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THE

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A. H. WRIGHT, B.A., M.D. Tor., M.R.C.S. England.

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TORONTO, JANUARY 16, 1890.

OPENING OF THE NEW BUILDING OF THE BIOLOGICAL DEPARTMENT, UNIVERSITY OF TORONTO, DECEMBER 19, 1889.

ADDRESSES BY THE PRESIDENT, THE MINISTER OF EDUCATION, PROF. RAMSAY WRIGHT, PROF. OSLER, PROF. WELCH, AND PROF. MINOT.

Sir Daniel Wilson, who was received with applause, said,—It is my pleasant duty to-day to welcome those who join with us in the public opening of these Biological Buildings. It is a very important step, I feel assured, in the history of the advancement of science in our Province and Dominion. It is an index of our share and sympathy in the progress that peculiarly marks the century that is now hastening to its last decade. From the age of the Renaissance this progress has been gradually achieving successive triumphs. That great change which is known familiarly as the renaissance, or new birth, was unquestionably a revolt against mediæval thought, and the grand claim of absolute freedom of research into all truths, of the right to accept of every manifestation of truth that science may reveal to us. Copernicus, Kepler, Galileo, and other great names, have been succeeded by those of men who have advanced step by step into the higher mysteries of science; and last of all we have had in our own day a great thinker in the department of biology, one who has revolutionized thought, and prepared the way for an entirely new advance in the research for truth. I feel nevertheless bound, for myself, to affirm that I cannot accept the doctrine of evolution in so far as it assumes, under certain teachers, that mind and thought, intellect, reason, and all upon which our moral sense and the conception of a future life are based, can be conceived of as a mere production of evolution. Nevertheless as students of science, we are bound to sit humbly at the feet of truth. Whatever truths are disclosed to us in the triumphs of science, however for the time being they may seem irreconcilable with other truths, we need have no hesitation in the assurance that one truth cannot conflict with another.

I rejoice in the ample provision that is now in progress for all the departments of science in connection with this University. These buildings furnish somewhat adequate accommodation for the biological and physiological sections of university training; and I welcome the recent addition to our faculty of one who is a specialist in psychology. I have only to add that already contracts have been accepted for a further extension of these buildings; and when the entire plan is carried out it will furnish accommodation for the other branches of science which we recognize as playing an important part in our Faculty of Arts. It is, therefore, with peculiar satisfaction that I now perform the pleasing duty of proclaiming the building dedicated by the University to the use of the biological department of science, open, and devoted to all the special purposes for which it has been constructed.

Hon. G. W. Ross said that when he was asked to attend the opening exercises of this department of university work he expected that he would not be called upon to take any part but to have the unalloyed pleasure of listening to the other speakers and witnessing the enthusiasm of the students. He could only say at the outset that he was delighted to notice the onward progress of the University of Toronto, and the enlarged facilities which were being provided from time to time in the various departments of thought germane to every well-equipped university. He need not indicate the steps of progress taken within the past few years. They were all familiar with that progress. They had in this building, just declared open, clear evidence that the Senate of the University of Toronto, that those concerned in its success, are determined that at least on the side of the natural sciences, they shall not be behind any other university on this continent. He was glad to hear from the President that the intention is to prosecute the good work further. Last session authority was given the trustees for $60,000 for the promotion and completion of this department, and he supposed next session further authority would be asked to bring within a convenient centre or within convenient access of each other, all the departments in which the students of natural science were interested. He was pleased to hear from Prof. Wright that the classes here were among the largest in any department of university work. Everybody knew the enthusiasm with which Prof. Wright entered upon his work. He welcomed Prof. Osler, who was a graduate of the University of Toronto. He was one of their own people, a Canadian by birth and education, and he supposed he went to America either by choice or by necessity. Probably by choice. They were proud of Prof. Osler, first because he was a Canadian, second because he had been a successful Canadian, and third because he was a distinguished Canadian. He congratulated the President upon the evidence of expansion of the University, and he congratulated the vice-chancellor for the devotion which he had shown in every department of university work.

Sir Daniel Wilson congratulated Prof. Ramsay Wright on his admirably equipped building and alluded in comlimentary terms to his ability for teaching. The president then called on Prof. Wright to deliver his opening address.

THE PATHOGENIC SPOROZOA.

BY RAMSAY WRIGHT, M.A., B.SC.,
Professor of Biology, University of Toronto.

In the course of some introductory remarks, Prof. Wright spoke of the stimulus to the various branches of biological study which he was confident would be given by the erection of the commodious and well-equipped building devoted to his department. He referred to the constant interest shown by the University authorities, and especially by Vice-Chancellor Mulock, in the progress of the work, and expressed the hope that the progress already made would lead to a symmetrical development of all the divisions of biological science in the University. Addressing an audience largely composed of practitioners of medicine, he referred to the circumstance that the youngest of the branches of special study in biology—that of bacteriology—is that which at present has the greatest interest for them. He had selected for discussion to-day, however, the biology of certain low forms of animal life—the Sporozoa—which, he said, were destined to attract the close attention of pathologists within the next few years.

The Sporozoa are a group of low forms of animal life, belonging to the sub-kingdom Protozoa, which, in consequence of the universal adoption of a parasitic mode of life, present certain peculiarities of structure and reproduction which mark them off quite sharply from the rest of the sub-kingdom. The structural peculiarities consist chiefly in the absence of any specialized organs for locomotion or the ingestion of food, while the reproductive peculiarities consist in the formation of large numbers of characteristic spores. It is to these that the group owes its class name, Sporozoa, given to it by Leuckart, who in addition to his invaluable services in familiarising us with the structure and life-history of the higher parasites, has made most important contributions to our knowledge of these lower forms. All of them are unicellular animals, which may occasionally be so large as to be visible to the naked eye, but are often—especially those interesting in human pathology—quite microscopic. Four orders are distinguished, (1) Gregarinidia, (2)

Sarcosporidia, (3) Myxosporidia, (4) Microsporidia; these may be shortly characterized before dealing with the forms of special interest to the medical practitioner.

1. The first Order, that of the Gregarinidia, is best known as furnisning the minute vermiform intestinal parasites of insects and other invertebrates. The unicellular nature is obvious in those which are known as *Monocystidea* (Fig. 1a), but masked in the *Polycystidea*, in which the cell shows a tendency towards subporary character, being discarded before the Gregarine enters into conjugation (Fig. 1c) The result of such conjugation is the fusion of the two cells within a single cyst, and is the general precursor in the intestinal Gregarines of sporulation, which consists in the segmentation of the protoplasmic mass from the periphery inwards (Fig. 1d) into globular clumps of protoplasm, each of which eventually gives rise to a spore with a resistent shell of characteristic form (Fig. 1e and f); such spores, from a fancied re-

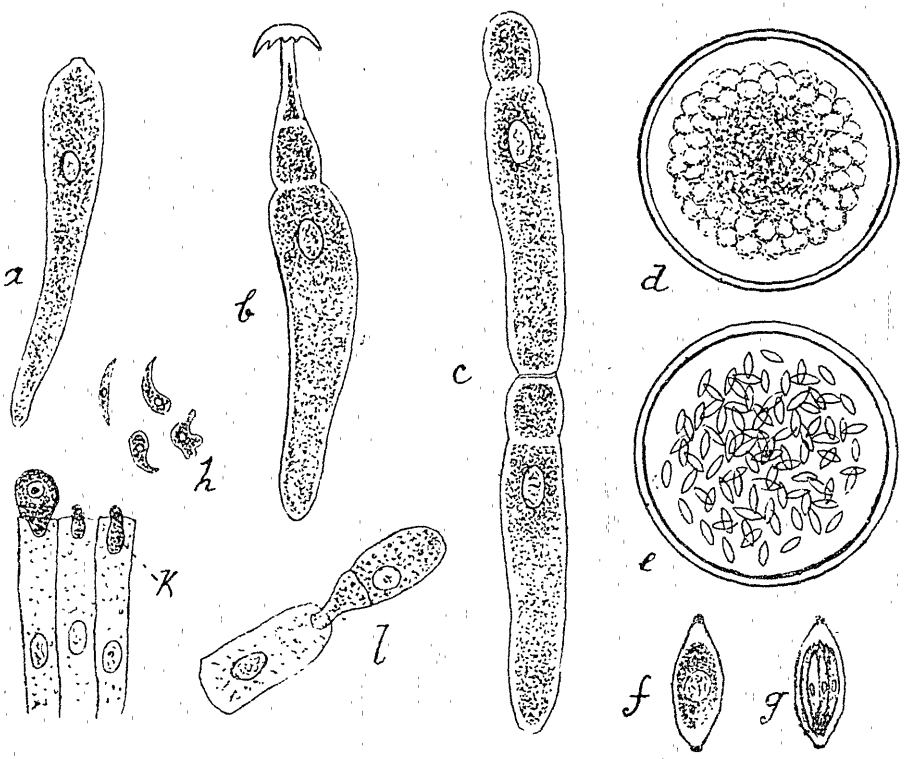

FIG. 1. DIAGRAM OF THE LIFE-HISTORY OF A GREGARINID.

a, A Monocystid form; b, a Polycystid form; c, two individuals of the latter, which have cast off their epimerites, are in conjugation; d, the resulting cyst containing the combined protoplasm of the two cells undergoing segmentation into spores; e, cyst containing the spores, each now encased in its hard shell (pseudonavicella stage); f and g, such spores enlarged, the contents segmented into crescentic germs; h, amœboid movement of the crescents; k, penetration of these into intestinal epithelial cells of insect; l, attainment of adult gregarina-form by same, while still adhering to epithelial cell by epimerite.

division into different regions. In all, however, the structure is substantialiy the same, the protoplasm surrounding the nucleus admitting of the recognition of two regions, the granular endoplasma and the hyaline ectoplasma, the latter the seat of the contractions which lead to the vermiform movements of the body. The cuticle through which the nourishment is absorbed, is frequently provided with an apparatus of attachment (Fig. 1b), but this may be of a temsemblance in form to the minute hard-shelled diatoms, used to be called *Pseudonavicellæ*. The spore-cases are voided through the intestine of the host, and the spores escape either through the rupture of the cyst or by special ducts, and are protected by their hard shells till they reach favourable conditions for further development. This consists in the segmentation of the contents of each spore into two or more sickle-shaped or crescentic germs (Fig. 1g), which are

capable of change of form, and probably in most cases of active penetration into the intestinal epithelial cells of a new host (Fig. 1h), which cells they leave after having attained the adult form (Fig. 1k). The above is a sketch of the life-history of a typical intestinal Gregarine from an insect; to the same order, however, there also belong forms, which unlike the preceding have a long intracellular life, and a short free life, and it will be necessary to return specially to these as they are the forms most interesting in human pathology.

2. The second order, Sarcosporidia, receives its name from the circumstance that the organisms in question are generally found in the muscular tissues of vertebrates. They are the tubes of Miescher or Rainey, which have long been known (Fig 2a) from the flesh of the hog, sheep and other animals, but which may be present in considerable numbers without apparently affecting the health of their host. When present in large numbers, however, they may give rise to various symptoms, according to the group of muscles—lumbar, diaphragmatic or cardiac—most involved. It has been suggested by Pfeiffer that the acute Polymyositis described by Unverricht and others is due to invasion by Sarcosporidia, but this has not been definitely proved. The tubes grow at the expense of the muscular fibres, and present within the porous cuticle which limits them, globular cysts in different stages of development, the ripe ones of which are full of crescentic bodies, which recall the crescents of the Gregarines, and are probably the means by which the parasites spread to other fibres. The Sarcosporidia are not confined to muscle-fibre, for they occur in the connective-tissue of the œsophagus of the sheep, forming there tumours of considerable size, which may entail various pathological consequences.

3. The Myxosporidia in their adult condition have the least regularity of form of any of the Sporozoa (Fig. 2 b.) They are found on the skin and mucous membranes of aquatic vertebrates, and like the last group are generally observed to be full of spores. These are unlike those of preceding groups, in that they are provided with projectile threads (Fig. 2 b & c) possibly a provision for attachment to a new host.

4. The Microsporidia, finally, include extremely minute Sporozoa, the spores of which (Fig 2 d) are so small that they have been taken for bacteria. They occur as parasites of the tissue elements of insects, and in the form of the pebrine of the silk-worm have led to enormous losses in silk-culture in Europe. M. de Quatrefages calculated that in the first thirteen years after the outbreak of pebrine, France lost two hundred million dollars from the ravages of this sporozoon. They are not confined to any particular kind of cell but invade and destroy all without exception.

We must now return to those forms which belong to the first order, but which differ from the type described, in that their life is chiefly an intracellular parasitic life, a short free or wandering stage, however, permitting the young forms to invade new cells or new hosts. They are generally known as Coccidia, and like the Sarcosporidia and Microsporidia are true cell-parasites. The best known is *Coccidium oviforme* from the liver of the rabbit. It occurs in caseous nodules and cysts of the liver, which are full of the parasites in their encapsuled stage (so called psorosperms, Fig. 2 e.) Sporulation does not occur within the host, but has been studied outside, and recognised to result in the formation of two crescentic germs within each of four spores. It is supposed that the cysts, which have been voided from the intestine of one infected animal, may after sporulation be introduced with the food into the intestine of a new host, the crescentic germs being eventually freed and thus ready to penetrate the epithelial cells of the bile-ducts (Fig. 2, e 5) the contents of which they devour before again undergoing encystation.

Several cases in which man has been attacked by the same parasite are recorded—a particularly interesting one is that described by Gubler, who diagnosed hydatid tumours of the liver. The patient died, and some twenty cysts full of coccidia were found, one six inches in diameter! There is little doubt but that cysts of this nature, full of caseous material, have often been misinterpreted in the past, and closer attention in the future may establish that such psorospermosis of the liver is not so rare as has been supposed.

A large number of similar forms are known in other vertebrates and invertebrates attacking the cells of the intestinal tract and its append-

ages. One of the most interesting recently described is the *Karyophagus salamandræ* of Steinhaus (fig. 2f), which invades the nuclei of the intestinal epithelium of the salamander, and only becomes free within the cell after all the nuclear matter has been devoured.

A similar nuclear parasite is asserted by Podwyssozki to occur in certain diseases of the liver in man, and a detailed description of these is promised shortly. The parasites, which he proposes to call *Karyophagus hominis*, first produce a hypertrophy of the invaded nuclei of the liver-cells, then distort them, and, after encystation and sporulation, finally cause the pigmentary atrophy and disappearance of the whole cells. Such destruction of the liver-cells as well as the irritating effect on the intra- and inter-lobular connective tissue caused by the presence of the coccidia may lead to cirrhosis and icterus. Podwyssozki calls attention to the ease with which the structures may be confounded with normal elements, expressly stating that they may easily be overlooked by an experienced histologist, and remarks that many of the so-called accessory nuclei, plasmomes, etc., described as normal cell-elements, may really be developmental stages of coccidia. It is obvious that the close cystological studies of the present day have prepared the way for researches into this difficult field of investigation

In adition to the above described cases in which the epithelium of the digestive tract is

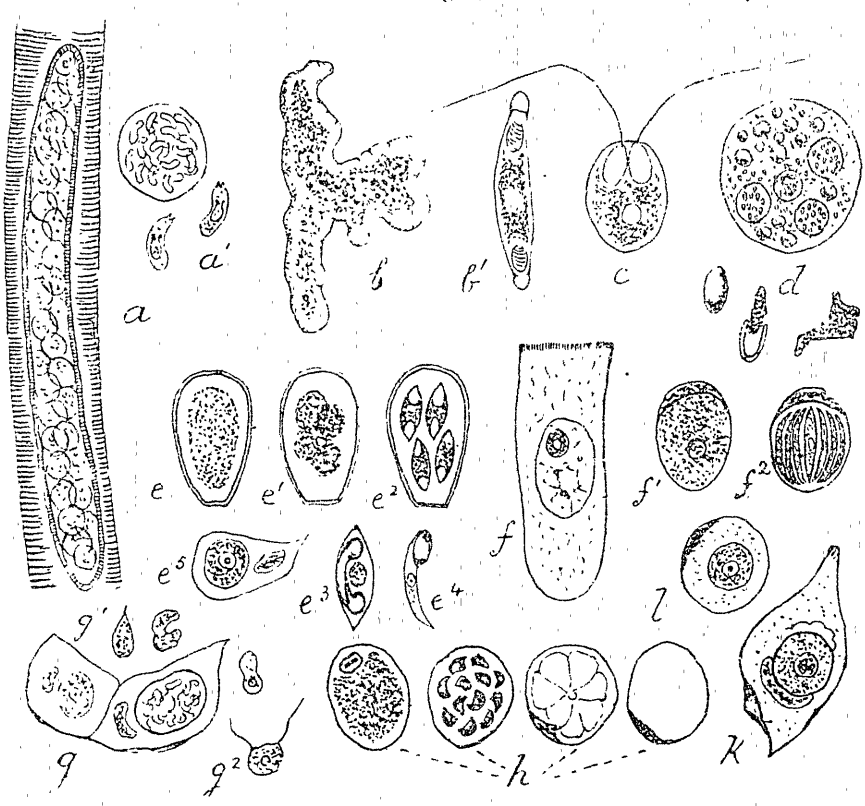

FIG. 2. ILLUSTRATING VARIOUS PATHIGENIC SPOROZOA.

a, A voluntary muscle-fibre from the œsophagus of the sheep containing a tube-like Sarcosporid; within the tubes are cysts in different stages of development, the ripe ones (a1) containing numerous crescentic bodies; b, a Myxosporid from the bladder of the pike, (b1), one of its spores with terminal thread-cells; c, a spore from another species with projected threads; d, yolk-cell from the egg of silk-moth infested with microsporid cysts; below is represented one of the oval spores contained in these and the amœboid germs with emerge from such spores; e, *Coccidium oviforme* from the liver of the rabbit in encysted stage; e1, e 2, contents of cysts segmenting into spores, e 3, one of the spores enlarged containing two crescentic germs, e4; e5, epithelial cell from a bile-duct invaded by a young coccidium; f, intestinal epithelial cell from the salamander, the nucleus of which is invaded by a coccidium (*Karyophagus* of Steinhaus), f1, a similar nucleus almost entirely replaced by the invading coccidium; f2, the coccidium undergoing direct division into segments; g, epithelial cells from the mouth of the pigeon, after Pfeiffer, with coccidia in different stages of development, one encysted with contained crescents; g1, crescents showing amœboid movements; g 2, adopting "flagellate" form on mucous membrane; h, four epidermal cells from *molluscum contagiosum* after Neisser, to the left is a cell, h1, with the contained coccidium in its protoplasmic phase, h2, segmentation into angular refractive bodies follows, which eventually enlarge so as to crowd upon each other, h3, their outlines disappearing and the surrounding cell cornifying give rise to the characteristic "molluscum corpuscle," h4; k, epidermal cell from *psorospermosis follicularis* (keratosis follicularis), after Darier, in which a coccidium pushes aside and distorts the nucleus; l, epithelial cell from Paget's disease "chronic eczema of the nipple" after Butlin, the contained coccidium interpreted by him as an instance of endogenous cell-formation.

attacked by coccidia, instances are not wanting where it is the epidermal cells of the skin which are invaded. Pfeiffer has given us a detailed account of the forms which cause a contagious skin disease in poultry, and which were originally described by Bollinger in 1873. The cells are invaded by the coccidia and the nuclei thrust aside as the parasite grows and proceeds to sporulation (Fig. 2 g). The spores are at once capable of propagating the disease, which therefore may be artificially produced by inoculation, and, indeed, if planted on the mucous membrane of the throat, instead of on the skin, the spores take on a "flagellate" instead of an amœboid form, but penetrate the epithelial cells and give rise to a diphtheritic condition which is very contagious among the poultry exposed to infection. Such polymorphism on the part of these spores is of great interest in view of the remarkable, and as yet only partly understood, polymorphism of the malarial parasite.

On the first discovery of this disease of poultry Bollinger compared it to "molluscum contagiosum" in man, and Neisser has recently shown (Vierteljahresschrift fuer Dermatologie und Syphilis) that this disease is really due to the invasion of the cells of the malpighian layer of the epidermis by coccidia. It has nothing to do with the sebaceous glands, but in the interpapillary colums of the rete mucosum all stages of the development of the parasite may be seen, from cells which are just invaded, to those in which the nucleus is thrust aside and the cell-protoplasm entirely replaced by the parasite (Fig. 2h). Sporulation occurs within the cell, 6, 8, or 10 refractive bodies being formed, these increase in size, so as to exercise mutual pressure, and the typical "Molluscum-corpuscle" is arrived at by cornification of the remains of the invaded cell around the coccidium-cyst. The contagious character is thus satisfactorily explained.

Molluscum is, however, not the only human skin-disease which must be attributed to coccidia. Darier has recently established the fact that certain conditions described heretofore as a variety of *acne cornea* or as *keratosis follicularis* are in reality a "psorospermosis follicularis," (Annales de Dermatologie et Syphilis July 1889). In these conditions the lesion exists in the necks of the sebaceous follicles, which are dilated into a cup or funnel shape, the funnel being occupied by a mass of corneous appearance which projects beyond the level of the epidermis in the form of a brownish or greyish crust. This is formed as a result of the irritation of the cells of the neck of the follicle by coccidia which have invaded them (Fig. 2k). Instead of the lesion being limited as described, the sebaceous gland and the hair-follicle being unaffected, vegetations may be developed from the neck of the follicle, and extend into the adjacent corium, giving rise to tumours which were observed chiefly in the inguinal region. Microscopic preparations of such tumours, Darier says, would be infallibly diagnosed as coming from an epithelioma of follicular origin, for the cells dispose themselves round central invaded cells in "nests" of the form characteristic for epithelioma.

A still more interesting, because more commonly observed condition, shown by Darier to be attributable to the invasion of the epidermis by coccidia, is that known as Paget's disease, "chronic eczema of the nipple," recognized by Paget as a frequent precursor of cancer of the breast.

Although it is not difficult to differentiate this condition from eczema, yet the presence of the coccidia in the epithelial cells of the deep as well as the superficial layers furnishes, according to Darier, an infallible distinction. These bodies had been noticed by Butlin (Medico-Chirurgical Transactions, 1877), who described the ducts and acini as full of epithelial cells of this character, supposed by him to be undergoing endogenous cell-formation (Fig. 2 l). Darier shows, however, that these are coccidia, which, when they attain their full size, distend the invaded cell beyond its normal dimensions and (unlike the coccidia of the psorospermosis referred to above) sporulate in situ.

The conclusion is at once suggested that the cancer which succeeds this condition is simply due to an inward extension through the galactophorous ducts, and Darier does not fail to draw it.

Darier's account of the two pathological conditions referred to above, presented in the Spring of 1889 before the Société Biologique of

Paris, elicited from M. Malassez the statement that in his belief coccidia are a more important factor in disease than has hitherto been admitted, that since 1876 he has regarded certain intracellular bodies met with in the central cells of nests in epithelioma as coccidia, and that four years ago he had showed these to Balbiani—the most distinguished French authority on Sporozoa—who had confirmed him in his belief. M. Albarran followed with a detailed description of these structures from

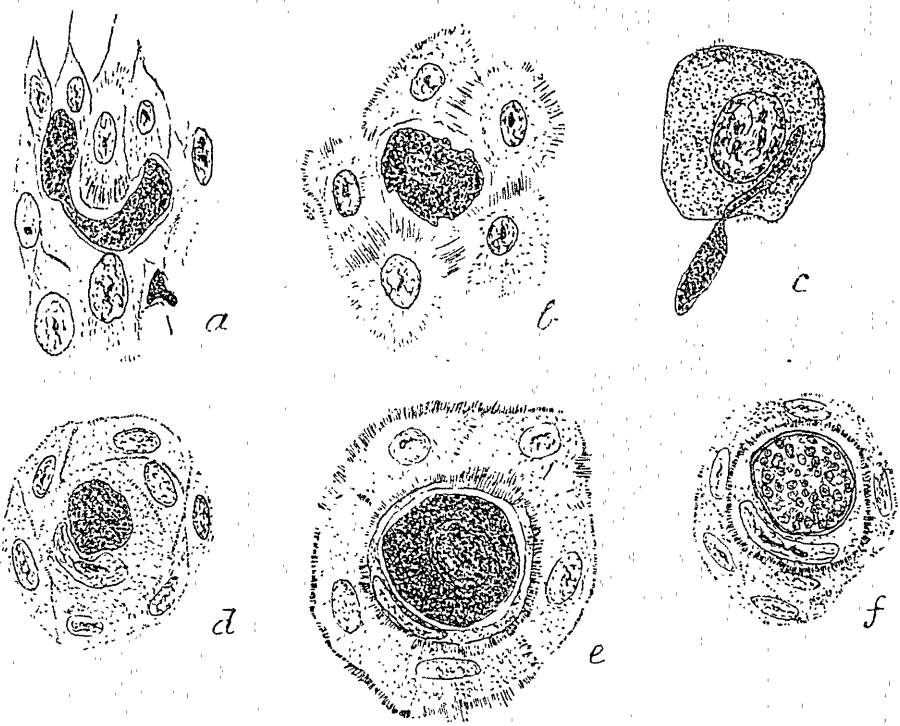

FIG. 3. FROM PREPARATIONS OF EPITHELIOMATA, DRAWN BY DR. A. B. MACALLUM.

a, b, c and e, from preparations made with chromic acid, hæmatoxylin, and eosin; d and f, from preparations made with chromic acid and gold chloride; a, showing a migrating plasmodium, non-nucleated and with granular protoplasm; near letter a is represented a leucocyte; b, showing a plasmodium between the prickle cells and possessing apparently a nuclear body; c, showing a plasmodium entering an epithelial cell; d, plasmodium in an epithelial cell, around which the other epithelial cells are laminated, resulting in a "nest"; the nucleus in the central cell is pushed to one side and partially invaginated by the plasmodium; e, a further stage of d, in which the nucleus and remaining protoplasm of the cell forms merely an envelope for the plasmodium, which is intensely eosinophilous, and which possesses apparently a nuclear vesicle; f, showing an epithelial cell with the nucleus pushed to one side and crescentic in outline, the contained plasmodium surrounded by a doubly-contoured membrane and apparently having undergone sporulation.

two cases of epithelioma. The foreign bodies in the epithelial cells are rounded or oval elements of a faint yellowish-green tinge with granular protoplasm and a central nucleus or entirely homogeneous. Occasionally they are in the form of cysts, and in some individuals six to eight refractive corpuscles of rounded or irregular form are to be seen. Occasionally the invaded cells are surrounded by one or two flattened cells; others occupy the centre of nests, and others extend into the connective tissue.

Many observers have been struck by these globular elements in the centre of the epithelial cell-nests, retaining their protoplasm while the surrounding cells cornify. They have generally been considered as the result of a mucous or colloid degeneration of the central cell, but it is not only in France that these have been interpreted as coccidia. Pfeiffer in one of his papers on the Sporozoa (Zeitschrift fuer Hygiene, III.) refers to the case of a girl of fifteen, who died of general carcinosis, the growths in the breast and mesentery exhibiting coccidia both in the protoplasmic and sporulating phases. On the other hand, Neisser, in his paper on Molluscum specially contrasts carcinoma with molluscum or epithelioma contagiosum, and adheres to Cohnheim's view of its etiology.

Entirely independently of these observations (which indeed have only been published within

the last few months) Dr. A. B. Macallum, who is in charge of the Histological classes in this Institution, showed me four years ago, sporulating cysts in epithelioma, and suggested the parasitic origin of the disease. You will have an opportunity of inspecting these preparations (Fig. 3), as well as others prepared by Dr. Caven, showing the presence of the same bodies in metastatic growths. They are apparently similar structures to those observed by Malassez and Pfeiffer, and probably also to those described by Thoma (*Fortschritte der Medicin*, 1889, No. 11), although the latter observer finds the parasite generally within the nuclei, and only occasionally in a cavity of the cytoplasma beside the nucleus. The optical characters of the protoplasmic bodies described, their staining reactions and their sporulation would seem to indicate that the structures are the same.

It is hardly necessary to point out the importance of these investigations as to the etiology of cancer, and their far-reaching consequences. Scheurlein's bacillus of cancer has turned out on examination to have nothing to do with the disease, but the analogy of the other diseases referred to above, seems to indicate that at last pathologists are on the road to discover the real materies morbi.

It is not only the epithelium of the skin and the digestive tract which may harbour Sporozoa; possibly the most interesting of all are those forms which invade the blood-cells and by the disintegration of these, lead to serious disease. Not much is known of the lesions produced by the presence of these blood-parasites except in man, and they have been observed in animals apparently quite normal. Whether this is the case remains for further investigation, but the observations of Danilewsky show that it is especially in sickly individuals of turtles and birds that the hæmogregarines described by him are to be found.

The earliest known forms of these blood-parasites are the *Drepanidium ranarum* of the frog, which is known in an intracellular crescentic phase, and in a free phase (Fig. 4 a) and the larger *Trypanosoma* or *Trichomonas*, a flagellate form with an undulating membrane found free in the plasma (Fig. 4 c). A similar Trichomomas is observed in the blood of various fishes, and still another species from apparently healthy rats, while in the blood of mules in India suffering from an epidemic pernicious anæmia—the so-called Surra-disease—entirely similar forms have been found. Whether the flagellate forms are really referable to the group of the Sporozoa remains yet to be determined, but Danilewsky's observations would appear to point out a very considerable polymorphism on the part of these hæmogregarinids, and would seem to support suggestions made that the organisms found in the blood in relapsing fever and pernicious anæmia may also be referable to this remarkable group. The comparative parasitology of the blood is yet in its infancy; there can be no doubt, however, but that a systematic study of the blood in other vertebrates in this regard, will help materially to clear up many obscure points as to the etiology of various human blood-diseases, and especially of malaria, on which Professor Osler is now to address you.

It has been my object in this address to emphasize the fact that not only bacteria, but low forms of animal life furnish important pathogenic organisms, and that continued comparative researches on the whole group of the Sporozoa are required to fill up the gaps in our knowledge of those forms which are pathogenic to man.

THE ETIOLOGY OF MALARIA.

BY WM. OSLER, M.D., F.R.C.P.,
Professor of Medicine, Johns Hopkins University.

During the early triumphs of bacteriology it was confidently anticipated that malaria would turn out to be a bacterial disease, and the *Bacillus malariæ* of Tommasi-Crudelli and Klebs was generally thought to be the looked-for micro-organism. The discovery by Laveran of amœboid bodies in the interior of the blood-cells was at first considered as pointing to phenomena of degeneration of these, and the original descriptions of the organisms seemed rather to indicate a retrograde step in the study of pathogenic micro-organisms. Since then, however, independent and renewed observations by Marchiafava, Celli, Guarneri and Golgi in Italy, by Councilman, James, and myself in America, and by Vandyke Carter in India, all point to the conclusion that Laveran's organisms are the real cause of the condition, at least that

they are peculiar to and diagnostic of the malarial poison.

Laveran's organisms resemble the Sporozoa, which have formed the subject of the preceding address, in their having an active amœboid phase, and a sporulating phase. The latter occurs apparently without encystation, and the resulting spores exhibit either amœboid or flagellate locomotion. Certain resting-stages—the so-called crescents—do not, however, appear to be comparable to the crescentic germs of the coccidia.

The amœboid bodies, *Plasmodium malariæ*, as they are now called, are to be found within the blood-cells of the acute cases of malaria, and exhibit a different stage of evolution according to the phase of the attack. During the apyrexia the plasmodia are to be recognized as minute, colorless amœboid bodies (Fig. 4) which gradually grow at the expense of the stroma of the red blood-cells, and become more and more loaded with fragments of black-pigment—melanin—the result of the digestion of the hæmoglobin. Eventually the whole of the stroma is devoured, the plasmodium assumes a globular form, the pigment generally accumulates at the centre, and the peripheral protoplasm segments into a number of young plasmodia, which are free from pigment and are capable of amœboid, more rarely of flagellate, movement. This segmentation is coincident with the chill After the attack the resulting small plasmodia may leave the larger vessels to crowd into the capillaries of the spleen, etc., where the central lifeless pigment masses are taken up by the leucocytes, but they are soon found within the blood-cells in the general circulation again. The length of time from the invasion of the blood-cells to the occurrence of segmentation determines the character of the fever, and Golgi believes he has made out specific distinctions between the plasmodium of tertian and quartan fevers (Fig. 4 o, p). The relationship of the intra- and extracellular crescents (Fig. 4, m) of chronic cases to the plasmodium has not yet been satisfactorily made out, but it may be noted that, while quinine at once causes the disappearance of the ordinary plasmodium from the blood, the crescents are on the other hand quite refractory thereto.

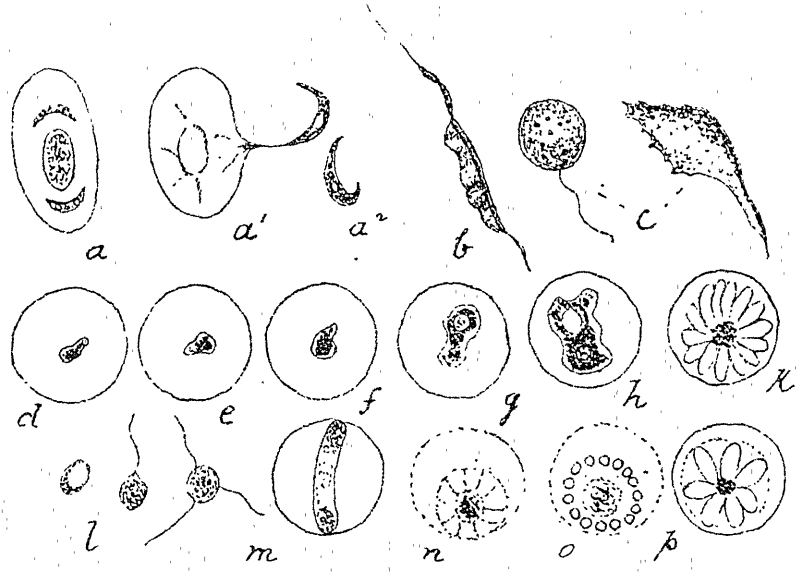

FIG. 4. VARIOUS FORMS OF BLOOD-CELL PARASITES.

a, Red blood-cell of frog containing two crescents of *Crepanidium ranarum*, a 1, a crescent escaping, a 2, a free cresent; b, *Trichomonas* from fish's blood, c, from frog's blood—two phases; d-k, successive phases of development of *Plasmodium malariæ* within human red blood-cells; k, segmentation in the rosette form with central pigment. l. free segments which may be amœdoid or flagellate; n o, plasmodium of tertian, *p*, of quartan ague according to Golgi.

Flagellated forms with three or more rapidly moving lashes are to be met with in some cases, especially in the blood from the spleen, and these have been observed to be developed from the free oval or rounded bodies. Nothing so far can be said as to their significance.

We must await the further working out of the life-history of the *plasmodium malariæ* till its zoological position and its causal relationship to the disease can be more thoroughly defined, in the meantime it is necessary to call attention to its great importance in diagnosis. Little difficulty is experienced in recognizing the ordinary cases of intermittent fever; it is in the chronic and anomalous cases which sometimes simulate typhoid, that the blood-examination is of most service. The finger-tip must be thoroughly cleansed before taking from it the drop of blood which is to be examined, and a very thin layer of blood must be taken so that the cells shall not run into rouleaux.

The detection of the smaller plasmodia within the blood-cells requires a high power—preferably a $\frac{1}{12}$ homogeneous immersion, and good artificial illumination, but the extracellular crescents in the chronic cases can be observed with a $\frac{1}{6}$. Seven out of twenty-four cases of malaria recently admitted into the Johns Hopkins Hospital could not have been satisfactorily diagnosed without the blood-examination. In subtropical and tropical practice especially is this new method of diagnosis likely to be of great service.

Professor Osler concluded as follows :—When I look back a few years and think of the appliances and arrangements which we had then in Toronto, and when I go over this building and see the beautiful arrangements, the elaborate apparatus, the splendid appliances for teaching, I feel that it is possible for one to live through a renaissance, similar perhaps in kind, less important in degree, than that to which the president referred in his opening remarks. As most of you know, I have continued to take an interest in the school in which I received my early instructions, and I continue to take a deep interest in everything relating to the profession in this my native Province. Though I am away a considerable part of the time, yet I am able to make repeated visits, and it is always a source of the greatest pleasure to meet my old teachers and my colleagues and my friends.

An address delivered by Prof. Vaughan, of the University of Michigan, at the opening of the Biological Department of Toronto University, will appear in our next issue.

PATHOLOGY IN ITS RELATIONS TO GENERAL BIOLOGY.

BY WILLIAM H. WELCH, M.D.,

Professor of Pathology, Johns Hopkins' University, Baltimore.

I esteem it a privilege to assist at the formal opening of this Biological Laboratory and to be able to extend to this University, and to this City, congratulations for the possession of a laboratory so admirably constructed and equipped and inaugurated with the assurance of an activity so fruitful and well directed. The existence in this place of such a laboratory is not a matter of local pride alone. It may safely be predicted that its influence will be felt throughout this country, and indeed wherever interest in the biological sciences is found.

With such opportunities as here exist, we may feel assured that this country will increase and expand the honorable reputation already gained by its contributions to biological knowledge.

Biology in its widest significance is the study of life in all its forms and activities, both normal and abnormal. No branch of human knowledge can exceed this in interest and importance; none has made greater advances during this century of scientific progress; none has achieved greater triumph for human welfare; none has influenced more profoundly modern philosophical thought.

I am here to say a few words concerning one department of biology, namely, pathology, particularly in its relations to general biology.

Pathology is the study of life in its abnormal forms and activities. The relations of pathology to practical medicine are necessarily so essential and intimate, that the broader conception of this science as a part of biology is in danger of being lost from view. I deem it, however, important for the scientific status and advancement of pathology to keep in mind and to emphasize its relations to general biology, not less than those to practical medicine.

In so doing, it is not intended to detract in any degree from the practical value of pathology and its applications to the diagnosis and treatment of disease. When we consider that pathology embraces the investigation of the causes of disease, of the anatomical changes produced by disease in the organs and tissues

of the body, and of the alterations in function resulting from disease, it is plain that pathology must constitute the scientific basis of practical medicine. This is not the less true because the prevention and cure of disease have not kept pace with the advances in our knowledge of the nature and causes of disease, and of necessity can not do so. Preventive and curative medicine, however, is constantly making beneficient application of pathological discoveries, and the most intelligent and efficient management of disease is becoming more and more that which is founded upon the most accurate knowledge of its nature and causes.

Inasmuch as the general public naturally interests itself but little in any side of medicine other than the treatment of disease, there is not sufficient general appreciation of the immense progress in the science and art of medicine of to-day as contrasted with that of a half century ago. The history of medicine is in large part the history of schools of doctrine. Stately superstructures of sweeping generalizations and attempted explanations were erected only to be overthrown because it was impossible to build upon a firm foundation of facts. To-day it is our conviction that these fundamental facts can be discovered in no other way than by observation and experiment. The adoption of this, the only scientific method of investigation, has with the aid of modern instruments and devices not only greatly enriched medical science, but it has overthrown the era in which, among scientific physicians, exclusive schools of doctrine can prevail. The scientific physician, no more than the scientific chemist, can yield adherence to any exclusive dogma. To the one as to the other no way which leads to truth is debarred.

By way of illustration of the achievements of modern pathology, permit me to contrast for a moment with the imperfect, meagre, and confusing information of former times, the fulness of our present knowledge concerning that disease, which of all diseases is the greatest scourge of the human race. Tuberculosis causes the death of not less than one-seventh, and, in some form or other and at some period, affects probably one-third of mankind. But a few years ago, not only was the specific cause of tuberculosis unknown, but there was no general appreciation of the fundamental fact that this is one of the infectious diseases. The knowledge of the frequency and wide distribution of tuberculous disease in other parts of the body than in the lungs is an acquisition of modern pathology. The pathological anatomy of tuberculosis, which not long ago was one of the most confusing chapters in pathology, has been made clear. The unity of all the processes now known to be tuberculous, can be established on an anatomical as well as on an etiological basis. The greatest addition to our knowledge of tuberculosis, and in fact one of the greatest achievements of modern science, is the discovery of the specific living germ which causes tuberculosis. We are now enabled to study both within and without the body, th form and the properties of this germ, the conditions which are favorable and those whi h are hostile to its preservation and development. Who can doubt that all this increased knowledge of the most devastating of maladies is destined to help in prevention and treatment? Sanitarians convinced of the preventability of tuberculosis have already begun the warfare against its spread.

If one seeks an illustration of immediate practical results of the modern investigations of the living germs which cause disease, let him turn his attention to the revolution thereby wrought in surgical procedures. The possibility which is now in the hands of the surgeon of keeping wounds free from all external infection, is a boon to humanity not less than the introduction of vaccination.

It would be pleasant to follow still further the practical benefits resulting from pathological discoveries, but it is not my intention on this occasion to dwell upon the applications of pathology to practical medicine. I have said enough to remove any misapprehension as to my belief that pathology should be made to serve the ultimate aim of medical education, the prevention and cure of disease. This science must ever hold a foremost place in any proper scheme of medical education.

This occasion is an appropriate one to emphasize especially those scientific aspects of pathology which give it an important position among the biological sciences.

In the first place I claim that pathology as a

science, quite independently of any practical or useful applications whatever, is as legitimate and worthy an object of pursuit as any of the natural sciences. In and for itself alone it deserves to be studied. Its methods are those of observation and experiment as in other biological sciences. Its subject matter is any living thing which deviates from the normal condition. It is not less interesting and important to learn the nature and causes of abnormalities in form and function than it is to become familiar with the normal, and when this knowledge may aid in the prevention and relief of suffering, added dignity and interest are imparted to the study.

As there comes a line where the distinction between the normal and the abnormal is shadowy and uncertain, so the separation between normal and pathological biology is not sharp. The province of the one encroaches at many points upon that of the other. Mutual aid is to be derived from a closer union between normal and pathological biology. The pathologist should not be content with methods of research less perfect than those employed in normal biology. He should not rest satisfied with results which stop at the mere description and classification of morbid processes. To be able to give a name to some pathological lesion, and to make it fit into some accepted scheme of classification, should not be the sole aim of pathological study. Pathological processes should be studied with the aim of elucidating their real nature, development and causes, their mutual relations and their dependence upon underlying laws. The purely descriptive phase of development of any natural science can be only temporary and unsatisfactory. The more a pathologist is imbued with the spirit of modern biology, the less content will he be to stop at this descriptive phase.

In the next place it can be justly claimed that the study of pathology as a science without immediate reference to practical results is in reality the method which is most likely to yield these results as well as to bear fruit in other directions. Experience has shown that the most important discoveries in science, come not from those who make utility their guiding principle, but from the investigators of truth for its own sake, wherever and however they can attain it. It is short sighted to fail to see that the surest way to advance pathology, even in its relations to practical medicine, is to cultivate it as a science from all points of view. It is impossible to foresee what may be the practical application to-morrow of any pathological fact discovered in the laboratory, no matter how remote from practical bearing it may seem to-day.

The experiments upon animals and other investigations which have led to the present accuracy in the localized diagnosis of lesions of the central nervous system, and have rendered possible the surgical treatment of many of these lesions we owe in large part to physiologists and pathologists who had little thought of the practical applications of the results of their researches. The instrument and methods which have enabled ophthalmology to attain such perfection in diagnosis and treatment rest upon researches in physiological optics belonging to the domain of pure science. It could not have been anticipated by those who began the study of the microscopic organisms which cause fermentations and infectious diseases, that their study would lead to a revolution in surgical treatment, and would open prospects which it would now be hazardous to specify as to the prevention and cure of infectious diseases. Did time permit, and were it necessary, much more evidence of similar character could be brought forward to show that those who work in laboratories, it may be without a thought as to the practical utility of their investigations, are no less genuine contributors to the science and art of medicine, than those who study diseases by the bedside.

As has already been mentioned, pathology has to do with abnormalities, not in man alone, but in all living things, both animal and vegetable. The points of contact between animal and vegetable pathology are more numerous than might at first glance appear. The student of animal pathology can draw many instructive lessons from such subjects as the behavior of wounds and the parasitic affections in plants. We are most of us probably inclined to think too much of the separation between the pathology of man and that of the lower animals. While there is a wide distinction in the dignity of the object of study, yet from a scientific point of view this separation is of little account.

Pathological investigations of diseases of animals constitute no less genuine and valuable contributions to pathology in general, than do similar investigations of human diseases. The advancement of recent years in the education and aims of those who devote themselves to animal pathology, will serve to bring into closer relations the students of human and those of comparative medicine.

It may be useful for us to consider briefly some of the relations and points of contact between human and comparative pathology.

In the first place there are many diseases which are common to man and to animals. These can often be studied to greater advantage upon animals in which many conditions can be controlled, which are beyond our control in man. In animals every stage of development of the disease can be studied, and in general, fresher material can be obtained. We can modify in various ways external and internal conditions so as to reach a clearer comprehension of the morbid processes Moreover the same disease may present interesting pathological peculiarities in different species of animals, so that the study of its occurrence in a single species, affords most incomplete knowledge. For instance, the pathologist whose sole knowledge of such a disease as tuberculosis is derived from the study of the disease as it occurs in man, has a far less complete understanding of this affection, than one who is also familiar with the striking peculiarities of this affection in cattle, swine, fowls, and other animals.

Especial importance attaches, of course, to the study of such diseases as are communicable from animals to man, as for instance, anthrax, glanders, tuberculosis, many entozoic affections, etc., and in general these are the animal diseases which have received the most attention from the students of human pathology.

One of the most important departments of comparative pathology is experimental pathology, the value of which to human pathology has long been recognized. To make of experimental pathology a distinct speciality and to endow it with a separate professorship as is done in some foreign universities, does not seem to me to be in the direction of the most fruitful and healthy development. The experimental method is the handmaid of pathology in all its branches, and is the only means of solving many important problems. The experimental production of diseases in the lower animals affords an insight to be gained in no other way as to the causes, development, lesions and functional manifestations of many diseases. Experience, however, has shown that grave errors are likely to be committed by experimental pathologists who have no knowledge of the natural diseases and conditions of the animals used for experimentation. How often, for example, have those studying the question of experimental tuberculosis, mistaken for genuine tubercles nodules produced by parasitic entozoa and to what misleading conclusions have such incorrect observations led.

There are as many general pathological processes which can be studied to better advantage in animals than in man. Such subjects as inflammation, œdema, thrombosis, embolism, and infection have been elucidated in large part by observations made on animals. Due caution is of course to be exercised in applying such observations directly to human beings.

Inasmuch as it is rarely possible for us to produce artificially all of the conditions which cause natural diseases, and as our very method of experimentation is in itself often a perturbating factor, it is no less important to study animal diseases resulting from natural causes, than it is to study the same diseases experimentally produced. Of course there are many diseases which have not yet been opened to the experimental method of investigation.

Questions of etiology and of pathogenesis are among those which have received and are destined still further to receive the greatest illumination from studies of comparative pathology. At present, probably no subject engages the attention of pathologists to a greater degree than the microscopic organisms which cause infection. If we had been confined to human beings in the study of infectious diseases, our knowledge in this direction would have been only a small fraction of what it is at present. In no single instance could the complete chain of proof required to demonstrate the causation of an infectious disease by a specific micro-organism, have been furnished. The far-reaching principle of preventive vaccination or inoculation would not be known.

A most important and promising field of pathological study, at present only partly cultivated, is found in the infectious diseases of animals and of plants, not only on account of the great economic interests often involved, but also as a means of widening and deepening our conceptions as to the causes, development, prevention and treatment of infectious diseases in general. Any pathologist who is at all familiar with the remarkable and peculiar conditions under which the so-called Texas Cattle Fever of the United States develops and spreads, will realize that the complete elucidation of all the etiological factors of this disease not only would contribute to the solution of a great economic question, but also would open fresh points of view in our conceptions of infectious agents and their properties. When we consider the many conditions which it is in our power to control in studying animal diseases, and above all the possibility of submitting to an experimental crucial test our conclusions, it is clear that the study of natural and artificial infections, as well as of many other diseases in animals, is calculated to advance in the highest degree the science of pathology. It is not a small thing that questions which were once considered to be wholly transcendental, as for instance the doctrine of immunity against infectious diseases have been brought within the working domain of experimental pathology.

Nor is it in the causation of infectious diseases alone that the comparative study of human and of animal diseases is destined to advance etiology. It is reasonable to expect that this comparative study will help to clear up many factors, at present obscure, in the causation of human diseases, including the influence of social conditions.

But let us take a broader view of comparative pathology than that which considers abnormalities only in man and in animals related to man in structure and function. I believe that many problems and facts in human pathology await for their complete elucidation the same application of the comparative method of study which has made of normal anatomy virtually a new science. What a barren mass of apparently unrelated facts is human anatomy when studied without reference to comparative anatomy and embryology! If knowledge is the understanding of the real nature of a thing, and how it came to be as it is, then there is no knowledge of human anatomy without the aid of comparative anatomy and embryology. How difficult and unmeaning is the old method of studying the anatomy of the human brain and how fascinating does the anatomy of this organ appear in the light of development!

A light similiar in kind, if not equal in intentensity, will be shed upon human pathology by a fuller insight into comparative pathology. We possess at present scarcely the rudiments of a comparative general pathology, but how useful and significant is even our fragmentary knowledge of this subject. The charm and impressiveness with which Metschnikoff has developed and presented the phagocytic doctrine is due largely to illustrations drawn from comparative pathology. It is impressive to see pictured in living forms from the lowest up to the highest, the combat with invading micro-organisms of infection. While the phagocytic doctrine can not be accepted in its entirety, it is interesting to observe that it received its origin and its chief support from observations made upon the lower forms of life, rather than from those on man and the higher animals.

The interesting and important discoveries concerning the curious parasitic organisms associated with malaria may seem to the student of human pathology anomalous and without analogy, but in Prof. Wright's admirable address to-day upon the sporozoa, we have had presented to us not only the life history of the class of organisms to which the malarial parasites probably belong, but also many examples of similiar parasitic affections of lower animals. We may expect still further information concerning this interesting group of infectious micro-organisms from researches in comparative pathology.

Take for instance one of the most disputed and still unsettled problems in pathology, the conditions which cause multiplication of the fixed cells of the body, a question which is intimately associated with the still broader one of the response of cells to the action of external stimuli. Can it be doubted that if we were acquainted with the behavior of cells in all types of living things from the unicellular

organism upward, under the influence of such stimuli as cause inflammation in human beings, under the influence of losses of substance and under various other conditions, we should have a much clearer comprehension of one of the fundamental and most common pathological processes in man?

The interesting studies of heredity by Weissman and others, pertain in part to pathology and also illustrate brilliantly the value of the comparative method of research.

The application of embryology to the explanation of congenital malformations is familiar and has long been an acquisition of human pathology. More recent is the endeavor to refer the origin of the genuine tumors to anomalies in fœtal development. It is probable that experimental and comparative pathology also will shed much light upon the still obscure question as to the origin of tumors.

A large mass of observed pathological facts we must now accept without adequate explanation. It is often the fundamental and common morbid processes which are most obscure. For many of these we may hope to find satisfactory explanation in the results which the comparative study of pathology will afford. At present nothing is to be gained by attempting to generalize from scanty and incomplete observations in comparative pathology. We must first accumulate a store-house of facts. We need investigators who shall study pathological conditions not in man alone or in the higher animals alone, but also in the simpler forms of plant and animal life. Something has been done in this direction, more indeed than is generally utilized in human pathology, but much more remains to be done. Conditions and processes which are difficult to comprehend in animals of complex organization often become clear in organisms of simple structure. Our pathological concepts are now derived almost wholly from observations made upon highly complex forms of life. I believe it to be no illusion to anticipate in thought, a time when all forms and kinds of living matter will be included in the domain of pathology, and when pathological laws will be derived from results of investigations which begin with unicellular organisms and which end with man. By the adoption of this comparative method of study, pathology will in reality acquire greater simplicity and deeper significance than it now possesses.

As the student of normal biology does not attempt to cultivate equally the whole field belonging to his subject, so the pathologist can not be expected to cover in his investigations the whole domain of pathology as thus broadly outlined. There will be special workers in various departments. As in normal biology, so in pathological biology, from the combined labors of all there will be constructed a science broader, richer and fuller of meaning than that which we now possess. The ideas which I have endeavored to present, although necessarily in a brief and cursory manner, concerning pathology in its relations to general biology, are naturally suggested by the opening of this biological laboratory. Permit me in conclusion to say that it is in a medical school in intimate and organic connection with a university where such laboratories exist, that the highest cultivation of pathology as a science is to be expected. Here is the favorable atmosphere, here the stimulus of allied sciences, and here the most enlightened appreciation and encouragement.

THE USE OF THE MICROSCOPE AND THE VALUE OF EMBRYOLOGY.

BY CHARLES S. MINOT, M.D.,

Professor of Embryology, Harvard Medical School, Boston.

Mr. President and Gentlemen—It has been said that the noblest study of man is man. There are many who believe it; but we who are gathered here to-day remember the purpose of our gathering, and know that the noble study of man is but a part, and that not even the greater part, of the nobler and vaster science of biology, the new birth among you and fair hopes of which we celebrate. Much has been told you by the able and distinguished savants who have preceded me of the stirring interests of biological science, and of the manifold bearings it has upon our thoughts, our philosophy, and also upon the practical exigencies of our daily life. But were I to tell you, even in mere catalogue form, of the manifold ways they have left unmentioned in which biology touches upon our affairs, I should occupy a far longer stretch

of time than even your Canadian courtesy would have the patience to endure.

I must, therefore, select some small portion, and of that speak briefly. I choose, as is common wisdom, from that part of the extensive domain of biology with which I am best acquainted through my own studies. I ask you to permit me to address you a few words concerning the use of the microscope and the value of embryology.

The first microscopes, such as those used by Malpighi, were curiously simple—a small piece of wood with an upright at each end; in each upright, a hole; in one hole the lens was fastened, in the other the preparation; a separate microscope for every preparation. These simple instruments were sent about—many of you have doubtless seen them—and entertained court ladies and others who cared for the newest curiosity. The modern microscope is a creation of this century, and began its development with the invention of achromatic lenses by Amici. Since his time the construction of the compound microscope has made great advances, not only in the build of the stands, but more especially in the lenses. We have only to note the introduction of water immersion; later, of oil immersion, objectives; and the recent invention of the wonderful apochromatic lenses, by which the capacity of the microscope is, I am tempted to say, almost doubled.

The reason why the microscope—why improvements in it are so important to the biologist is, that the size of the elements with which he has to deal is different from that in other departments of science. It is only in the organic world that the explorer finds the microscopic structure to be his most important guide. It is true that the microscope is of great utility in other departments of science. I do not overlook its applications in physics. I do not forget what it can reveal to the retrographer examining rock sections; but still I assert that it is only in biology that the microscope is the supreme instrument of research. Now, the proper use of this precious implement is an art difficult to acquire, but invaluable to the biological possessor of it. It demands not only an acquaintance with the elaborate methods of preparing the tissues, hardening, sectioning, staining, and so forth, but also the acquisition of a peculiar experience of the eye, and habit of the hand, which can be gained only by industrious and well-directed practice, and, besides all this, it demands the cultivation of the geometrical faculty of the mind. With the microscope we can see only one plane, and we have to build up our plastic conception by combining the views we get in various planes into a mental image corresponding with the actual structure, somewhat as the mechanical engineer makes out the form of a machine from the elevation and plan. This mental process is much harder to carry out than one might believe who had had no experience in trying to drill students into the habit of it. In this building there is, to an unusual degree, provision made for microscopical work, as I see by the broad windows open to the best light, and by the general laboratory arrangements. In all this, I believe we have to acknowledge the wisdom of Prof. Ramsay Wright. I congratulate you in having at the head of your biological department one who thus recognizes the real needs of the student, and makes good provision to satisfy them. You all know the immense usefulness of the microscope, not only in medical science, but also in medical practice, as a clinical resource. The time is near when every physician will know, as a matter of course, how to use the microscope in his professional work. What your students learn in this building will tell through years to come.

The field of biology known as embryology has great significance both to the pure investigator and to the practical medical man. It explains structure. As we follow back an organism to earlier and yet earlier stages, we see what is secondary disappear, and what is essential remain, and it is from the embryo that we have the fundamental plan of the body. He, therefore, who wishes his anatomy to be something better than a stupid system of mnemonics, must betake himself to embryology to obtain an intelligent comprehension of the body. Again come the practical applications. Let me instance a few. The so-called germ-layers govern the pathological changes; each of the three layers of the embryo has its specific morbid anatomy, and, with certain limitations, we may say that a disease proper to one germ-layer does not trespass upon the tissues belonging to the others. The laws of reproduction, too, it is

indispensable for the physician to know; these we must study in a broad way, and, in fact, the laws of reproduction have been discovered for the most part, not from the study of man, but of the lower animals. We can hardly exaggerate the necessity of the physician's knowing the structure of the uterus and its functional changes. Concerning the uterus we have, in deed, much to learn still. It is only recently that we have discovered that pregnancy induces an extensive destruction of maternal tissue, the mucous lining of the uterus undergoing degenerative changes such as we have been accustomed to think of as exclusively pathological. In a short time the epithelium of the pregnant uterus is destroyed and the glands break down. These appearances have been noted in the so-called uterine moulds, and have been usually considered as evidence of disease, but we now know that they are normal appearances of pregnancy. So with the canalized fibrine of the chorion of the ovum: that, too, is a normal condition of pregnancy. In these instances we have microscopic pictures which we have hitherto associated with the presence of disease, but which are really healthy growths. May we not expect that embryological research, in elucidating these changes, will lend a helping hand to her sister, pathology, who always has, and always must lag a little behind the knowledge of normal structure? To the physician embryology has to offer the key to many malformations of harelip, cleft palate, a foramen between the cardiac ventricles, congenital umbilical hernia, hermaphroditism and pseudohermaphroditism, and a long array of other arrests of development. Indeed, embryology ought to form a part of every medical curriculum, and I am glad that you include it in your plan. May our colleges in the States imitate your example!

Embryology requires to be studied broadly, and by the comparative method. Only by so doing can a just estimate of the facts be secured. Confine your studies to the development of man, and you will never understand it. Give the mind range and opportunity, and it will soon pick out by comparisons drawn between various species that which is essential and significant. It is from such studies that we have been brought lately to deep problems. We see now in the course of development that the early embryonic cells have a large nucleus with very little protoplasm, and that the older cells show a great increase in the amount of protoplasm in proportion to the nucleus. You are all familiar with the famous apothegm which designates protoplasm as the physical basis of life, but in the light of what I have just said, it might be as well defined as the physical basis of advancing decrepitude. Again, we observe that it is only in the simpler tissues that there is much possibility of growth. As the tissues become more highly differentiated, they lose their power of growth. You all know that the cells of the spleen, of the skin, and of other simple tissues, multiply in the adult, but in the highly specialized nervous system we never find any cell divisions. Now this loss of reproductive power, coincident with specialization of structure, may prove to be but the beginning of that final loss we call death. If this be true, then death is a penalty we pay for having a high organization. We pass beyond the present bounds of science, but hope and hypothesis ever lead us, and who dares to say where the bounds of discovery are set in biology? Is not this very building a monumental assertion that we have not reached them yet?

The reason why I allude to these things is largely a personal one. Prof. Wright I have known for many years, and I have often had occasion to wish for his counsel or for his advice, because I have always found that he is one of those minds which naturally take themselves to the consideration of the larger problems of biology. These general questions and these complications of knowledge, which lead us to meditate upon the farthest reaching problems, will receive at his hand a larger share of consideration than they would get from many others of the biologists of the world. I congratulate you all most heartily upon the possession of this beautiful building. We have in the United States, unfortunately, scarcely any building equal to this; none, I think, superior to it for the purpose for which it is designed. Even my own University of Harvard, one of the richest and oldest in the States, has not anything I would call better than this. I thank you all for your most hospitable welcome. I had the pleasure of being here some ten years in the official capacity of examiner. I notice there is a certain

difference between that time and now. I was then not welcomed with the applause which you have generously given me to-day.

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TORONTO, JANUARY 16, 1890.

THE NEW HOSPITAL IN TORONTO.

Senator Macdonald has long been recognized as one of the most noble, worthy and generous citizens of Toronto. To those who knew him best it was not a matter of surprise that he, who had ever shown a willingness to spend time and money to assist all worthy objects of charity, should have given the magnificent sum of $40,000 for the improvement of hospital accommodation in Toronto. This is only one among his many generous acts during his prosperous and honorable career, but we believe it is the most important one of his life. There is every indication that there will be a most generous response on the part of the public, and, as a consequence, there will arise in the near future a noble pile of buildings, which will together be known as the "Park Hospital of Toronto," which, to use the words of the trustees, "will prove through long generations a blessing to our people." All honor to one whom we are proud to own as a citizen amongst us! May he be spared many years to witness the results of the great work he has accomplished in the inauguration of such an institution.

The objects are two-fold: 1st, to furnish increased hospital accommodation for the benefit of those suffering from serious accidents or diseases. It is definitely understood, however, that no persons suffering from infectious or contagious diseases will be admitted. 2nd, To aid the cause of medical science. This consideration will be highly appreciated by both the general and professional public. It is becoming generally understood that it is highly important that no man shall receive a license to practice medicine in this Province until he has received a thoroughly practical training. Notwithstanding all that may be justly said in favor of laboratory work, especially in the primary subjects, there can be no doubt that the all important duty of the student is to train his senses, his observing powers, his staying qualities, his nerve, patience, presence of mind, together with all the reasoning faculties with which God has endowed him, in his course of clinical instruction. Do patients object to being made subjects for clinical teaching? No! they do not if treated with the consideration they deserve. On the contrary they are wise enough to see that this very system furnishes to them a guarantee that their condition will be thoroughly investigated and properly treated.

PROVINCIAL MEDICAL BOARDS.

The College of Physicians and Surgeons of Ontario is one of the best abused medical boards in the world. McGill, through Dr. MacDonnell, says "it imposes upon our students certain very vexatious regulations, and exacts of them pecuniary taxes wholly out of proportion to the benefits they may ever expect to derive from becoming licentiates"; and, among other adverse comments, adds that one of its objects is "to render it more and more inconvenient and uncomfortable for an Ontario student to seek his education out of his own Province." As we understand the question these words contain an insinuation that is neither just nor generous. They imply that our Medical Council is endeavoring by its "vexatious regulations" to prevent Ontario students from going to McGill; but as the regulations referred to apply to medical colleges in this Province as well as in Quebec, and as McGill is placed in the same position in relation to our Council as our own colleges, we think the imputation is quite unfair.

Dr. MacDonnell evidently thinks that our Medical Board is an expensive, vexatious, and useless concern which ought speedily to be wiped out of existence. Dr. Osler, of Johns Hopkins, is of a different opinion, as shown by his letter published in the *Montreal Medical*

Journal. In this letter he clearly expresses the belief that the present high standard of medical education in Ontario and Quebec is largely due to the uniformity in the qualification to practice —"a uniformity which the public has a right to expect, but which it certainly cannot obtain from irresponsible medical schools." We agree with Dr. Osler, and we feel certain, notwithstanding all that may be said to the contrary, that the system of granting licenses through a central examining board, which at present obtains in Ontario, is the best in the world.

We do not claim, however, that our Medical Council has yet reached perfection. Far from it! Its requirements are in many respects sadly out of touch with modern ideas of medical education. Many of the worst defects were ably criticised by Dr. MacDonnell in his recent address. The didactic lecture nuisance is becoming intolerable to students who wish to devote a large portion of their time to practical work in laboratories, dissecting rooms, and hospitals. The profession is commencing to appreciate this and will, we hope, before long proceed to abate the nuisance. Who will oppose the much needed reform? We fear the most sturdy opponents will appear among the representatives of some of our Medical Colleges. To many, who run medical schools on strictly business principles, there is a great charm in the double didactic method with a merely theoretical, written graduating examination. It is simple, easy and cheap. Our Provincial Medical Board has shown its non-appreciation of such considerations by making its examination eminently practical. We have no idea that it will stop at this step. We have no doubt that it will soon get on the right track, and make all its requirements fully accord with the views of the best of our advanced medical teachers in various parts of the world.

NOTES.

IN our explanations in last issue made with reference to the editors of the journal, we should have stated that Dr. Graham was compelled some time ago to give up his active work in connection with our editorial department because he had not sufficient time to attend to it. He allowed his name to remain for a time, and it was retained longer than he intended.

MEDICAL COUNCIL ELECTIONS.—Our readers will perceive by an advertisement that the elections for the Medical Council of Ontario will be held in March. Those presenting themselves as candidates for election are required to send in their nomination papers signed by at least twenty registered practitioners not later than 2 P.M. on the first Tuesday of March. Voting papers will be sent to those entitled to vote between the first and second Tuesday in March. The returning officers shall receive the votes sent to them up to the last Tuesday in March.

SIZE OF AMERICANS AND ENGLISHMEN.—Some time ago it appeared from statistics that the heads of Americans and Englishmen were growing larger. Quite recently (according to the *Medical Record*), Mr. Edward Atkinson has collected statistics which show that the whole American, as well as his head, is growing bigger. It seems that the Yankee and the Southerner are somewhat similar in figure; and they both have comparatively long legs and small waists. In the West, we are told, the waists are proportionately larger and the legs shorter from "climatological and ethnological causes."

THE LITERATURE OF GYNÆCOLOGY.—Dr. Skene, of Brooklyn, says that during the last eight years the literature of gynæcology has been enriched by 807 books, and 7,505 journal articles and pamphlets, or,on an average, about 2 books and 18 articles a week. Gynæcology is an interesting subject to general practitioners, but many such, in this province at least, have not completed the whole series herein referred to, and would be quite pleased to have these able and zealous authors pause for a time, so that they might have some chance of catching up, or "getting abreast of the times," as the popular medical vernacular so sagely expresses it.

Personal.

Dr. Geo. M. Shaw, of Hamilton, is spending a few weeks at Johns Hopkins Hospital, Baltimore.

Hospital Reports.

FOREIGN BODY IN ŒSOPHAGUS—ŒSOPHAGOTOMY—RECOVERY.

UNDER THE CARE OF LACHLAN M'FARLANE, M.D., IN TORONTO GENERAL HOSPITAL.

F.L. æt 23, moulder.

The history of the case is as follows:—On November 30th, at nine o'clock in the morning, while at work, he somewhat hurriedly took a drink of water. Whilst swallowing the water a plate with an artificial tooth attached became dislodged from the roof of his mouth; the first intimation he had of the dislodgement of the plate was that immediately after swallowing the water he felt something sticking in his throat, and at the same time observed that the plate was no longer in the roof of his mouth. He went immediately to a doctor, who, with the assistance of another practitioner, passed an umbrella probang, but did not succeed in doing any good. Dr. McDonagh then saw the patient, he examined with the laryngoscope, but failed to discover anything abnormal; a probang with a bulbous extremity was then passed into the stomach, and during withdrawal, a foreign body was detected, at a certain point a grating sensation was felt. Located by measurement it was eight and a quarter inches from the upper incisor teeth, or two inches from the upper limit of the œsophagus.

Œsophageal forceps of various kinds were introduced into the gullet; during one of these attempts the foreign body was seized, but the patient grasped the doctor's hand and forced him to relinquish his hold; all subsequent efforts to seize the body with forceps were unsuccessful. Measurements with the bougie were again made with the same result as before. The patient was sent to the hospital on the afternoon of November 30th. The following morning at 11 o'clock he was put under the influence of chloroform, and another effort was made to seize the plate by means of forceps, but this was again unsuccessful. At 2 p.m., ¼ grain of morphia was administered hypodermically; the patient swallowed some chicken broth and milk. During the evening he vomited on two separate occasions, but from 10 p.m. until 4 a.m. he slept well. On the following morning, December 2nd, at 6 a.m., he again vomited and complained of pain and soreness in the chest. At 9 o'clock he had beef tea and again at 1 p.m. without subsequent vomiting. In the afternoon shortly after 2 o'clock, Dr. McFarlane performed the operation of œsophagotomy. The operation was therefore undertaken fifty-three hours after the patient had swallowed the plate.

The patient was placed under chloroform; an incision was made beginning half an inch above the sterno-clavicular articulation and carried upwards along the inner border of the sterno-mastoid muscle to a point a little above the middle of the thyroid cartilage. The incision was carried down between the trachea and the great vessels; the omo-hyoid, sterno-hyoid, and sterno-thyroid muscles were drawn inwards: the thyroid body was exposed and was also drawn inwards; the great vessels were drawn outwards and protected by means of a spatula. During this dissection a few medium-sized veins were cut and ligatured at the root of the neck. The wound was explored with the finger, and at the lower angle a foreign body was detected lying in the gullet, this was distinctly felt and was apparently fixed in position. A scalpel was introduced and an incision made into the œsophagus, cutting down upon the foreign body and by this means an opening was made a little more than an inch in length; the tooth was then felt projecting into the lower angle of the wound; this was seized and some traction made upon it, but the plate was not dislodged; the plate was then grasped by its superior margin and rotated on its antero-posterior axis, so that little by little it was rolled out from its position. The wound was then thoroughly irrigated with 1.2000 perchloride of mercury solution; the wound in the œsophagus was left open, it was not thought advisable to close it by suture. Several stitches were inserted so as to bring the edges of the skin wound into accurate contact, a small opening was left at the inferior angle to permit of the exit of a good sized drainage tube which was placed in position at the lower portion of the wound and was carried down to, but not through, the opening in the gullet. An antiseptic dressing was applied and the patient sent back to bed. The operation throughout was conducted with thorough antiseptic precautions.

He was very restless for some hours after the operation, the temperature rising to 101.8°; small pieces of ice were given him to suck. At midnight $\frac{1}{120}$ grain of atropia was administered hypodermically with the view of diminishing the flow of saliva and to thereby lessen his inclination to swallow. The patient had a good night.

During the next few days the patient's strength was sustained by means of nutritive enemata: occasionally he was allowed to suck a small piece of ice—his craving for something to drink was very distressing. The wound was dressed

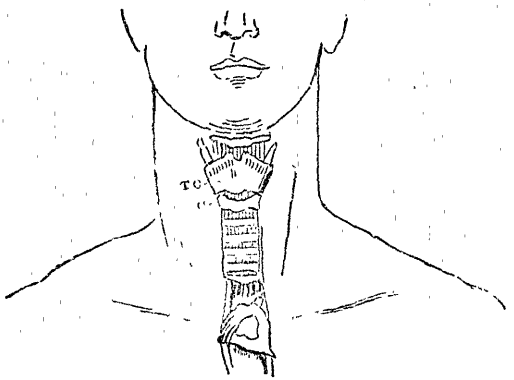

Fig. 1. The position which the foreign body occupied in the œsophagus is indicated. The cartilages of the larynx are outlined and a portion of the trachea represented. The œsophagus, at the point where the foreign body was lodged, lies immediately behind the trachea and slightly to the left of the middle line. The line to the left of the windpipe indicates the direction of the incision.

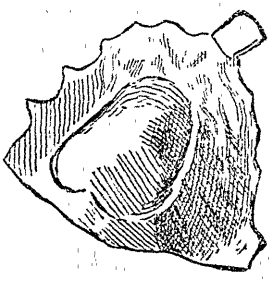

Fig. 2. Plate with attached tooth.

eight hours after the operation in consequence of discharge coming through the dressings; the discharge from the wound which at first was blood-stained serum became purulent and contained a considerable quantity of mucus, thus demanding pretty frequent dressing; from time to time the wound was washed out with boracic acid lotion. The hypodermic injection of $\frac{1}{120}$ grain of atropia was repeated every six hours. The temperature which fell to 99.4° the morning after the operation, continued normal during the subsequent progress of the case.

On December 7th, whilst dressing the wound, the patient was allowed to drink a small quantity of water out of a tumbler, the greater amount of water was forced out through the wound during the act of swallowing. This happened again on the 8th when he was allowed to take a sip or two of water, and at this dressing there appeared some tendency to bagging at the lower part of the neck, the lower angle of the wound was therefore more freely opened up and a good sized drainage tube inserted; efficient drainage was thus established.

December 9. The patient complained of dryness of the throat and irritation there, so that it was deemed advisable to stop the administration of atropia which had been continued up to this point. The patient was allowed to swallow half a pint of water, and of this about four teaspoonsful came out through the wound.

December 10. He drank a small quantity of milk, some of this also escaped through the drainage tube. The patient's strength was not being satisfactorily maintained and whiskey was added to the nutritive enemata.

December 12. Two divided oysters were swallowed with some milk, but more milk came through the wound than usual, although the oysters apparently passed on into the stomach; the nutritive enemata were stopped. During the evening he swallowed four divided oysters and some milk, the latter was partly passed on into the stomach but a considerable amount came out through the wound. On the following day he partook of custard, five divided oysters and ten ounces of milk; three pieces of oyster and a small quantity of custard and milk came through the wound. On December 14th, whilst syringing the wound a piece of oyster came away in the discharges. During the next few days the patient was fed upon custard, jelley, milk, and occasionally divided oysters, but there seemed to be no tendency for the opening in the œsophagus to close up; during each act of swallowing a considerable quantity was always forced through the wound, the patient constantly complained of hunger.

December 18. The administration of nutritive enemata was again commenced, and feeding by the mouth entirely stopped, this was continued for three days. On December 21st, five ounces of milk with one ounce of water were

swallowed, none came through the wound; the nutritive enemata were continued until Dec. 23rd. On that day he swallowed oyster soup, custard, jelly, and milk, all of which apparently passed on into the stomach; he continued to partake of this sort of food without any trouble arising. On Christmas Day he had porridge and milk for his breakfast, and on subsequent days was able to take semi-solid nourishment without mishap, the purulent discharge from the wound diminished daily.

On December 28th patient was discharged from the hospital, he had no inconvenience whatever in swallowing his food and the wound in the neck was almost completely cicatrized.

For notes of this case we are indebted to H. A. Turner, resident surgeon at the hospital.

Remarks:—Œsophagotomy was undoubtedly called for as the only means of obtaining relief for the patient. There was no difficulty encountered during the operation, there were no important structures divided, and the bleeding, which was insignificant, was easily controlled. It was not thought advisable to suture the opening in the œsophagus; the plate had been fifty-three hours in the gullet and was firmly impacted so that probably some extent of damage had been done to the œsophageal wall, and it was consequently thought safer to leave it open.

During the subsequent history of the case, the most noteworthy point is the way in which the act of swallowing could never be completed without forcing out the contents of the gullet into the wound. It was attempted at one time to pass a stomach tube and so to feed the patient; but he resented the attempt so strongly that the thing was abandoned as impossible. For a time he was allowed soft food by the mouth, the enemata being stopped, but invariably some of it came through the wound. On the fifteenth day after the operation the nutritive enemata were resumed and for three days he had absolutely nothing by the mouth; the wound gave no further trouble, and a complete cure resulted.

GENERAL TUBERCULOSIS—DEATH—POST-MORTEM.

UNDER CARE OF DR. NEVITT, IN HOSPITAL FOR SICK CHILDREN, TORONTO.

E. C. F., æt. 9, admitted into hospital July 16th, 1888, complaining of persistent pain in the head so severe as to prevent her from sleeping. Family history could not be obtained. Patient has had measles, mumps, and chicken pox.

History of present illness. — During past winter began to have pain in her head so severe that she could not sleep without medicine. Pain is in frontal and occipital regions, but especially over the left eye; the pain comes on every day at same time, viz., 6 a.m., lasting until 6 p.m., it then ceases but reappears toward midnight. For some time past there has been a discharge from the right ear. Dr. Palmer examined the ear three weeks ago, and said there was a perforation of the membrana tympani and sufficient pus within the ear to account for the pain. Her sister says that during the pain her eyes sometimes turned in.

Present condition. — Fairly well nourished; skin clear and pale, with veins prominent; expression that of one in constant pain; bright and intelligent. Since admission to the hospital her sleep has not been disturbed by the pain. The pain is now in the occiput, running down neck and spine on left side; pain in forehead is greatest over left frontal eminence. There is a tender spot over right frontal eminence. Pain on pressure behind right ear and in front of tragus, lymphatics at right angle of jaw and in left axilla, swollen and tender. Tenderness on pressure over spine; motor power, normal; reflexes, superficial and deep, normal; tactile sensibility, sensibility to pain and temperature, normal; special senses, normal save right ear, watch only being heard at 4½ inches. Vascular, respiratory, and digestive systems normal.

Treatment.—℞. Pot. bromid gr. ii., tr. calumbæ m. v., syr. simpl. ad. ʒi., t.i.d.

July 23. Less pain, although it persists in frontal and occipital regions.

July 27. Pain worse, fœtid discharge from the ear; boracic acid is to be blown into the ear.

Aug. 4. Ear still discharging; has ceased to complain of pain in the head.

Aug. 5. Temp. p.m., 101°F.; no perceptible cause.

Aug. 12. Evening temperature has been running up to 102°F., with morning remissions of two or more degrees; no pain; less discharge from the ear; tongue slightly pasty; pulse 120.

Aug. 13. No ear discharge to-day; quinine gr. ⅓ added to mixture.

Aug. 30. Dr. R. A. Reeve examined and found a perforation of the right membrana tympani in the process of healing; Politzer's bag does not improve the hearing. Ophthalmoscopic examination:

Right Eye.—Optic disc hazy, veins sinuous; slight papillitis.

Left Eye.—Optic neuritis more marked.

Sept. 14. Occipital pain every afternoon; chilly sensations; no discharge from ear.

Oct. 12. Temperature ranging around 103° F. every night.

Oct. 18. Somewhat worse; complains more of the pain in head; had a profuse attack of epistaxis, tenderness just below the ear, but not over mastoid process.

Oct. 27. To endeavour to relieve the pain in head she was given ℞. antipyrin grs. iii., to be repeated in half hour for three doses if needed.

Oct. 28. Antipyrin seems to afford some relief.

Nov. 9. Failing.

Nov. 19. Getting worse; greater discharge from ear, cervical glands swollen; right tonsil swollen.

Nov. 24. General hyperæsthesia; no enlarged abdominal glands; creaking heard in right chest.

Nov. 26. Chills and sweats at night; slight photophobia.

Nov. 28. Worse; epistaxis; tongue dry and coated; small crepitation in left lung.

Nov. 29. Dr. McPhedran examined patient; crepitation and slight dullness over left lung; spleen enlarged; photophobia marked; no paralysis.

Nov. 30. Last night she thought there was a bad smell around her bed; so fixed was this idea that she had to be moved to the other end of the ward in order to quiet her. At midnight she had a convulsion, which commenced with a scream. At the beginning of the fit her head turned to the right side. When Dr. Nevitt saw her there was opisthotonos, and right lateral deviation of both eyes. She was given an enema of bromide of potassium and chloral.

Dec. 1. Pupils dilated; no response to light; right lateral deviation of eyes; Cheyne Stokes respiration; difficulty in swallowing, but no other sign of paralysis. Unconscious ever since convulsion. Coma deepens until death this p.m.

POST MORTEM EXAMINATION.

Inspection.—Female; complexion dark; emaciated; rigor mortis well marked; P. M. staining in usual places; skin over lower part of abdomen and upper part of thighs particularly dark; in external meatus of right ear a crust of yellowish white material found; teeth and lips covered with sticky half dried mucus; on inner side of left index finger cuticle is gone for ¾ inch.

Section.—Heart; pericardium extremely thin, contains about ℥ii. of fluid; right auricle distended with blood; size of heart normal; thrombus attached to left border of right ventricle at junction of anterior wall with interventricular septum, attached also to anterior wall of ventricle, one inch in breadth; from this a clot, partly A.M. partly P.M., extends into pulmonary artery. In left ventricle a thrombus, extending from apex to mitral valves, attached to both and reaching into the aorta. Valves all normal. Foramen ovale closed. Interventricular, undefended space, extremely thin at two points.

Lungs.—Front and free borders very pale and anæmic.

Left Lung.—No adhesions to parietes, a few delicate adhesions between the lobes. Outer and upper part of lower lobe shows a triangular area of collapse. In the base of this triangle is an abscess cavity, containing a quantity of curdy pus and cheesy matter. This abscess opens into a branch of main-bronchus about one inch from root of lung. At root of lung, and lying upon main-bronchus is a caseous lmyphatic gland. Other bronchial glands, indurated. Section of upper lobe, shows it to be thickly studded with miliary grey tubercles. None seen in lower lobe. Slight emphysema around the free border, especially of upper lobe.

Right Lung.—Splenization in greater part of the lower lobe, and outer and back part of upper; remainder very anaemic, muco-purulent matter flows from bronchi on section; whole lung studded with grey miliary tubercle.

Kidneys:—Right, size normal, capsule peels off readily. Healthy, save in a spot where there is a small abscess size of a split pea.

Left, same condition as right, only two small abscesses found.

Spleen:—Slightly enlarged. Indurated glands at hilus.

Duodenum and Stomach:—Bile ducts, pancreatic ducts pervious. Stomach contains blackish green fluid. Walls pale and coated with mucus.

Liver:—Capsule adherent to diaphragm in a few spots. In these parts of the capsule are seen numerous grey milliary tubercles. The liver has the general appearance termed nutmeg, and a few tubercles are to be seen in its substance, especially towards the surface.

Large Intestines:—A small date-stone shaped mass of fecal matter found in vermiform appendix. Extensive ulceration of caput coli and part of v. appendix. Ulceration has honey combed appearance. Very extensive ulceration of mucous membrane, patches reaching to within six inches of the anus.

Small Intestine:—Numerous small ulcers in mucous membrane of lower part of ileum; typical tubercular ulcers.

Pancreas. Normal.

Brain:—Ante mortem clot in longitudinal sinus. Great amount of serous fluid in subarachnoid space. Meninges over vertex, congested. Some small gray points were seen in the pia in front of Pacchionian bodies, possibly tubercles. Miliary tubercles distinct at commencement of left sylvian fissure and following vessels a short distance. A few also in right fissure very little exudation at the base. Brain substance throughout firm and shows puncta cruenta very well marked. A minute cyst large enough to contain a linseed grain found in right natis. Scattered through the cerebellum are numerous yellow firm masses, both deeply placed and superficial. These on microscopic examination proved to be masses of tubercle.

Obituary.

HUGH MUNRO MACKAY.

We have to announce, with deep regret, the death of Dr. H. M. Mackay, of Woodstock, January 17th. He had been much overworked during the fall and early winter, and, as a consequence, had become much reduced physically. While in this weak state he was unfortunately attacked with pneumonia, and died after a comparatively short illness. He graduated in the University of Victoria College in 1867, and in the following year passed the double qualification examination in Edinburgh. He has long been recognized as one of the leading practitioners of Western Ontario, and three years ago was appointed a member of the Provincial Board of Health. Personally he was a most estimable man whom no one could know without highly respecting. It is a sad blow to the Provincial Health Board, as well as to the Province, to lose, within a few weeks, two such able and worthy men as Drs. Yeomans and Mackay.

Books and Pamphlets Received.

Personal Observations of Leprosy in Mexico and the Sandwich Islands. By Prince A. Morrow, A.M., M.D.

Case of Tuberculosis Papillomatosa Cutis. With Remarks on the Relation of Papilloma to Syphilis, Lupus, etc. By Prince A. Morrow, A.M., M.D.

Miscellaneous.

The Government of Victoria is about to establish a retreat for inebriates.

STATISTICS OF LEPROSY IN THE UNITED STATES.—In view of the general impression that Leprosy is spreading in this country, it is desirable, in the interest of the Public Health, to obtain accurate information upon this point. The undersigned is engaged in collecting statistics of all cases of Leprosy in the United States, and he would ask members of the profession to aid in this work by sending a report of any case or cases under their observation, or coming within their knowledge. Please give location, age, sex, and nationality of the patient, and the form of the disease—Tubercular or Anæsthetic; also any facts bearing upon the question of contagion and heredity. Address Dr. Prince A. Morrow, *Journal of Cutaneous and Genito-Urinary Diseases*. 66 West 40th Street, New York.