughter had been placing in her eye drops of an atropine solution filched from her employer. Of course, mythomania, a type of moral degeneracy, a form of lack of adaptation, a weakness which resorts to trickery, may be and generally is accompanied by suggestibility; so that academically speaking, a deliberately produced lesion simulating spontaneous disease which the patient is trying to imitate may deserve the term hysteria; for of course, imitation is one of the forms of suggestion. These considerations are applicable to many cases of so called neurasthenia, (17) very often to the traumatic neurosis, (18) and frequently to the false gastropathies. (19) The false neurasthenic is a creature who, wounded in *amour propre*, solaces himself by retirement from further wounds: he is a simulator, more or less unconscious, and is curable by a removal of his unreal belief. Similarly, a traumatic neurasthenic tenaciously clings to the false fixed idea which holds him in disaccord with the environment, until he achieves the solatium he craves. Sometimes, however, the old man of the sea takes so strong a hold that he cannot be cast off: like the widow, he has nursed his grief until it becomes stronger than he. The gastric neurotic too must be cured by the destruction of his erroneous fixed belief in his digestive incapacity. (20) All of the foregoing false fixed ideas are hysterical, as they have arisen in suggestions whether they originated directly from an injudicious physician, a too sympathetic friend or indirectly from the gossip of neighbours, or the store of the patient's memories. And all are curable by suggestion, or better, by persuasion. The latter is constituted by the patient's awareness of the steps traversed; (21) whereas in suggestion, he does not know how the newer idea has been implanted in his mind; for it is inculcated either by authoritative assertion, or insinuated while his attention is distracted elsewhere; in either case, received without critical examination.

More careful investigation of the psycho-neuroses has now shown that many of the annoying, harassing, indescribable sensations which make life a misery to certain people have nothing to do with hysteria. They are cenesthopathies, (22) that is disordered impressions from the organs not derived from without: they are somatopsychic affections. Common in the psychose, they may be quite monosymptomatic, and even unaccompanied by hypochondriasis. They are in no sense hysterical.

Another important kind of symptoms not derived from suggestion are those lately placed together by Janet under the title of Psychæthenia. (23) He has shown how unamenable to suggestion are these. The crises of agitation (24) these patients often undergo have been labelled hysteria countless times. They are essentially different, as is the whole clinical picture. The main differentia are:—

"Firstly, as to fixed ideas, their duration in hysteria tends to be long; for though they are easily buried and forgotten, they are resuscitated with great ease and infallibility; whereas in the psychasthenic the fixed ideas are very mobile, but keep recurring voluntarily and indeed become cherished parts of the individual, and are far more difficult to eradicate than those of the hysteric. Secondly, hysterical ideas are evoked by well defined and not numerous association "suggestions;" in the psychasthenic they are often evoked by apparently irrelevant association, which are searched for by the patient; thus the "*points de repere*" are very numerous, cannot be predicted with certainty, and are often mere excuses for crises of rumination or tics. Thirdly, in the hysteric, the ideas tend to become kinetic, whereas the psychasthenic's constant state of uncertainty causes him to oscillate between "I would" and "I would not." Inhibition is too strong to allow an act, but not strong enough to dismiss the obsession." (25)

As to the crises, those of hysteria cannot be distinguished from those of psychasthenia or epilepsy, except by the property of being produced and removed by suggestion; for the foregoing criteria demonstrate the invalidity of the distinctions formerly drawn by Janet and others with regard to loss of consciousness, amnesia, automatism and power of arrest. (26) Recently, Ernest Jones (27) has insisted upon the need formerly expressed by Janet of studying the mentality between the crises in order to appreciate their significance; and this necessity remains true, although the dissociation hypothesis on which it is based is by no means beyond criticism. Walter Scott (28) has recently attempted to rebut it in a case cured by suggestion without regard to the sejunction of hypothetical buried complexes; and although his case and argument do not convince, I believe that the synthesis only awaits the labours of men of ability and clinical experience equal to that of such men as Jung, Morton Prince, Sidis etc.

The criterion of suggestibility makes necessary a revision of the conclusions of Hoche (29) and Heilbronner (30) on hystero-epilepsy. They believe that even fixed pupils and sphincter relaxation may occur in simple hysteria.

But it is now pretty clear that reflex iridoplegia indicates organic disease, (31) or at least, if temporary, a profound intoxication, which may produce also marked suggestibility, which, however, is unrelated to the pupil fixation. But sphincter relaxation may occur during profound emotion, as in the terror stricken dog reported by Féré, in (32) which an agoraphobia had been contracted from its mistress. The tendency to the loss of sphincter control during profound emotion is a commonplace; and the reinforcement of this by suggestion can very easily prevent the inhibition by which civilized people and domestic animals counteract the emotions might lead to unpleasant effects. There is a partial loss of consciousness, an insanity if you will, during the first access of every emotion. Thus in the emotion accompanying blushing, timidity inhibits voluntary activities; during laughter, the voluntary control is much diminished; the state of consciousness during such emotions has been shown by Sir Arthur Mitchell (33) to be analogous with that in dreams, during which auto-suggestions dominate the mind. That hetero-suggestions also are influential in sleep and dreams has been proved by the experiments of Morly-Vold (34) and Vaschide and Vurpas. (35) These observers, by stimulating the auditory, tactile and other senses, provoked dreams in accordance with the stimuli used; thus a string tied round the ankle caused the patient to dream that a wild animal was lacerating his foot, and so on. All these states are marked by lack of voluntary control, which connotes exalted suggestibility, that is to say, hysteria. This, then, is the relation between facile emotionalism and hysteria. Emotionalism is not hysteria, except in so far as it favours suggestibility. No one is a greater prey to emotionalism than the psychasthenic; but as Janet (36) has shown, his suggestibility is much diminished; for though he suffers profoundly on account of his emotions, it is on account of their incompleteness and failure of fruition in act.

The principle is simple enough, but is much complicated by the fact that phobies, tics, and other psychasthenic symptoms may occur in hystericals by imitation (which of course is merely a form of suggestion) or as a consequence of organic states. I have now under observation a patient who is at the same time claustrophobic and agoraphobic on account of a single fainting attack during cardiac enfeeblement due to an attack of influenza. She is in no sense of the word a psychasthenic; it is a phobia by suggestion. Phobias were cured by suggestion, and therefore were probably of the hysterical type, in the instructive case recently reported by Scott. (28) The psycho-analysis, not published in the report, is still more striking in this regard. An example of obsessions induced by suggestion and repeatedly cured thereby was related of a kleptomaniac by Bernard Leroy (37) at the Congress of Geneva. Irresistible impulsions derived from suggestion caused this woman in turn to fall violently in love with an officer whom she did not know; to passionately long for the death of her husband and indeed to make all the preparations for compassing his death, until the culmination of her preparations so horrified her that she recoiled and was cured of that obsession on the moment; and finally the intense longing to steal, which she satisfied by robbing the counters of the department stores.

Hysterical tic can usually be cured rapidly. For examples I must refer to a forthcoming article. (38)

The diagnosis of these pseudo-psychasthenics must be made by the patient's lack of the anguish and other emotional accompaniments to the hindrance of his morbid act: by the absence of sentiments of incompleteness with the various "manias" to which it leads, and by the uncritical irresistibility and absence of struggle of the obsessive ideas and impulsive acts of the false psychasthenic. (39)

The comprehensibility of hysteria, and the simplification of the treatment made possible by the foregoing facts, adds enormously to the precision, and hence the power of the therapeutist; and will remove from our profession the hitherto deserved stigma of inattention to, and ineptitude in face of, the numerous patients suffering from functional diseases of the nervous system and hysteria who have fallen a prey to the charlatan and pseudo-scientist in such vast proportions; it will put an end to the posing of ecclesiastics as mental healers, of metaphysically absurd cults, which undermine the collective intelligence; and lastly it will give confidence to medical men in their capacity to take their due part in the field of psychic enquiry so avidly pursued by the laity of the twentieth Century.

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AN ACCOUNT OF CANADIAN LEPROSY

BY

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In this brief article I propose to run hurriedly through the history of leprosy in Canada, and give some idea of present conditions, as I have seen them. It is the real clinical leper in whom we are particularly interested, and I leave to your leisure a sufficiently abundant literature on the laboratory aspect of the subject. Your clinical experience in general warns you that there is but one way to learn of disease,—from its unfortunate victims. And so my object will be not so much to add to your knowledge of this subject, as to arouse your interest and direct your attention whither you may gain practical knowledge for yourselves.

Our information concerning the early history of leprosy in Canada is somewhat vague in detail, but the main fact that the first cases appeared in 1816 among the Acadian people of Tracadie, Gloucester Co., N.B., seems beyond reasonable doubt. When, however, we seek the origin of the infection such a maze of theory and conjecture at once presents itself, that the inadequacy of tradition becomes painfully apparent.

Treating all explanations of origin based upon such predisposing or accidental concomitants as heredity, climate, diet, etc., at their modern valuation, we come down to consider seriously whether the first bacilli were imported from France or elsewhere by the French themselves, or whether they were accidentally sown there by strangers, as has so often happened in a maritime community.

The former view, I believe, prevails. It is plausible on the surface and may be true; but there seems so unmistakable a substratum of improbability that the matter will at least bear discussion. Is it possible that these people brought the disease with them and yet they were or seemed so profoundly ignorant of its nature? Possibly so. But immigration from France practically ceased half a century before the date of which we are speaking, and yet the first cases were two Acadian girls born of Acadian parentage. And so, our theory seems to fall before the facts of recorded history.

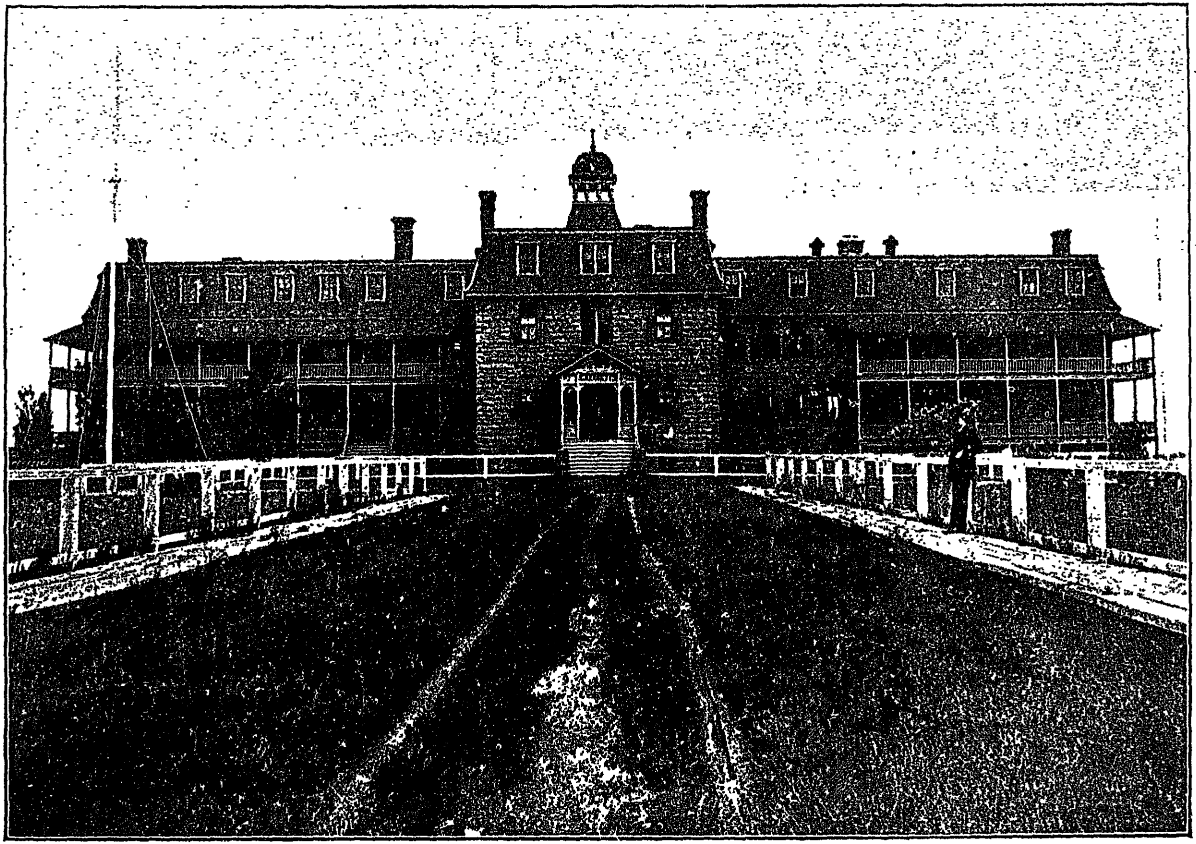
On the other hand, my friend the present medical superintendent of the Leper hospital is convinced that the disease came not from Normandy but from Norway, not through the agency of colonists but of sailors whose vessel is said to have been stranded on the shore of Bay Chaleur in the autumn preceding the outbreak. According to him, two of these men spent a whole winter with the family in which the first cases of leprosy appeared in the following summer. If we accept this piece of tradition, we have fairly strong circumstantial evidence; if we reject it, then we may never claim to know the origin of Leprosy in Eastern Canada.

From two cases developing in rapid succession in the family mentioned above, the disease spread slowly and in its own peculiar selective manner,—usually one, rarely more than two members of a given family becoming affected. It never invaded the inland settlements to any extent. The earliest medical attendant on the scene diagnosed the condition as closely akin to scurvy as it existed in England, but modified by the climate, and aggravated by the inferior food in common use.

Thus events held the natural tenor of their way for nearly thirty years, when a stranger is said to have recognized and reported the condition. Investigation was at once made, and as a result an isolation hospital was established on Sheldrake's Island at the mouth of the Miramichi River, and an attempt was made to gather in all cases that could be found.

Strange to say, the scheme was met with total indifference or active opposition by those in whose best interests it had been inaugurated. Twelve sorely discontented patients in all were housed at this hospital, and the superintendent modestly admitted that probably a much greater number were still at large. Four years after its founding, this Sheldrake Island Hospital was burned by the lepers themselves, as the surest means of regaining their freedom.

The story of these early events, unimportant in themselves, serves to illustrate the usual insidious invasion and spread of the disease, and the difficulties that might even yet be expected to arise in some quarters from a resort to active interference. Grant that the whole problem is one for the State and has beeen assumed by the State; grant that the danger of infection to otherwise healthy Canadians does seem minute; yet, above all there arises a very definite field of duty and responsibility for the medical profession at large. We have now more than ever before to contend with a menacing tide of European immigration from lands where leprosy is by no means unknown, and cases are not wanting at the present time where these foreigners have eluded the vigilance at our borders or developed symptoms after their arrival in the country. In dealing with this class especially, it becomes the medical man to be ever on the watch and to be sure of his ground, unless we are to have repetitions of the train of woes following an unrecognized case as has been related of New Brunswick; or have the brunt of our ignorance fall on hapless individuals suffering from minor skin affections, as happened in some cases in British Columbia.



LEPROSY HOSPITAL.

After the burning of the first Leper Hospital, much discussion arose as to the advisability of attempting to establish another similar institution. Among the usual champions of public economy were to be found the mass of the medical profession, who seem to have been practically unanimous that leprosy was an hereditary disease and consequently not to be checked by legislation aimed merely at the affected individuals. And the distribution of cases in Tracadie seemed to bear out their argument in a wonderfully convincing manner. Cases could be cited where a leper husband or a leper wife had lived and died with his family without other members developing the disease; or there might have been one leper child in a family, which was usually large, numerically, and no others showed symptoms of infection.

Fortunately, wiser counsels prevailed. Not only was a new hospital erected, but a change was made which wrought wonders in the line of improved public sentiment. The building was erected at Tracadie, so that patients were placed on terms of the easiest communication with their friends. The terrors of isolation faded so rapidly away that the medical attendant was able in his first annual report to make the flattering statement that patients had voluntarily presented themselves for examination and entered the hospital without objection. From that time our present system may be said to date, though the full idea of isolation could not be carried out until the present building, equipped after the manner of a modern hospital, was built in 1896.

But a history of leprosy in Canada would hardly be complete without a word concerning the colony which once existed in British Columbia. Some years ago the inmates of this Institution were re-examined by Dr. Smith, now in charge at Tracadie. Several patients were found to be non-leprous and were allowed their freedom. The remainder, being of Oriental extraction, were returned to their own country, where thanks to the hospitality of His Celestial Highness and our own generosity, the survivors are still maintained at our expense.

The visitor to the Lazaretto usually takes a light breakfast and prepares himself mentally for repulsive sights, — almost unrecognizable masses of human remains still clinging to a fluttering thread of existence. Then, he is apt to express himself as disappointed,—meaning of course that he is most agreeably surprised. As he passes from one to another, each rises to attention, and does his best to answer questions regarding subjective symptoms, past and present. If it is fine weather, perhaps half the total number of patients would be seen on such a visit. But where are those lepers of which I had read even recently to prime myself for the occasion? Here, on the strength of expert diagnosis, I have seen and examined some ten cases of leprosy; but according to my text-book notions I have seen but one leper in the series,—an old lady with leontine facies in the last stages of the disease.

But the casual visitor, disabused of extravagant ideas of distress, is apt to carry away equally erroneous ideas in the opposite extreme. The worst cases are least in evidence in the wards. You have seen but half of the cases, the others have just gone out;—you go out and they will just have gone somewhere else. Surprise them in some quiet retreat, and you may after a time gain a limited amount of confidence and see ravages of B. Lepra which quite surpass ordinary text-book illustrations. Perhaps this confidence will unearth another interesting feature—the mental condition of the patient. As a rule they are shy,—some are philosophical enough, but in most there is a marked degree of mental depression. Science has in no way mitigated in his mind the traditional almost hereditary horror of a leper. Practically he ranges himself in the category of criminal convicts rather than with the unfortunate victims of disease. With a touch of sympathy for their sad plight, one is impressed with the encouraging results of active measures in respect to this disease. Unfortunately, one need not go far to see the results of inaction in respect to other kindred germs—the B. Tuberculosis or the Spirochæte Pallida.

From the series of cases now at the Lazaretto it is easy to point out two cases of tubercular leprosy, several of anæsthetic leprosy, the remaining overwhelming majority are mixed in type. The one, a man twenty-five years of age, first developed symptoms five years ago. His complaints then were weakness and general malaise, but no definite pain in any part. A little later, some patches of discoloration appeared on his face, and these and other areas, especially on the brow, became thick and anæsthetic. Similar smaller nodules appeared on the ulnar aspects of his wrists and hands. From time to time some of these masses break down and a slight discharge results in a thick yellowish scab. More recently his sight has become affected, and white pearly masses can be seen in his left eye. His hands are edematous and fingers pointed, showing atrophy of the distal phalanges. Mentally he is bright, indeed he is rather witty. In form, his case is similar to that of the old lady mentioned above, but he represents an earlier stage—the typical facies is in process of development.

In these tubercular cases the symptoms are very definite, and the course is comparatively rapid, especially in the young. If they do not succumb to intercurrent disease, the viscera become involved—the kidneys, lungs and the digestive tract. The beginning of the end is commonly marked by symptoms of pulmonary tuberculosis, nephritis, and intractable diarrhœa. It is said that the early cases which appear in a locality are often of this type, and that the milder anæsthetic cases occur more frequently as the disease becomes endemic.

There is an old man now in the hospital who some ten years ago was affected with what he thought to be rheumatism. The ungual phalanges of his fingers and toes became distorted and shrivelled. He has since felt an indefinite numbness in his hands which, however, did not incapacitate him for work. About a year ago his sight began to fail and he came up for examination, only to be told that he had a mild form of anæsthetic leprosy. He is hardly convinced as yet that such is the fact, and earnestly sought my opinion of his case.

A a rule, the ear-marks of past attacks of the disease are to be found on the hands, face, and eyes. The hands are affected variously in detail, but it all amounts to either atrophy or disintegration. It is remarkable how regularly the ungual phalanges only are affected; — atrophied, seeming to come to a point at the tip; or distorted, forward or laterally, or what is most common, they have disappeared altogether. Then the striking feature is what a neatly and completely healed stump remains. But a valuable point in differentiating is, that while the surgeon rarely leaves the finger-nail, in B. Lepra amputations that appendage is often found on the end of the stump, showing that the skin was not the seat of the disease.

While the eye is regularly affected in both forms, there are important differences in the modus operandi. In tubercular cases, the impairment of vision comes early, due to formation of tubercles on the cornea; in the anæsthetic cases, the patient usually enjoys good sight until the late symptoms begin to appear. The lesion then is optic nerve atrophy without noticeable changes in other structures of the eye.

Individual cases may show some striking local lesion. In one there was ectropion due to tubercular infiltration of the palpebral conjunctiva of the lower lid; in another there was general involvement of the mucous membrane of the mouth with profuse salivation. Cerebral symptoms seem common. One old man, blind and demented, was usually engaged in soliloquy; another was maniacal with homicidal tendencies, and had to be closely guarded.

There are now eighteen known cases of leprosy in Canada—and we trust that all cases are known. Of these, thirteen are probably traceable to the original infection,—the remaining five are foreigners. Two of these five, mother and son, were found in Nova Scotia, having come from the West Indies. Manitoba furnishes another two, Icelanders by birth; and the fifth is the Doukhobor boy who came under observation some two years ago.

Information regarding the incidence of the disease in families I am unable to give. Among the laity the opinion still prevails that leprosy is hereditary, and this at foundation is the reason such data are carefully withheld. Many of these patients have relatives not far away, and to disclose their identity might react unfavourably on the present happy state of public co-operation which the Hospital enjoys, and which is so absolutely essential to the welfare of the movement.

Obviously the treatment of leprosy is prophylaxis, which again emphasizes the importance of early diagnosis. In the Lazaretto, two wards are for leper patients only, and their wants are administered to by a devoted band of Sisters of Charity under the direction of the Medical Superintendent—an appointee of the Federal Government. The care of patients in hospital is largely routine hygienic and dietetic measures, with one very essential adjunct—employment. Before many of these unfortunate individuals there is a fairly long but hopeless life, to be spent in confinement. The fullest freedom of the grounds is accorded, and outdoor exercise encouraged. Attempts to escape, or acts of insubordination are exceedingly rare; yet the possible dangers arising from the unoccupied mind or the idle hand are thoroughly understood.

Of the therapeutic agents, Chaulmoogra Oil alone deserves mention. Used internally it checks the acute symptoms, and as a dressing promotes the healing of leprous ulcers.

As I remarked in the beginning, I have probably succeeded in adding nothing of value to your knowledge. There is but one way to make such addition, and to that way distance, it is true, offers some obstacles. But here difficulties end. On the scene, you have before you our most complete triumph over any disease. Is it worth your while? I am sure I do not know what your time is worth; and if you refer to financial gain, I may say that I know of nothing offering more doubtful returns. But if you ask whether you would be likely to see and learn enough of this ancient and now well-understood disease to satisfy your simple desire to know, to enable you to fulfil your responsibility to the community, and safeguard your own welfare, then I unhesitatingly say,—It is worth your while. Visit the Lazaretto, learn all you can from the lepers whom you will find kindly disposed, and cultivate the acquaintance of the Medical Superintendent who is kindness itself.

VALUE OF THE X-RAY IN THE DIAGNOSIS OF RENAL AND URETERAL CALCULUS.

BY

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In the preparation of this paper the aim has been to ascertain to what extent positive diagnosis of calculus was possible before the introduction of the X-ray. Following on this a careful search has been made among the important periodicals of Europe and America for evidence and statistics showing the place taken by the X-ray since its introduction as an aid to diagnosis in renal surgery.

The operation of Nephrolithotomy was[1] introduced by Mr. Henry Morris in 1880. Between this date and 1898 when he delivered his Hunterian lectures he performed[2] ninety-four operations for renal calculus. In these ninety-four (cases) he failed to find a stone in[3] forty-four or more than 46%. This is a very high percentage of error. Since Mr. Morris first introduced the operation he probably had a larger series of cases than any other operator during the period mentioned (i.e. 1880-1898), but we shall see later that no other operator was able to reduce the percentage of errors.

To make our ideas definite, we shall glance at the cardinal signs and symptoms of Nephrolithiasis and try to estimate their importance. The classical signs of calculus are usually said to be pain, renal colic, and hæmaturia, and at a later stage perhaps pyuria. Pain is not very definite evidence of a renal stone because it may be referred to various parts of the body. Thus most surgeons can recall instances where the pain suggested acute gastro-intestinal disturbance, biliary colic, appendicitis, or the pain may even be referred to the opposite side from the one affected.

On the other hand there are several kidney conditions having symptoms identical with those of calculus. Such are kinks in ureter, neoplasm into which hæmorrhage has occurred, hæmorrhagic pyelitis and most important of all tuberculosis. Thus C. T. Holland, of Liverpool,[4] cites a case where the symptoms were typically those of a stone in the kidney. Operation was performed but the surgeon found no stone, instead he got a typical tubercular kidney.[5] Another case cited by the

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[1] A. D. Bevan.—Annals of Surgery, 1901.

[2] H. Morris.—Hunterian lectures and J. E. Smith.—Chic. Annals of Surg., 1, 1904.

[3] H. Morris.—Hunterian lectures and J. E. Smith.—Chic. Annals of Surg., 1, 1904, and R. Abbe.—N. Y. Ann. Surg.

[4] Lancet, June 2, 1906.

[5] Lancet, June 2, 1906.

same surgeon was a girl of nineteen years. The only symptom she ever had was persistent pain in the back and loin of the right side. Appendicitis was diagnosed, operation was advised and performed but the organ was perfectly healthy and the symptoms persisted. A second operation was now undertaken for suspected stone which was found and removed. The same author [1] cites cases where the wrong kidney has been operated upon for suspected stone but where the symptoms were vague. Similarly the kidney has been suspected and cut down on when the ureter was at fault and *vice versa.*

Thus far the evidence goes to show how indefinite and unreliable the symptoms are: and later on it will be shown with illustrative cases that not only are the symptoms and ordinary methods of examination inconclusive but where stone was correctly diagnosed and operated, the operation was often incomplete because of the presence of two or more stones which could not be detected readily and were never suspected after the finding of one. Many instances of this kind have been recorded, as we shall see later.

Palpation does not afford us much aid except in rare cases. It is very rare indeed that a single stone can be felt: or that one gets the sensation of grating when two or more stones are present. In occasional cases a stone if in lower ureter may be palpated by the rectum or vagina. Tenderness over the kidney if associated with subjective symptoms has some value but is inconclusive.

The following quotations from well-known surgeons will serve to show how ineffectual are the ordinary means of examination:[2]—"The diagnosis of stone in the kidney is very difficult. Ransohoff has collected 40 cases, in all of which the symptoms of renal calculus existed but in which exploration failed to find a stone. In fact I think there are but few surgeons of any experience with renal calculus who have not failed at times to find a stone." "A short time ago (i.e. prior to the days of X-ray) the diagnosis of renal calculus was never made till the classical symptoms showed that the pathological process had so far advanced as to render surgical intervention necessary and hazardous. At that time diagnosis of 'calculus ureteritis' was never made and many cases lost one kidney as a result of unilateral anuria, and many others died without any diagnosis than 'suppression of urine' ever being made. Many cases of imparted calculus lost one kidney because the symptoms of recovery and destruction are identical." [3]

The X-ray was first used in renal calculus by McIntyre, of Glasgow,

[1] Lancet, June 2, 1906.
[2] G. E. Armstrong, Mont. Med. Jour., Jan. 5, 1897.
[3] C. L. Leonard, (Phil.), Ann. of Surg., 1901.

in 1896, and with good results, for he demonstrated the presence of an oxalate stone. Others soon confirmed this work both in England and America. During the following three or four years evidence as to its value was slowly accumulating, but the general opinion seemed to be that only oxalate stones could be demonstrated as no technique could be devised that would show phosphates, urates or uric acid, and so its value was not considered to be very great.

During these years experimenters were earnestly at work to improve the X-ray apparatus and to devise a better technique whereby any calculus could be shown, no matter how small or what its composition might be. To Prof. Schoneberg we are indebted for improvements in the efficiency of the X-ray apparatus which are outside the scope of this paper to mention further. Working with this improved apparatus C. L. Leonard, of Philadelphia, devised a much more accurate technique. He was the first to lay down the dictum which is now the basis for accurate reading of skiagrams:—"A skiagram to be accurate must differentiate tissues of less density than the least dense calculus." That is to say, if a skiagram can differentiate the kidney itself from surrounding tissues no calculus can exist undetected, because every calculus is more dense than kidney tissue.

This principle was first announced by Leonard in February, 1902, and it marks the beginning of more accurate work in diagnosis by the X-ray. Leonard himself can differentiate the kidney from surrounding structures and maintains therefore that he can demonstrate the presence or absence of stone with almost mathematical precision. He reports a series of 320 cases with the following results:—

Presence of stone diagnosed in 93.

Absence of stone diagnosed in 227.

The cases where a positive diagnosis was made were divided as follows:—

Stone found at operation in 42 cases.

Stone passed spontaneously by urethra in 26 cases.

Refused operation, 2 cases.

Symptoms too mild to need operation, 23 cases.

In the case of patients where a negative diagnosis was made the symptoms cleared up in most of the cases, but in four cases they persisted with some severity, so that operation was performed and stones found. Thus, so far as the cases could be followed, the total error was four cases in 320 examined, or 1.25%. In the matter of these cases it was afterwards learned that one error was due to the plate being in bad position so that the shadow was not thrown on it at all, and in the other three the shadow appeared, but owing to its small size and faulty reading of the plate it was overlooked. In this series of cases one stone was plainly shown as small as one grain in weight and one stone was shown at three different levels on successive occasions.

These results secured by Leonard are pretty well confirmed by other workers,—some getting better results and others not so good.

L. B. Harris in the *Australian Medical Gazette* reports a series of 328 cases. Of these 50 gave a positive diagnosis and 278 were negative. At operation, 7 of the 50 were found to have no stone. We are not informed of the results in the cases where no stone was diagnosed. If the sum total of error was 7 cases we have an error of 2.25%, which is higher than Leonard's by 1%; but is, however, not large.

Kumnel and Rumpel report 18 cases where the diagnosis was positive and all proved correct at operation.

A. B. Johnson reports 125 cases in the *New York Medical Journal.* Of the series a positive diagnosis was made in 30 cases and all proved correct at operation. Of the negative diagnoses one error was made and that was a uric acid stone which the X-ray did not show. It was later removed by operation. So far as the other cases could be followed the other negative diagnoses were correct. This is an error of 1% only.

In the *Lancet* for June, 1906, C. T. Holland reports 79 cases. Twenty-two positive diagnoses were made and all proved correct by operation. Of the 57 cases giving a negative diagnosis one error was made, i.e. the X-ray failed to show the presence of a uric acid stone which later gave severe symptoms but was passed spontaneously. The percentage of error here is about 1.25%.

E. Harry Fenwick has had a very wide experience with skiagraphy in calculi of the urinary passages—having taken over 1000 X-ray photographs. His testimony is that the positive diagnosis is very accurate and that after repeated careful trials the negative is also reliable.[1] He reports a case which shows the wonderful accuracy attainable under favorable conditions. In this case he made the following predictions from the skiagrams:—

1. The kidney is dilated by back pressure, originally a hydronephrosis: now a pyonephrosis.

2. The lower pole is transformed into a dilated thin-walled cavity (a calyx) with 6 smooth calcium oxalate stones. The cortex is very thin.

3. A cyst projects on the convex border in its middle third, which will emit a quantity of inodorous pus.

4. The upper pole is also dilated but with no stones.

[1] B. M. J., Jan. 4, 1908.

5. A large calcium oxalate stone blocks the pelvis. This stone is covered with phosphatic deposit.

At operation the predictions were found correct to the letter, except that the lower calyx had 5 stones instead of 6, one being in a neighboring calyx.

Thus far the evidence has been pretty strongly in favor of the X-rays as an aid to diagnosis, but it would be unfair to omit the opinions of other surgeons whose experience has been less successful. Henry Morris said in 1900, the X-ray is of little value in diagnosing the presence or absence of renal calculi. Professors Israel and Schoneberg held similar views as a result of their experience. Walsham's experience is that it is almost impossible to find a stone by X-rays in a stout patient and in no case can one smaller than a pea be shown. A. B. Robinson:—The value of the X-ray is doubtful. It should not have the casting vote. R. C. Lucas:—The X-ray has been overlauded,—a negative diagnosis is of no value.

These views expressed by such prominent men naturally carry weight, but their importance is much lessened by the fact that in no instance was the series of cases large,—seldom more than 5 or 6, so that the experience is not sufficient on which to base a true estimate of radiography.

Now let us consider the causes of error.

All errors are referable to the operator, the photographic plate or some peculiar condition of the patient.

On the part of the operator bad technique is the most obvious cause. Thus Leonard made a wrong diagnosis because the plate was put in bad position and the calculus did not appear. Likewise, too long or too short an exposure will fail to differentiate properly between the structures to be shown.

Again, the operator may not have the necessary experience to interpret the plate correctly. Every observer has experienced this, and it is now well known that an X-ray operator must be an expert of wide experience to get good results.

Occasionally a flaw in the plate has led to a wrong diagnosis, but this may be avoided by using only the best plates or by a second sitting. The errors from these sources may be eliminated or brought to a minimum by painstaking effort, but not so for the third class of errors,—those referable to the patient.

Obesity is a great barrier in the way of doing accurate work,—some say it is impossible to be sure of the diagnosis in a fat patient.

A wrong diagnosis has sometimes been given because the stone was too small to show. Its composition too is a factor,—a pure uric acid stone of any size is hard to show.

The most difficult of all to exclude are calcareous glands or arteries and dense fœcal concretions. On many occasions these have simulated stone so closely that operation was thought necessary. The subsequent operation showed a calcareous gland or artery in the stone area, but nothing in the kidney or ureter.

Strange as it may seem errors have arisen from a button on the patient's clothing appearing in the kidney area, but this is unpardonable because the area to be skiagraphed should be free from any such cause for error.

Up to this point we have seen how inaccurate were the methods of diagnosis before the advent of the X-ray: we have also seen something of what this process can do: it now remains to formulate an estimate of its value in renal surgery.

1. It diagnoses calculus from other kidney conditions and obscure conditions of other organs. One case is [1] quoted where, in spite of a negative result with X-ray, operation was done, but a tuberculous kidney was found with no calculus. Another case is that of a woman with obscure symptoms for 12 years. Two or three uterine operations were done without relief. The X-rays showed a calculus. Its removal cured the symptoms.

2. Early diagnosis is possible where the symptoms are not otherwise severe enough to warrant operation. On the authority of C. L. Leonard it is stated that in operation after early diagnosis the mortality is 2-3%. After the characteristic symptoms have appeared with infection it is 25%. Undoubtedly in some instances serious destruction may occur in this way before the symptoms are serious enough to suggest operation for stone. Four cases in point are [2] cited by C. T. Holland.

3. It makes operation *definite* in its aim and *complete* in its results. Thus a hydronephrotic kidney would not be opened if the X-ray showed the cause to be stone in the ureter. In another case X-ray showed two calculi, one was found without much trouble, the second only after painstaking search and without the definite evidence of the skiagraph would certainly have been [3] overlooked. Numerous cases of this sort have been reported by various authors.

The conclusion of the whole question at present seems to be that the X-ray is not infallible, a low percentage of errors must always be reckoned on. But used with other means of diagnosis it is invaluable, and the nearest approach to accuracy yet obtained.

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MEDICINE IN CANADA.

BY

M. CHARLTON.

IV.

Before the nineteenth century medicine in Canada had but small beginnings, but it began to occupy a much more prominent position with the expansion of the country. As the population increased and the land became more cultivated, wealth and prosperity took the place of the privations of the earlier settlers. New laws were made to encourage education and immigration.

Since the English occupancy, war had twice devastated the land through the mistaken zeal of the Americans. Considering all these drawbacks in a newly settled country, medicine had made progress, and from the year 1832 we see a positive advance in medical matters in Canada, especially in Montreal. This city had been the great objective point of the American forces in the war of 1812. But after affairs had quieted down Montreal began to give promise of what it was to become later—the centre of Canadian commerce and the centre of medicine in Canada.

The great Lachine canal had been commenced in 1817, by the removal of the first sod by the Hon. J. Richardson, the first president of the Montreal General Hospital. In the same year the Bank of Montreal was opened.

Printing, which was practically unknown in the French *régime*, is said to have been introduced into Montreal through the failure of the American invasion in 1775. When the news reached Congress of the defeat at Quebec, they sent three commissioners to Montreal to confer with General Arnold. Benjamin Franklin was one of those appointed. He brought with him from Philadelphia a French printer to establish a newspaper in Montreal by which they hoped to influence the minds of the Canadians. Two years before this, printer Fleury Mesplet had translated and published in Philadelphia the address of Congress to the Canadians. The commissioners reached Montreal about 29th April, 1776, but they soon found out the utter hopelessness of their task.

Franklin left Montreal on the 11th of May, but Mesplet, the printer, remained and established himself as a printer and publisher. He was the originator of the Montreal *Gazette*, which was, in 1778, issued as a weekly paper called "*La Gazette de Montréal*." The first few numbers were printed in French, later in French and in English, and finally, in 1795, it appeared as the "*Montreal Gazette*." According to his prospectus, we read: "I propose to fill a sheet with publick advertisements and other affairs, immediately concerning trade and commerce, to which will be added some diversified pieces of Literature. I dare flatter myself, as I hope, Gentlemen, you will encourage this, my feeble beginning, that you will in a short time see with satisfaction not only a great variety of Notices and Advertisements, but also a collection of facts both entertaining and instructive. I will endeavour to procure a choice collection of the Newest Pieces, and I don't doubt but this will stir up the genius of many who have remained in a state of inaction, or could not communicate their productions without the help of the Press. I will insert in the above Paper, or *Gazette*, everything that one or more gentlemen will be pleased to communicate to me, provided always no mention be made of Religion, Government, or News concerning the present affairs, unless I was authorized from Government for so doing, my intention being only to confine myself in what concerns Advertisements, Commercial and Literary affairs."

Mesplet and his editor, Jatard, did not however adhere to these resolutions, but sent forth a "scurrilous sheet" called *Tant pis, tant mieux,* "defaming all the King's officers and trying to throw the colony into confusion," and adding one more burden to the already over-burdened Governor Haldimand.

During the winter of 1775-6, Mesplet published what is supposed to be the first book printed in Montreal, "Réglement de la Confréré de l'adoration Perpétuelle du Saint Sacrement et de la Bonne Mort."

As far as we know the first contribution to medical literature in Montreal was a pamphlet brought out in 1786 by R. Jones, descriptive of the epidemic which first broke out at Baie St. Paul. This was followed by a work on the "Use of Pure Nitric in Whooping-Cough, or Asthma," by Dr. Thomas Arnoldi—(date unknown). In 1819, John Tindall—On observations on the breeding and management of neat cattle; together with a description of the diseases to which they are liable.—Montreal. In 1812, Extracts from a report of the Massachusetts Medical Society respecting a disease commonly called spotted or petechial fever, which has within a few years been epidemic in various parts of New England.—Montreal.

Mention is also made of a work on physiology in manuscript, said to have been stolen from Dr. Wolfred Nelson. In 1830, J. F. Perreault published a work on large and small agricultural pursuits.

Before the conquest a number of manuscripts on general subjects had been written and circulated among friends. Unfortunately, these have perished. Before closing this short account of the establishment of printing in Montreal, mention must be made of one who stood prominently forth in the publishing world, M. Michel Bibaud. He was born at Côte des Neiges in 1782, and lived long enough to see the rapid development of printing in Canada. He wrote many valuable articles on the history of the times and lived his life as an honourable and useful citizen.

At this time in Montreal there was a noted group of men at the head of medicine. Among some of the best known were: F. C. Arnoldi, D. Arnoldi, B. Berthelet, O. T. Bruneau, W. Caldwell, G. W. Campbell, J. Crawford, A. Hall, A. F. Holmes, W. Robertson, S. C. Sewell, J. Stephenson.

Some of these men had already been heard of in foreign parts and more than one Canadian thesis had been noticed abroad—that of Dr. Vallée of Montreal, on Cancer, 1826, was thought worthy of discussion by the Medical Faculty of Paris.

They were men of brilliant talents who appreciated the value of a sound medical education, and as such they deserve a permanent place in the medical history of Canada. There is no doubt that the high standard set by these pioneer medical men has influenced medicine in Montreal, and helped to give it its present status.

Two of the most important events in its medical history had already taken place in Montreal. The establishment of the first English hospital —the Montreal General Hospital—and the first medical school—the Montreal Medical Institution.

The hospital had now been in existence for ten years, and during these years it gave ample promise of the ultimate high position it was to occupy not only in Montreal but throughout the whole of Canada. With what pride must its little band of faithful workers have watched its growing usefulness. The first addition to the hospital was a wing added in 1832 in memory of its first President, the Hon. John Richardson, as one of Montreal's oldest and most respected citizens. It was resolved to perpetuate his name and connection with the hospital by building a new addition to be named after him. The public subscribed largely, and in September, 1831, the corner stone was laid. By the 7th of December, 1832, the new addition was ready for patients. With this new addition the hospital now contained 19 wards, and 160 beds.

The tablet on the wing reads as follows:—

THE RICHARDSON WING
of the
MONTREAL GENERAL HOSPITAL.
This Building Was Erected
A. D. 1832
To Commemorate the Public and Private Virtues of
THE HONOURABLE JOHN RICHARDSON,
A distinguished Merchant of this City, and Member of the Executive and Legislative Councils of the Province.
He was first President of this Hospital, and a liberal contributor to its foundation and support.
He was born at Portsay, North Britain, and died 18th May, 1831,
Aged 76 years.

The founding of a medical school in Montreal had given a great impetus to the study of medicine. Each year the school grew in usefulness, but the year 1829 saw a change; it ceased to be an independent school, and become known under the name of the Medical Faculty of

McGill University. The founders of the school gave up its identity to save the Charter of that University, and it is interesting to note that it was owing to a medical man that there was any University, for if it had not been for the untiring exertions of Dr. Stephenson, who, when others were indifferent, worked with such energy that he secured the bequest of James McGill for a college, when his will was being almost successfully put aside by his heirs. From that time to the present, it has been the leading Faculty in the University, making the name of the University known far and wide through the names of its teachers, "composed as it always has been of men ranking among the first in the profession." The Medical Faculty has every reason to be proud of the long list of names of its staff, men who set the love of their profession before the gain of money, and it was a common occurrence for them to help out the meagre income of their Faculty from their private means.

As Dr. Osler has expressed it, "faithfulness in the day of small things may be said to have been the distinguishing feature of the work of the Faculty in these early days. The lives of the senior members taught us youngsters the lessons of professional responsibility, and the whole tone of the place was stimulating and refreshing." Again the testimony of Sir William Dawson, in his address at the Semi-Centennial—"They were able and good lecturers, fit men to make the beginning at such kind of work," and then he mentions the names of Drs. Holmes, Campbell, Hall, Bruneau and Fraser, etc.

The first session of the Medical Faculty of McGill took place in the winter of 1829-30. In the session of 1830-31 the students of the Medical School formed themselves into a Medical Society, and this was the parent of the present fine society that the students now possess. It seems strange that during all these years the students should not have had a journal of their own. Some years ago the matter was brought before the undergraduate body and the advisability of starting a journal suggested. The proposal was enthusiastically received. The late Dr. James Stewart so approved of the idea that he spoke to the students at one of their meetings offering his support to such a scheme. The first diploma was issued by the Medical Faculty in 1833 to E. M. Logie. It is not on parchment but on ordinary paper, the size of foolscap, and written in the neat, legible handwriting of Dr. W. Robertson. The diploma was recently presented to the Medical Faculty by the grandson of Dr. W. Robertson, the late Angus Hooper, Esq.

Before the year 1833, the Medical Faculty moved from its first quarters, No. 20 St. James street, to a larger house in the same street, which stood between the Bank of Montreal and the Cemetery. The school remained there until the year 1843. The winter course lasted from November 2nd to the first week of April, a term of about six months. Five lectures per week were given, and two lectures a week in the Clinical Course.

THE

Montreal Medical Journal.

A Monthly Record of the Progress of Medical and Surgical Science.

EDITED BY

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A NARROW ESCAPE.

Dr. Guy Johnson writing privately from Campas, Sonora, Mexico, to a surgeon in Montreal, mentions a case in which the patient had a narrow escape from death. The circumstances are so unusual that we venture to note their occurrence in the words of the letter.

"A man was working with a hand-drill at the bottom of a shaft 120 feet deep. While working there, the man operating the hoist for a huge water-bucket weighing about 250 to 300 lbs., left his work to get a drink. The bucket went down the shaft and fell on the man at the bottom. It struck him on the left shoulder and back, but did *not bruise him.* It forced him down on to his drill, a steel about 1½ inches in diameter, the head of which had been mushroomed to about 2½ inches by constant hammering. The head of the drill entered in the Episternal notch, exposing the trachea, passing to the left side of the trachea. Forcing the vessels outwards, it passed downwards and outward through the pleural cavity, forcing the lung down and smashing the fourth rib about four inches to the left of the spine; then shoving the scapula outward, it came out through his back.

"The foreman, being a fool, pulled the drill out, but instead of pulling out the pointed end, he pulled the mushroom head back again.

"I had to ride 25 miles to see him, through some of the roughest country I have ever travelled, and when I got there, the man was not suffering from shock. Pulse 80, strong and regular. Breathing deep and regular, 28. Temperature, 97.4°. He had not lost much blood and there was no blood froth in his mouth. I rapidly cleansed and packed the wounds and had him transported on a stretcher to my house, 25 miles. It took 12 hours to carry him in, so I waited a few hours to let him rest. Then I performed a thoracotomy, removing about 1½ inch of the ninth rib and let out about a pint of bloody fluid.

"Next day he had a dry pleurisy, and since then he has been having a temperature of 99-101. There is very little purulent discharge from the original wounds and the lung is expanding well. To-day is the seventh day since the accident. His breathing is rapid, 30 to the minute, and painful, due partly to the pleurisy and partly to the tubes I have in the wounds. His pulse ranges from 80-100. I believe that eventually he will pull through."

OBSTETRICS IN CHINA.

Some nine years ago, Dr. D. J. Evans published a manual of obstetrics for students and practitioners in Messrs. Lea's series. The book was well liked, and in its newer editions is still popular. We have just been favoured by the receipt of a translation of this work in Chinese by Mary W. Niles, M.D., of Canton, published in Shanghai in 1908. We must be content with recording the occurrence and congratulating Dr. Evans upon the celebrity to which his book has attained. We are unable to offer an authoritative opinion upon the accuracy of the translation, but hasten to add the one item of evidence which we were able to secure. Two familiar forms of bandage are described by the hieroglyphics T and Y, though it does not appear which country can lay claim to priority of discovery of these useful devices. This book will prove quite as useful for English speaking students and practitioners as many others which are specifically issued for their instruction.

UTERINE CANCER COMMITTEE.

We have received for publication the following appeals to the medical profession and to midwives and nurses respectively, with reference to the early recognition of cancer of the womb.

The circumstances which led to the preparation of these appeals are briefly as follows:—At the Annual Meeting of the British Medical Association at Exeter in 1907 the Section of Obstetrics and Gynæcology adopted a resolution requesting the Council of the Association to appoint a committee to consider the best means of disseminating knowledge of the importance of the early recognition of uterine cancer. That committee presented a report which was considered and generally approved by the same Section of the Annual Meeting of the British Medical Association in Sheffield in 1908.

At its meeting on April 28th, 1909, the Council of the British Medical Association approved for publication the appeals to medical practitioners, and to midwives and nurses, and directed that they should be communicated to British and colonial medical and nursing journals.

The attention of all Medical Practitioners is directed to the necessity of emphasising the curability by operation of uterine cancer in its early stages.

The adoption of a more extensive operation by the abdominal route has made it possible to deal successfully with cases hitherto regarded as inoperable, and to remove more of the pelvic cellular tissue as well as a portion of the vaginal walls; it is in these situations that recurrence is prone to develop.

Many patients now present themselves for examination and treatment when the disease is considerably advanced, and it is hoped that by a wide-spread and accurate knowledge of the early signs and symptoms the number of such patients will gradually diminish.

Special attention is directed to the following:

1. Cancer of the uterus is at first a local disease.
2. Cancer of the uterus is often a curable disease.
3. Operation is the only satisfactory method of treatment.
4. The earlier the disease is recognised the more hopeful are the prospects of treatment.
5. The risk of operation in early cases is slight, and the chance of permanent cure is good.
6. The recognition of early cancer is not usually difficult, and the disease should not be overlooked by the medical attendant.
7. A medical practitioner who fails to make a physical examination of a patient exhibiting any of the symptoms of uterine cancer incurs grave responsibility.
8. Treatment of symptoms without a physical examination is unjustifiable.
9. Early cancerous ulcers should not be treated with caustic; their appearance becomes masked, and valuable time is lost.
10. It is an error to wait and observe in order to arrive at a diagnosis.
11. In doubtful cases a diagnosis must and can be made in a few days.
12. To examine, to diagnose, and then to treat, should be the rule in all cases.

Symptomatology.

Uterine cancer is at first a painless disease which does not affect the general nutrition.

The early symptoms of cancer are: — Irregular bleeding of any description, even if there be only traces; bleeding post coitum; and watery, blood-tinged discharge. There may be no loss of strength or wasting, nor any condition to alarm the patient. Pain, wasting, profuse bleeding, and foul discharge, indicate advanced disease.

As the majority of cases occur between the fortieth and fiftieth year, the symptoms are too often regarded by the patient as due to "change of life." The medical attendant should not accept this assumption until he is satisfied that cancer does not exist.

Bleeding, however slight, occurring after the menopause, should give rise to suspicion that cancer is present.

Examination.

If a patient with any of the above symptoms comes for advice, a careful visual and bi-manual examination must be made before any treatment is recommended.

Should a patient refuse to be examined—and this is exceptional when the situation is explained—the medical attendant should decline any further responsibility, and no treatment should be advised. The examination should be made, even if bleeding is present, as valuable time may be lost by postponement until the hæmorrhage has ceased.

It is most important to observe rigid aseptic precautions in all manipulations.

In the examination, the condition of the vaginal portion of the cervix and of the cervical canal should be carefully noted.

In the early stages new growth may be found on the surface of the vaginal portion of the cervix, in the lining of the cervical canal, or in the substance of the cervix. Any prominence on the surface of the vaginal portion or any ulceration, *i.e.*, a definite loss of substance, should at once arouse suspicion. A nodule or nodules, hard, inelastic, or irregular in outline, felt in the substance of the cervix, suggest the presence of cancer. If the whole cervix be affected, the relative hardness as compared with the soft elastic body is pronounced.

The detection of high-lying cervical cancers and cancers of the body of the uterus is only possible after curettage or digital exploration.

The signs common to the early stages of cancer of the cervix uteri are:—

(1) The definite occurrence of new growth on the surface of the vaginal portion of the cervix, in the lining of the cervical canal, or in the substance of the cervix;
(2) Friability;
(3) Bleeding on manipulation.

(1) The definite occurrence of new growth on the portio vaginalis or in the cervical canal cannot fail to arouse suspicion. When, however, thickening of one lip or a portion of one lip of the cervix exists, the nature of the growth is difficult to determine if the mucous covering be still intact. It is then necessary to remove a portion of the affected tissue and examine it under the microscope.

(2) Friability is a sign of the greatest importance, and may be tested by the finger nail, curette, uterine sound, or an ordinary long probe. Degrees of friability exist in early cases, depending upon the amount of interstitial tissue contained in the growth.

(3) The occurrence of free bleeding after the slightest manipulation is, when combined with friability, a valuable diagnostic aid.

Forms of Uterine Cancer.

Vaginal portion of the cervix.

(1) *Infiltrating type.*—In this type, one lip, or a portion thereof, or even the entire vaginal portion of the cervix, is infiltrated with cancerous growth. Ulceration occurs early from the surface inwards, or necrosis may begin in the centre, and opening on the surface, lead to the formation of a deep ulcer, with undetermined edges.

The growth is somewhat hard in consistence, but is still friable if tested with the probe, curette, or finger nail.

(2) *Papillomatous or polypoid type.* — This includes the so-called cauliflower excrescence, and is characterised by the growth from the margin of the os externum of a rounded or flattened tumour, varying in size, which may or not have a definite stalk. It has a papillary surface, bleeds readily, and is very friable. More rarely it resembles a bunch of soft papillomata. Portions of the growth, pale red or greyish yellow in colour, are easily detachable on examination.

(3) *Superficial flattened type.*—This is characterised by a flattened growth on the vaginal portion which tends to spread over its surface. It is prone to early ulceration and is frequently seen clinically as an ulcer. The lip or portion affected is thickened. The ulcer has a sharply defined, raised edge, indented

at places, yellowish grey, finely granular surface, a moderate amount of loss of substance, and an infiltrated base. It bleeds readily on touch and the amount of hæmorrhage is entirely out of proportion to the amount of injury inflicted. The finger nail can detach small pieces from its surface.

Cervical Canal.

(1) *Superficial type.*—The inner surface of the cervical canal is lined by an irregular papillary growth which at first attacks the substance of the cervix superficially. As the growth increases portions of it may protrude through the external orifice of the cervical canal. When ulceration occurs the superficial portion of the growth is shed, with consequent hollowing out of the cervical canal, whilst the remainder of the periphery of the cervix is more or less thickened by infiltration. Where the external os uteri is narrow the process may be hidden or patency of the os uteri may be produced by destruction of its margin, whilst in uteri where the os is already wide a crater-like cavity is formed.

(2) *Infiltrating type.*—The cancerous infiltration proceeds from the mucous membrane deep into the tissues of the cervix, and thus the whole cervix becomes thickened and enlarged, or the enlargement and infiltration may be limited to one or more portions of the cervical walls. Necrosis may commence on the mucous surface, or in the centre of the infiltrated area and may lead to extensive destruction of the cervical tissues.

Probably the majority of cancer cases which are overlooked are examples of disease affecting the lining of the cervical canal or the tissues of the wall of the cervix.

Cancer beginning in the cervical canal is not difficult to detect where the os uteri is dilated as in many multiparæ. The finger passed into the cervical canal feels irregular elevations or nodules from which portions may be removed. Free hæmorrhage follows this manipulation. Difficulty arises where the os uteri is not dilated and the disease is hidden. A sound carefully passed into the cervical canal may give the impression of impinging on an irregular nodular surface, or friable tissue may be removed by the curette. Free hæmorrhage following such manipulations is a suspicious sign. Thickening and hardening of the cervix may be detected by a rectal examination, which is most helpful in detecting cancerous nodules in the cervical walls, and should always be made in such cases.

Body of the Uterus.

If the vaginal portion of the cervix, the cervical canal and the cervical walls have been proved to be free from disease attention must be directed to the body of the uterus. The uterus may not be enlarged, although a cancerous growth exists in its interior. Usually, however, there is some increase in size, which in advanced cases may be considerable.

Microscopical Investigation.

In doubtful cases, if there be a suspicious hard nodule, or erosion, or ulcer on the external os uteri, a piece including a boundary of healthy tissue should be excised.

The vulva and vagina having been thoroughly cleansed, the posterior vaginal wall should be retracted by means of a speculum, and the cervix pulled slightly downwards with a volsellum. A wedge-shaped piece, the size of a pea or bean, including *a margin of healthy tissue* should be excised with a sharp knife.

The bleeding which follows this little operation should be stilled by the insertion of one or two sutures, or by firm tamponade with a strip of gauze. An anæsthetic is not essential. The patient should be kept in bed for 24 hours.

The tissue removed should be transferred to a small stoppered bottle filled with absolute alcohol or methylated spirit, and forwarded without delay to an expert in uterine pathology.

Where the cancer originates in the body of the uterus or in the cervical canal, it is frequently possible, by using the curette, to obtain a sufficient amount of tissue for examination without the aid of anæsthetics. If this cannot be done, it may be necessary under an anæsthetic to curette the whole interior of the uterus and cervix, special attention being paid to the region of the tubal orifices. All fragments should be collected, including those which may have been washed out. The douche, if employed, should consist of sterilised water or a weak solution of corrosive sublimate (1 in 10,000), as carbolic acid and lysol interfere with the staining of the cells.

The fragments should be transferred to a stoppered bottle filled with absolute alcohol or methylated spirit.

If the expert's report is favourable the patient will be reassured, if unfavourable immediate operation is imperative.

The Operation.

The question of operation is best decided by the operator, who may require to examine under anæsthesia.

To Recapitulate.

(1.) Attend to all symptoms suspicious of cancer, and instruct the patient on their importance;

(2.) Examine immediately all cases of bleeding or abnormal discharge;

(3.) Make a definite diagnosis and do not wait for the disease to develop;

(4.) Urge immediate operation if the diagnosis is established.

The practitioner who diagnoses cancer in an early stage, when operation offers a probability of cure, renders a service to his patient as great as that rendered by the operator.

AN APPEAL TO MIDWIVES AND NURSES IN ORDER TO PROMOTE THE EARLY RECOGNITION OF CANCER IN THE WOMB.

Cancer of the Womb is a very common and fatal disease in women, but *it can be cured by operation when it is recognised early.* A woman sometimes tells a nurse or midwife her ailments before she speaks to a doctor, and the nurse or midwife has then an opportunity of aiding our crusade against this terrible disease.

Cancer may occur at any age, and in a woman who looks quite well and who may have no pain, no wasting, no foul discharge and no profuse bleeding.

To wait for pain, wasting, foul discharge, or profuse bleeding is to throw away the chance of successful treatment.

The early signs of Cancer of the Womb are:—

1. *Bleeding,* which occurs after the change of life.
2. *Bleeding* after sexual intercourse, or after a vagina douche.
3. *Bleeding,* slight or abundant, even in young women, if occurring between the usual monthly periods, and especially when accompanied by a bad-smelling or watery blood-tinged discharge.
4. *Thin watery discharge* occurring at any age.

The nurse or midwife who is told by a patient that she has any of these symptoms should insist upon her seeing a medical practitioner in order that an examination may be made without delay. By doing so she will often help to save a valuable life, and will bring credit to herself and to her calling.

Reviews and Notices of Books.

DRUGS AND THE DRUG HABIT. By HARRINGTON SAINSBURY, M.D., F.R.C.P., consulting physician to the City of London Hospital for Diseases of the Chest. Methuen and Co., 36 Essex Street, London, W.C. Price 7s. 6d. net.

This handsome volume was published by Messrs. Methuen on May 13th, as one of "The New Library of Medicine," edited by C. W. Saleeby, M.D. It looks and feels like a book, and not like a mass of paper and covers. It contains a great deal of miscellaneous writing, and many literary allusions, and figures of rhetoric which only the learned will understand It is more philosophical and suggestive than informative, though it is not wanting in keen observation of which the following is an example: "The drug store is fast losing the dignity of the workshop, and is in rapid process of becoming the mere vendor's booth or huckster's stall."

The volume opens with a summary of the history of medicine which gives in 42 pages as compact and lucid an account as we have seen. The objective of drugs and the rational and psychic basis of their employment occupy three chapters. In "Ideation in its relation to treatment," and in "The Therapeutics of Pain," Dr. Sainsbury is profound without being obscure. The chapters on Habit, Control and Cure are marked by observation and reflection which ultimately become converted into wisdom in the mind of a wise man. Books of this quality, which are written by a man and not by a machine, do something to bring medicine back into life where it belongs.

OPERATIVE NURSING AND TECHNIQUE. By CHARLES P. CHILDE, B.A., F.R.C.S., Eng. London: Baillière, Tindall and Cox, 1909. 3s. 6d. net.

This little book upon nursing is dedicated to the sisters and nurses of the Royal Portsmouth Hospital in the hope that it may be of assistance to them in their surgical work—a hope which we believe will have its fulfilment. There are nine full page plates in the book and over 200 pages of text. The reproduction as frontispiece of the "theatre sister prepared for operating" might well pass for "the woman with the veil." It is in marked contrast, however, with the plates which illustrate the lithotomy position and the exaggerated lithotomy position. There seems to be a resemblance of features in the "surgeon prepared for operation," and the patient who is intended to illustrate the Trendelenburg position. It is impossible, however, to identify the subjects selected to illustrate the two positions first mentioned. Figure 9, which shows the theatre nurse lifting cotton wool from a covered sterilized tin, is an alluring picture but does not add much to the informative value of the book. Possibly the book would have been equally valuable if all these pictures had been omitted.

ATLAS AND EPITOME OF OPHTHALMOLOGY. By PROFESSOR O. HAAB, of Zurich. Edited by G. E. DeSchweinitz, A.M., M.D. Philadelphia and London: W. B. Saunders & Co., 1909. Canadian Agents: J. A. Carveth & Co., Ltd. Price, Cloth, $3 net.

ATLAS OF THE EXTERNAL DISEASES OF THE EYE. Including a brief Treatise on the Pathology and Treatment by PROFESSOR O. HAAB, of Zurich. Authorized Translation, edited by G. E. DeSchweinitz, A.M., M.D. Philadelphia and London: W. B. Saunders & Co., 1909. Canadian Agents: J. A. Carveth & Co., Ltd. Price, Cloth, $3 net.

We are under a debt of gratitude to Dr. DeSchweinitz for his translation of these two admirable works by Professor Haab, of Zurich. Former editions of these two books have been already reviewed in this journal and it is hardly necessary to add any more to what has been already written. The new edition has kept pace with the scientific advance of Ophthalmology. The notes on the Pathology and Treatment of the External Diseases of the Eye are valuable as being the result of years of close observation and study on the part of the talented author. These books cannot be too highly recommended, both to the student and to the practitioner. The beautiful diagrams impress the facts on one's mind almost if not quite as clearly as would the observation of the actual cases in the clinic. Both works as their titles imply are profusely illustrated. The illustrations are of a high order and exceedingly true to nature.

J. W.

KEEN'S SURGERY, Vol. 4. W. B. Saunders & Company, Philadelphia, 1909.

The fourth volume of Keen's Surgery contains articles upon 17 different subjects and embraces 1160 pages. As usual the contributions are of rather uneven merit. The claim that the work is of international character is not well substantiated in this volume inasmuch as no article is by other than an American author.

The first chapter is on Hernia and is written by Coley of New York. It is a valuable chapter representing the results of an enormous personal experience. He agrees with Russell of Melbourne, that all the inguinal and many of the femoral herniæ occur into a perforated sac. In treatment he advocates warmly the Bassini operation for the inguinal variety. He is against local anæsthesia except in cases in which a general anæsthetic is dangerous. The illustrations, most of them original, by Fry, are excellent and a good bibliography is appended.

The lesions of the rectum and anus are taken up by Abbe, of New York. At some points the chapter shows evidence of hasty writing, as indeed do many of the other articles written by busy "authorities." There is an inadequate description of metastases in rectal cancer and likewise of its operative treatment.

Edsall writes a chapter upon the examination of urine in relation to surgical measures. It is valuable, authoritative and scholarly. The chapter on the kidney, ureter and adrenal glands is written by Ransohoff of Cincinnati. Unlike most of the moderns he believes in the segregator for routine practice. He supports Tuffier's conservative position with regard to nephropexy; he is most conservative with regard to Edebohl's decapsulation operation; he gives an insufficient discussion on the pathological site of malignant tumours of the kidney, but as a whole the article is very well written and one is pleased to find the evidence of wide reading and proper digestion of the literature. Branchford Lewis of St. Louis writes upon the bladder. What he says is decidedly better than how he says it. Cystoscopy and uretero-catheterization are naturally well described, coming from such an authority as Lewis. The article on stone in the bladder is from the pen of A. T. Cabot of Boston; he advocates the litholapaxy as an operation of choice—Bigelow and Boston! He does not describe at all the perineal operation for stone.

Perhaps the best chapter in the book is that by Hugh Young of Baltimore, on the prostate, and one is pleased to see that he gives proper credit to the work of the French school, particularly Proust and Alberran. Among much that is original one notes particularly the advice, based upon personal experience, to treat persistent retro-urethral fistulæ by the addition of suprapubic drainage to the plastic operation. It is pleasant to find in a textbook such a piece of justifiable polemics as that in which Young gives the credit of priority in suprapubic prostatectomy to Fuller and disposes in one concise and cutting paragraph of the so-called "discoveries" of Freyer. It is not only that the chapter is full of the evidence of a large first half-knowledge but also that it is written in really good English—this is what pleases.

The chapter on lesions of the penis and urethra is written by Horwitz of Philadelphia; that on the scrotum, testicle, cord and vesicles by Bevan of Chicago. The section on the surgery of the intestines was written by van Hook and Kanaval of Chicago. Here especially perhaps does one see the disadvantage of compressing so much into one volume. For instance the disorders of circulation in the mesenteric vessels, intestinal obstruction, congenital dilatation of the colon, are all given but scant space, the two last occupy a page and a half between them. It is, however, inadequate for a work of this size.

J. B. Murphy writes upon the appendix. Anything that he writes of course commands attention, and this is in many respects an able article. His views upon the general treatment of peritonitis are well known and are here well set forth. The articles upon the ear by Dench of New York, and upon the eye by DeSchweinitz are both excellent. There follow somewhat long chapters, relatively speaking, upon military surgery by O'Reilly, naval surgery by Rixey (an excellent and well illustrated chapter), on surgery in the tropics by McCaw, and on the influence of race, age and sex in surgical affections by Rodman of Philadelphia.

As a rule the volume is not so good as some of its predecessors, but nevertheless contains a vast deal of useful information.

E. W. A.

Medical Reports of the Central London Throat and Ear Hospital, Vol. 1, 1909. London, England: Adlard and Son.

Under this title a small volume has been received for review. Warm praise must be bestowed on the editors for bringing forward much valuable material in a compact and interesting form. In a large special clinic there are always many cases which although perhaps not worthy of individual publication form very instructive reading if edited by a competent critic.

In the first two articles, Dr. J. Dundas Grant has been the most fortunate, both as to the form of his contributions and the interest of the subjects discussed. In the first article he discusses the question of retaining the matrix in operations for cholesteatoma of the middle ear and the matter is clearly set forth and illustrated by case reports. We regret to find no mention of Prof. Siebenmann, of Basel, who is the originator of this method. Siebenmann has pointed out that the danger of cholesteatoma is not due to any invasive character of the matrix, but to retention and increased pressure in a cholesteatomatous cavity. When the cavity is freely exposed and kept clean and dry the matrix assumes a form which makes it an ideal lining for the cavity.

Dr. Grant's second article deals with the question of ligation of the internal jugular vein in dealing with cases of lateral sinus thrombosis. He opposes ligation and reports three cases of recovery where no ligation was carried out. While the surgeon is to be congratulated on the result it lacks value from his failure to state whether other cases were operated on unsuccessfully by this method during the ten years covered by the case reports, or to give his results by other methods. The high mortality of laternal sinus thrombosis is too well known to require comment. The best results of a series so far published are those of Alexander of Vienna, who got 78 per cent. cures in a series of 32 cases, following the method of ligation in all cases.

A great deal of interesting material is reviewed by other contributors, together with brief summaries of their indications for various forms of operative interference, their methods and results. Our attention was attracted by the report of a case of adenoid tuberculosis by Dr. Abercrombie. His assumption that the condition is a very rare one is quite unwarranted. The reviewer had an opportunity two years ago of reporting a series of such cases from Dr. Birkett's clinic at the Royal Victoria Hospital and found at that time a very extensive literature upon the subject. Nager also recently reported a series of similar cases from Siebenmann's clinic at Basel.

Dr. Dan McKenzie reports some interesting observations made with a view of determining if possible the relation of artificial feeding and the use of the rubber "dummy" or "comfort" in infants to the development of adenoids and high vaulted palates. His results tend to minimise the importance of these factors as far as the question at issue is concerned though the practice is strongly condemned. The interesting question of the relation of adenoids to vaulted palate is not discussed. Dr. Wyatt Wingrave reports a mass of very interesting pathological material, including a series of brain abscesses of otitic origin. The bacteriological examinations of the ear and nasal sinus discharges have been the subject of a great deal of painstaking investigation which deserves warm praise.

We hope to see the appearance of further volumes to carry on the good work started by Vol. 1.

E. H. W.

A MANUAL OF SURGERY. By ROSE AND CARLESS. Baillière, Tindall and Cox, 8 Henrietta Street, London, W.C. J. A. Carveth & Co., Toronto. Seventh edition. 554 illustrations. 1908.

The appearance of a seventh edition of this popular work so soon after the last edition speaks for itself. This book appeals especially to students, as there is no other textbook that covers the subject of surgery so thoroughly in one small volume. The reference to the practical application of Sir Almroth Wright's brilliant work on opsonins is hardly as full as one would wish. Its use in the treatment of boils is not mentioned, except a general comment on the benefit which may follow its application to conditions associated with staphylococci. In the chapter on tuberculosis one would expect that more than a few lines would be devoted to the uses of Koch's T. R. tuberculin, in view of its wide application at the present time. Beck's paste in the treatment of tubercular abscess is not mentioned. The classification of tumours is concise and easily appreciated. In the chapter on fracture the authors favour more frequent operation in the treatment of certain simple fractures of the shaft of long bones. The early use of a plaster of Paris splint in the treatment of intracapsular fracture is not referred to. The chapter on abdominal surgery is very well written. The book is a demy 8vo. of 1376 pages, with good type, well indexed and illustrated. It deservedly merits the continued approval of general practitioners and students.

J. A. H.

MIND AND ITS DISORDERS. By W. H. B. STODDART, M.D., F.R.C.P. ("Lewis's Practical Series"), H. K. Lewis, London, England. 1908.

If the volume before us had been styled a reference handbook for the general practitioner instead of a text-book for students it would have been more suitable. As the former it is well worthy of perusal, and forms a valuable work of reference, presenting, as it does, several features lacking in most of the standard works on mental diseases; as the latter it is, in our opinion, too much involved for the ordinary working student unless one who has made up his mind to devote himself to the specialty.

Generally speaking the author has adopted the classification of Kraepelin, and the chapter on dementia praecox presents as good a picture of this multiform and much debated disorder as we have yet seen. The two chapters devoted to the toxic insanities are also deserving of special praise as stating the clinical, mental features resulting from the abuse of alcohol, morphine, etc., in a brief yet very clear manner. Paranoia we should have preferred to see treated at greater length to the exclusion of neurasthenia and hysteria, which the majority would dispute as being properly included under the head of mental diseases.

The section on "some of the diseases to which the insane are specially liable" is a noteworthy feature, and one that might well be imitated, and at greater length, by other writers on insanity. The book closes with an excellent *résumé* of the lunacy laws relating to private and public asylums in Great Britain, to which is appended copies of the various forms used in the commitment of lunatics. Were the text-books used by our home graduates similarly supplied it would be a great boon to those in charge of hospitals for the insane, that is, provided the said graduates would carefully study and apply the information furnished them.

Throughout, the volume is well gotten up, well illustrated, and has many features of interest that make it worthy of studious perusal by all those interested in psychiatry.

T. J. W. B.

Medical News.

MEDICAL FACULTY, McGILL UNIVERSITY.

Following is the list of names of students, 71 in number, who have completed the course for the degree of Doctor of Medicine in the Medical Faculty of McGill University. In addition to the primary subjects they have passed a satisfactory examination, both written and oral, in the following subjects:—Principles and practice of surgery, theory and practice of medicine, obstetrics and diseases of women and children, pharmacology and therapeutics, medical jurisprudence, practical and general pathology, bacteriology and hygiene, mental diseases, and also clinical examinations in medicine, surgery, obstetrics, gynæcology and ophthalmology and otology, conducted at the bedside in the hospitals:—

Archibald, D. W., North Sydney, C.B.; Atkinson, P. McL., Albert, N.B.; Auld, F. M., B.A., Covehead, P.E.I.; Bailey, C. V., New Glasgow, N.S.; Ballon, D. H., B.A., Montreal, Que.; Benoit, H. W., Ottawa, Ont.; Bramley Moore, A., London, Eng.; Bugbee, R. G., Ph.B., North Attleboro, Mass.; Cameron, J. R., Charlottetown, P.E.I.; Carney, M. J., Halifax, N.S.; Carrington, E. A. S., M.D., Barbadoes, B.W.I.; Churchill, L. P., Dartmouth, N.S.; Clarke, J. C., Nelson, B.C.; Cody, H. C., Centreville, N.B.; Conn, L. C., St. Catharines, Ont.; Cotton, T. F., B.A., Cowansville, Que.; Cox, C. G., Hull, Que.; Craig, D. A., Kemptville, Ont.; Craig, H. M., Kenmore, Ont.; Cron, Chas., Harbor Grace, Nfld.; Cross, C. E., B.A., Montreal, Que.; Curry, W. A., B.A., Halifax N.S.; D'Avignon, F. J., Au Sable Forks, N.Y.; Davis, D. W., Brockville, Ont.; DeWitt, C. E. A., B.A., Wolfville, N.S.; Donahue, H. F., Leominster, Mass.; Dorsey, J. W., Charlottetown, P.E.I.; Drury, W. H., Barrie, Ont.; Dunlop, F. T., St. John N.B.; Ewing, W. T., Montreal, Que.; Fairie, J. A., Montreal, Que.; Foster, L. S., Providence, R.I.; Fraser, M. J., Stratford, Ont.; Funk, E. H., Rossland, B.C.; Gillis, J. J., B.A., Miscouche, P.E.I.; Greenleese, J. C., Ottawa, Ont.; Hale, G. C., London, Ont.; Hand, W. T., Montreal, Que.; Johnson, A. L., B.A., Halifax, N.S.; Kelly, C. M., B.A., Fredericton, N.B.; Lannin, J. C. J., South Mountain, Ont.; Lawrence, W. A., Lisbon, N.Y.; Lawson, G. C., Charlottetown, P.E.I.; Leys, W. M., Brantford, Ont.; Lindsay, L. M., Montreal, Que.; Maclean, C. G. G., Victoria, B.C.; McBride, W. P., Central Bedeque, P.E.I.; McCallum, J. S., Smith's Falls, Ont.; McEwen, S. C., Vancouver, B.C.; Manning, G. M., Barbadoes, B.W.I.; Miller, R. L., Montreal, Que.; Murray, J. M., Marmora, Ont.; Ower, J. J., B.A., Smith's Falls, Ont.; Palmer, J. E., B.A., Hampton, N.B.; Paterson, J. H., Almonte, Ont.; Patton, W. D., Vancouver, B.C.; Read, E. S., B.A., St. Felix de Valois, Que.; Richardson, R. W., Lisbon, N.H.; Scott, J. B., Hull, Que.; Sharpe, C. E., Jamaica, B.W.I.; Stewart, Alex., Ormond, Ont.; Smith, B. S., Boston, Mass.; Sparks, J. J., St. John's, Nfld.; Tannenbaum, D., Montreal, Que.; Taylor, T. H., Cumberland Mills, Que.; Thomson, J. O., Montreal, Que.; Turnbull, F. M., Bear River, N.S.; Underhill, T. B., Weyburn, Sask.; Walsh, J. J., Woburn, Mass.; Walsh, J. P., B.A., Quebec, Que.; Worley, E. G., Haley's Station, Ont.

The following is the prize and honour list of the fourth year:—

Holmes' gold medal for highest aggregate in all subjects forming the medical curriculum:—E. H. Funk, Rossland, B.C.

Final prize, for highest aggregate in the fourth year subjects—L. C. Conn, St. Catharines, Ont.

Wood gold medal, for best examination in all the clinical branches—R. G. Bugbee, Ph.B., North Attleboro, Mass.

Woodruff gold medal, for best special examination in ophthalmology and oto-laryngology—E. H. Funk, Rossland, B.C.

McGill Medical Society, senior prize—L. S. Foster, Providence, R.I.

Honours in aggregate of all subjects—1, L. C. Conn; 2, E. H. Funk; 3, W. A. Curry, B.A.

Following is the prize and honour list of the third year:—

Third year prizeman—Sidney B. Peele, New Westminster, B.C.

Sutherland medallist—J. H. Allingham, B.A., St. John, N.B.

Joseph Hills prize—J. R. Fraser, Lakefield, Ont.

Morley Drake prize—T. A. Robinson, St. Marys, Ont.

Honours in aggregate of all subjects—1, Peele, Sidney B.; 2, Robinson, T. A.; 3, Fraser, J. R.; 4, Park, J. E.; 5, Macaulay, A. E.; 6, Wilson, G. T., B.A.; 7, Clarke, T. L. E.; 8, Hepburn, W. G.; 9, Macmillan, H.

The following students, 78 in number, have passed in all the subjects of the third year, viz.; Pharmacology and therapeutics, pathology, hygiene, medical jurisprudence, clinical medicine, clinical surgery, obstetrics and bacteriology: Allen, K. W.; Allingham, J. H., B.A.; Anderson, W. M.; Archibald, D. W.; Ballon, D. H., B.A.; Barnhill, H. B.; Bauld, W. A. G., B.A.; Benner, F. A.; Black, V. E., B.A.; Booth, G. E.; Boudreau, F. G.; Bourne, Wesley; Brown, D. M.; Burton, W. E.; Cameron, J. R.; Carruthers, R. S. P.; Champion, B. H.; Chisholm, H. G.; Clarke, T. L. E.; Crease, A. L.; Cross, C. E., B.A.; Dakin, W. A., M.A.; Dunnet, H. W.; Elliott, R., B.A.; Ewert, Carl, B.A.; Fraser, J. R.; Fraser, M. J.; Froomess, L. E.; Gallagher, J. B., B.A.; Graves, C.A.; Hawkins, A. B.; Hepburn, H. H.; Hepburn, W. G.; Herbert, T. A.; Hicks, E. R., B.A.; Hutchison, G. W.; Keay, Arnold; Lavers, P. L.; Leys, W. M.; Lindsay, L. M.; Lockwood, S. L.; Logie, H. B., B.A.; Macaulay, A. E.; Mackintosh, A. E.; Macmillan, H.; Macmillan, S.; MacPhee, J. A., B.A.; McAlister, W. J.; McBurney, A., B.A.; McCracken, W. A.; McEacharn, M. T.; McNaughton, M. W.; Malcolm, R. B.; Manning, G. M.; Marchant, H. B.; Moodie, A. R.; Mundie, G. M., B.A.; Murray, M. J.; O'Callaghan, R. H. L.; Ower, J. J., B.A.; Parke, J. E.; Paterson, J. H.; Peabody, H. S.; Peele, Sidney B.; Piper, J. O., B.A.; Reed, E. H.; Robinson, T. A.; Scott, J. B.; Shillington, R. N. W.; Sihler, G. A., jr.; Sinclair, F. D., B.A.; Stewart, A.; Strudwick, H. T.; Thomson, J. O.; Underhill, T. B.; Walker, E. E. W.; Wallace, I.; Wilson, G. T., B.A.

Following is the prize and honour list of the second year:—

Second year prizeman— F. H. MacKay, Mount Stewart, P.E.I.

Senior anatomy prize—F. H. MacKay, Mount Stewart, P.E.I.

Honours in aggregate of all subjects—1, F. H. MacKay; 2, D. S. Lewis, M.Sc.; 3, H. C. Steeves, B.A.; 4, A. B. Walter; 5, Paul Ewert, B.A.

The following students, 30 in number, have passed in all the subjects of the second year, comprising Pharmacy, Histology, Anatomy, Physiology, Biological Chemistry and Organic Chemistry: Beck, S. G.; Bourne, C. R.; Davies, A. P.; Derby, L. L.; Derome, H. R., B.A.; Diaper, F. E.; Ewert, Paul, B.A.; Freeze, D. F. D.; Harrison, John; Hebert, A. J.; Houle, L. G.; Lewis, D. S., M.Sc.; MacDonald, D. L.; MacHaffie, L. P.; MacKay, F. H.; Macleod, J. S.; Malone, R. H.; Oulton, J. R., B.A.; Planche, H. H.; Rosenbaum, J. J.; Steeves, H. C., B.A.; Stewart, J. W.; Stone, W. R.; Sutherland, T. W.; Swaine, F. S., B.A.; Walcott, E. J. O'N.; Walter, A. B.; Webster, A. V.

Following is the prize and honour list of the first year:—

First Year Prizeman—H. W. Wade, Millis, Mass., U.S.A.

Junior Anatomy Prize—A. L. Jones, Victoria, B.C.

Honours in aggregate of all subjects—1, Wade, H. W.; 2, Robson, C. H.; 3, Nase, Philip; 4, Morris, W. G.; 5, Smith, J. A.; 6, Phillips, J. G.; 7. Wall, J. T.; 8, Crowdy, C. T.; 9, Purdy, W. T.; 10, Gowdey, W. C.; 11, Stewart, R. C.; 12, Meeker, J. E.