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NOTES ON THE DIAGNOSTIC VALUE OF BLOOD EXAMINATIONS.*

BY

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Never since blood examinations have constituted a routine practice in the diagnosis of disease has so much detailed work been done in the subject as during the past few years, and yet never has so much doubt been cast upon its value and significance. The subject has interested physicians and surgeons alike in the matter of diagnosis, prognosis and treatment; to both it has often been of the greatest value, while, at times, too, it has proved most disappointing and unreliable. The journals which have of late been so replete with discussions on laboratory methods have considered more especially the value of blood examination with a desire to answer satisfactorily the following questions:—

1st. Is a blood examination at all of use for diagnosis in medical or surgical conditions?

2nd. If such be the case, is not the mere estimation of the numbers of red and white cells and the amount of hæmoglobin quite sufficient for all practical purposes? In other words do we really require stained and other preparations of blood to assist us in the diagnosis? And,

3rd. Can the surgeon rely on blood examination for diagnosis and prognosis, for indications when to operate or when to refrain.

Concerning the first of these questions, as to whether or not any diagnostic value can be attached to blood examination, the scepticism is of course absurd and not even well founded. The basis of the claim however, rests on the fact that apart from a few parasitic diseases very

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few maladies can be absolutely diagnosed from examination of the blood alone. That is to say, without seeing the patient and judging from the general condition, signs and symptoms, one would scarcely be justified in making a diagnosis from the blood alone even if the so-called "blood diseases" like chlorosis, pernicious anæmia even leuchæmia. For, after all, to diagnose the condition of chlorosis is merely to detect a symptom common to very many various diseases. In the generally accepted meaning of the term it implies a diminution of the hæmoglobin in each corpuscle, the cells themselves remaining but little altered in numbers and it matters not whether the cause be constipation, general debility, nephritis, lues or pulmonary tuberculosis. To rely upon a blood examination of this nature as a proof of mere chlorosis is to deceive oneself as to the underlying cause and very possibly to neglect some important organic disease. Without a physical examination of the various organs of the body we are utterly unable to exclude the serious organic diseases which induce a chlorotic condition of the blood.

It is further in all probability true, that even *pernicious anæmia* itself is merely a symptom, the blood being gravely disturbed from some underlying causative disease, be it a gastro-intestinal infection or some form of intoxication. Although one special set of changes is often found in the blood in this disease, yet, the variations from the type are so wide and numerous that one can scarcely speak of its having a pathognomonic blood state. This is all the more true when one remembers that with the invasion of certain forms of animal parasites into the body, as also in certain forms of carcinoma one may obtain a condition of the blood exactly like that seen in well recognizable cases of pernicious anæmia.

In a classical case of pernicious anæmia for example, we look for a certain type of blood whose main features are, a great diminution in the red cells, which though greatly altered in shape and size, show many large ovoid forms of good color. There is a diminution of the hæmoglobin, though relatively not so great as is the corpuscular decrease hence the richer color of the cells (or in other words a high color index); lastly, one may expect to find many nucleated red cells and especially megaloblasts. Examining, however, the findings of most authorities, we learn that after all there is no necessity of having this pathognomonic condition of the blood in all cases. In fact, in a large proportion they do *not* all exist, except perhaps at a very late stage of the disease when the other features have already given evidence of the nature of the malady. In the interesting series of Dr. Billings, for example, we find in twenty cases, variations in the red

blood counts of from 156,000 to 4,000,000, in one-fifth of the cases there was no high color index, in fact that in twelve of them the index was either constantly low, or low at some time or other during the malady. Furthermore, nucleated red cells were often absent during the course of the disease and frequently even when present, they were found only after a prolonged search and in very small numbers. Again, it was ascertained from this series that the megaloblasts which are regarded by many as a very important feature of the blood diagnosis, came most often only in the advanced stage of the disease. In his long series of examinations which have been tabulated, we note this interesting fact, that in the early stages of the disease they are certainly remarkably scarce, and that where they were numerous the disease was already far advanced and had shortly afterwards become fatal. Now the diagnostic significance, to be of value, should demonstrate the fact at the early stages of the disease when we are yet doubtful as to the differential diagnosis between pernicious anæmia and a possible latent gastric carcinoma. We are, therefore, confronted with a serious disadvantage, all the more so when we learn that some regard the presence of megaloblasts in carcinoma, if not as a frequent occurrence, at all events as not a very great rarity.

The limitations for diagnosis are quite as noteworthy in regard to the color index. We have already mentioned Dr. Billings' experience in this respect and the observations of Cabot on 110 cases bear this out. In thirty-one of his series there was no relative increase in the haemoglobin. So too, has been our own experience in the cases admitted to the Royal Victoria Hospital. In twenty-four cases which were undoubted, (the diagnosis having been verified either by the subsequent course of the malady or by autopsy), the color index was plus in only six, distinctly low in five, there was a normal ratio in five, and in the remaining eight the index was at some time during the course of the disease increased, at other times diminished.

Our cases have also shown, as did the series of Billings and Cabot, that the blood count may vary very much during the course of the disease, that while often the count was below two million red cells, frequently it would attain to nearly the normal, though in the majority of cases, the number was below two million. An average of all the cases, male and female, gave to the red cells a percentage of 34.4.

Realizing then the remissions with non-characteristic blood counts, the rarity of the classical, typical signs in the early stages, when the differential diagnosis is so important, as also that other diseases may have often a blood state resembling that of the early stages of pernicious anæmia, we must acknowledge certain limitations in the significance of the blood findings though this need not detract from the value of the

examination in the hope of finding the more typical form. That the limitation should be thoroughly recognized is important too for a special reason, inasmuch as if one relies too much on the value of the blood examination he will be apt to discard the diagnosis of pernicious anæmia made from the general signs, for the insufficient reason that the blood state was not typical of the disease.

Nor is it too extreme to say that even in leuchæmia the blood examination alone is insufficient for a diagnosis without regard for the other clinical signs. While the pathognomonic condition of the blood in this disease should be certainly recognized, one *does* nevertheless see or read of instances where in non-leuchæmic patients the blood resembled that disease. In order to be pathognomonic, the blood state (characterized as it is by very great increase of the mononuclear leucocytes), should not be found in any other disease. Nevertheless, Palma has found a similar condition of the blood in a case of sarcoma, Cabot, in certain cases of pertussis, in one of which there were mononuclear leucocytes varying in number from 103,000 to 185,000, instead of the normal six or eight thousand. We know further, that not infrequently there are periods of remission of the disease where the blood for a greater or less length of time returns to the normal, presenting no features whatever to aid us in the diagnosis. So rare, however, do cases such as these of Palma and Cabot occur that when the typical picture does present, one may be practically certain of the diagnosis, though the limitation as just explained leaves no doubt that the blood findings afford merely a confirmatory evidence in the diagnosis.

Perhaps, however, the best answer to the question so frequently raised of late as to whether or not a blood examination is ever necessary, may be answered by the following citation of a case:—

A patient, J. C., æt. 68, was admitted to the private wards of the Royal Victoria Hospital, complaining of chills and fever which had been present off and on for some weeks previous to his admission. There was no regularity in the occurrence of these symptoms but the patient instead of improving, became rapidly worse, inasmuch as great prostration supervened, repeated vomiting, and pains in the limbs. There was nothing in his personal history of any importance. With the exception of a history of an empyema necessitatis 40 years previously, he had been a healthy man and temperate in his habits. There was no history of malaria or of residence in a malarial district.

On Admission.—The only evidence of disease that could be found at first was some anæmia, weakness, occasional vomiting, some emphysema and old pleurisy, and a chondroma of the left testicle. The urine was normal. The retina showed no evidence of disease, and the glands

were normal throughout, and in fact until the examination of the blood on the following day, no satisfactory diagnosis could be made. The very first examination of the blood in the fresh state, however, revealed an enormous increase of the leucocytes, these being almost equal in number to the red cells. The diagnosis of Myelogenous Leuchæmia was made on the basis of this examination and subsequently confirmed by stained preparations. Examinations of the blood showed for the following week a red blood count of between three and four million, a white blood count averaging about a hundred thousand, (in which the differential count showed by far the large majority to consist of myelocytes) and the hæmoglobin varied between 60 and 70 per cent. Soon after, the patient who had constantly had slight fever of an irregular and mostly intermittent type, became rather weaker, the blood count varied rapidly and within 24 hours the white cells decreased in number within a few days to almost normal. Progressive asthenia and coma developed and four weeks after admission he died. The blood count remaining normal to the end.

At the autopsy which was performed by Dr. Adami, the diagnosis of myelogenous leuchæmia was confirmed, the spleen and glands were found normal; the bone marrow, however, was characteristic of the disease.

The necessity of a blood examination was here self-evident, there being no signs or symptoms otherwise upon which one could base a diagnosis.

That the counting of the blood cells and the estimation of the hæmoglobin are sufficient for all practical purposes of diagnosis, is I think, generally admitted. I would go even further and say that in the majority of cases one can obtain *sufficient information from the microscopical examination with ordinary slide and coverglass of a freshly removed specimen of blood.* One can thereby gain a very fairly accurate idea of the leucocyte count, of its relation to the red cells, of the shape, size and arrangement of the latter, and when present, he can see the nuclei in their bodies. One may obtain in addition thereby an approximate conception of the amount of hæmoglobin from the coloration of the cells. Having this information, even if it be only approximate, we are in possession of whatever facts we need for ordinary differential diagnosis. I would not be misunderstood, however, to lack in my respect for the instruments now in vogue and from which one always derives greater satisfaction, but that they are not *usually* needed to make our diagnoses, will, I think, be acknowledged by most of those who have studied along these lines.

It is a comparatively easy matter to tell whether or not a very

marked leucocytosis be present, should such be the case the condition is likely to be either leuchæmia, sarcoma, pneumonia, pertussis or sepsis, and between these various diseases, it is not often that a differential diagnosis would be called for inasmuch as the general signs and symptoms would declare the nature of the malady. Even in those rare conditions in which one is called upon to differentiate between general sepsis and acute lymphatic leuchæmia, a rapid glance at the fresh blood specimen will usually tell from the degree of leucocytosis as to which malady is present.

From such a simple examination too, it is quite easy to gather whether or not an anæmia, if present, be mild or severe; if, in other words, it be an ordinary, simple secondary anæmia, or approaching that of the pernicious type, nearly as much at all events as one can gather with any great satisfaction from the use of instruments. The arrangement of the corpuscles to each other, their color, size and shape, and their nuclei if present, will greatly help in the diagnosis, at all events will support sufficiently what an examination of the patient's general condition has rendered suspicious.

Without instruments then it is possible to obtain a considerable degree of satisfaction in diagnosis. With their help on the other hand we can gain more accurate estimates to complete the diagnosis.

Having done thus much for our diagnosis, the question arises, to what degree is a further examination of the blood necessary, and do stained preparations of the blood afford really a very practical aid in the detection of the disease. In other words, is a so-called *differential count* of the leucocytes of very great interest and importance. That it is interesting, of course, goes without saying; for practical purposes, however, we are called upon to decide mainly between leuchæmia, with its mononuclear leucocytosis and those diseases in which a marked leucocytosis due to polynuclear cells is present. As already remarked, the degree of leucocytosis in the two conditions is usually so different as to render it unnecessary to make further examination and only in a few rare instances of doubt can it be of any importance. It must be confessed that in slight leucocytosis our own experience with differential counts has afforded us but little satisfaction.

Apart from these, however, there is a very large series of maladies in with a slight or moderate leucocytosis is present (about 20,000), and we are called upon to employ a knowledge of this fact for diagnosis. It must be admitted, however, that these leucocytoses occur under most varying circumstances, the list being far too long to enumerate here.

Incidentally it may be said that it occurs in most inflammations, sometimes being present, however, and sometimes absent, the amount

depending upon the resistance of the individual and its relation to the degree of infection. Where there is a severe infection with little resistance there is no leucocytosis and vice versa. Then, too, more or less marked leucocytoses are present in uric acid diathesis, in chronic nephritis, (which is present in most elderly overworked people), after the use of phenacetin, after excitement or exercise or massage, or cold baths and after food ; this so-called digestive leucocytosis is not, however, always present, for what reason it is unknown. In face then of such a list it may well be asked what significance is to be placed on a moderate leucocytosis. It is true that by its means we are aided in distinguishing between abdominal inflammation and hysteria or between appendicitis and neuroses, but where a leucocytosis can occur so easily we must exclude all the many extra causes—a task not always easy. At all events we know in this connection that for reason of this variation we cannot employ the absence of a digestive leucocytosis to confirm a diagnosis of gastric cancer, as some have considered possible.

Again in one case of nephritis in which the autopsy confirmed the diagnosis to the exclusion of any other disease, there was a leucocytosis of 30,000, of which the main increase was in the small and large lymphocytes, in repeated examinations. In another patient with general debility there was a leucocytosis of 20,000, which at the end of a fortnight disappeared as the patient regained his health and strength. In this case the leucocytosis was of the ordinary variety (polynuclear increase).

Considering then under what great variety of circumstances one may get a leucocytosis and considering too the many latent conditions which would have to be excluded before we attach any diagnostic importance to the presence of some increased leucocytes in the blood, we are bound to acknowledge that the diagnostic value of this condition suffers in consequence. That lymphocytosis, too, is of some value in the diagnosis of pertussis may be true, to most practitioners the satisfaction would be greater were it possible to tell thereby when the disease had come to an end !

In attempting to form a rational conclusion as to the significance of slight leucocytosis we must be prepared to exclude many simple conditions, and we must be aware that no latent condition giving rise to leucocytosis is present. Thus our use of this means of diagnosis is limited, inasmuch as in those cases where it might be expected to signify some pathological condition, the increased cells may be due to something else.

It is just with reference, too, to this point that *surgery* loses so much the expected aid from blood examinations, and it is not to be wondered

at that Dr. Deaver and other eminent surgeons fail to appreciate the value of blood diagnosis from the present state of our knowledge.

It is mainly perhaps in appendicitis, typhoidal perforations, and obscure pus formations that the hæmatologist claims to give aid to the surgeon. Let us see to what extent this is true. In appendicitis, the attacks are accompanied at all stages by varying white blood counts, abscesses may form without an increase of cells, or, *per contra*, one may obtain from a simple catarrhal inflammation, that later subsides, a marked leucocytosis (say 18,000), and lead the credulous surgeon astray. Dr. Deaver records one case of interest which will, I think, help to give us a clue to our means of benefiting such patients. An individual was admitted to his care with signs of appendicitis and the leucocyte count showed 20,000 cells. Operation was delayed for the nonce and subsequent examinations revealed a gradually decreasing leucocytosis down to the normal. Naturally it was concluded that pus was absent, but from other suspicious signs the abdomen was opened and a gangrenous appendix with local suppuration found. So far as I have found personally, or otherwise learned, a leucocytosis of over 20,000 has not been found in non-suppurative inflammations either of the appendix or of the pelvic organs, and for this reason Dr. Deaver's case might reasonably have been operated upon as early as this marked increase had been found. It should, I think, have strengthened his faith in the diagnostic value of great leucocytosis. The important point, however, is this, *viz.*, that the reverse rule does not hold good, and *one may readily get an absence of leucocytosis with extensive suppuration.* One should, therefore, not trust to a moderate leucocytosis as a basis for excluding the presence of pus if one would be rightly guided. In a case recently seen with Dr. Bell, the appendix was gangrenous and abscesses had formed in the liver, but the white cells numbered on an average only 15,000.

The same holds true for typhoid perforation, as was shown by Dr. C. K. Russel's interesting observations made at the Montreal General and Royal Victoria hospitals. In several instances the abdomen had been opened for symptoms of perforation with a leucocytosis of about 15,000 to 17,000, and nothing found. In other cases the white cells were less than normal, when perforation was in progress and had developed; but in no case where the leucocytes numbered more than 20,000, had the abdomen been opened without a perforation being present. Dr. Russell has added several others to his series, attesting the value of this feature, and it may, I think, reasonably be said that, to a surgeon, the value of a blood examination in this respect lies in the positive findings

of a marked leucocytosis of over 20,000, and in the disregard for any leucocytosis which is merely moderate.

Much has been written on the value of hæmoglobin estimation as a guide to surgeons in treating cases of hæmorrhage with shock, *e.g.*, gastric ulcer, and it has been thought possible in this way to prevent fatal collapse by finding from the blood that the patient's condition would not warrant the attempt. Experience of those who are competent to judge does not seem to bear this out, and surgeons, it would seem, are more justified in relying on their observations from the patient's general condition than from the percentage of hæmoglobin.

The notes as above given have purposely avoided any reference to the Widal test, the examination for malarial plasmodia and bacteriological examination of the blood, as being already more than sufficiently dealt with in current literature. It may, however, be incidentlly said that difficulties in successfully cultivating bacteria from the blood in cases of sepsis have doubtless been due in the past to the insufficient quantity of blood employed. The more recent observers, who have by venesection used several cubic centimetres of blood for cultures, have been enabled to obtain excellent and positive results, not only in streptococcus septicæmia, but likewise in general gonorrhœal infections, in pneumonia, and in typhoid fever.

THE TOXIC ACTION OF ANTISEPTICS.

BY

CHARLES G. L. WOLF.

Antiseptic technique consists essentially in bringing micro-organisms in contact with a solution, usually aqueous, and containing a certain quantity of a metallic salt. This may be varied as in the case of phenol or boric acid, by the salt being replaced by a substance having acid properties. The use of other solvents, such as alcohol or acetone has for the most part been restricted to experimental work. In the exceptional case of formalin, the substance is neither acid nor alkaline, but is an aldehyde. Hydrogen peroxide and potassium permanganate act as oxidizing agents, and fall out of the class of antiseptics embraced by the salts of the heavy metals. It must also be noted that the time during which the organism is in contact with the solution is, on the whole, short. This applies more particularly to hand disinfection, and the flushing of suppurating wounds. In very rare instances, indeed, is it possible to bathe the infected surface for an extended length of time. For that reason, antiseptics are generally chosen for the rapidity with which they kill, rather than for their power of inhibiting the growth of micro-organisms.

Since the initial bringing together by van't Hoff (*Zeitsch. f. physikal. Chem. 1, 481,* [1887]), of facts which had accumulated regarding the properties of solutions, these have received an enormous amount of attention from physical chemists on all sides. The connection, however, between the antiseptic power, and the physical properties, has been given comparatively little attention by pathologists and the medical public generally. That such a connection exists, and intimately, it is the purpose of the following paper to show.

When sodium chloride dissolves in water, a clear homogeneous solution results which differs both from the original solid salt, and from the water in which it is dissolved. It conducts electricity. (Arrhenius, *Zeitsch. f. physikal. Chem., 1, 631,* [1887]). It differs markedly from a similar aqueous solution of substances such as cane or grape sugar in that these do not conduct the electric current. The difference in these solutions is also marked by other striking phenomena in connection with their freezing and boiling points, (Raoult, *Annales de Chim. et Phys.* (6), *VIII., 320*), and Beckmann (*Zeitsch. f. physikal Chem. IV., 543* [*1889*]), and their osmotic pressure (Pfeffer, Osmotische Untersuchungen, 1887), which cannot be more than mentioned here. This difference in the behaviour is due to the splitting up of the sodium chloride molecule into sodium and chlorine in the form of

ions. These atoms or atom-like particles are closely connected to one another, and do not exhibit the usual properties of the free elements except under special conditions. This peculiar form of separation is known as dissociation, and the ions differ from the elements in a free state in holding enormous electric charges. It is these charges which prevent the elements from behaving, when present as ions, as the free elements themselves do. The charges which the ions of sodium chloride hold are opposite and equal. The sodium is assumed to be positively charged, and the chlorine negatively. By reason of the equality of these charges the solution itself is electrically neutral.

In solutions of medium concentration some of the salt may not split up into ions, but may go into solution undissociated. With increasing dilution the amount of separation increases, and this holds good for all solutions which conduct electricity. Therefore, in a concentrated solution there may be comparatively little separation into ions, in medium concentration, a fair proportion of the ions and the undissociated salt, while at high dilution the salt may have dissociated to the extent of 90-100 per cent.

With the exception of the stronger acids, sulphuric, nitric and hydrochloric, the other acids dissociate incomparably less than their salts. A comparison of sodium chloride and an organic acid, such as cinnamic acid, shows that while the former is practically completely dissociated when its molecular weight in grams is dissoved in 1,000 litres of water, cinnamic acid has but 17.0 per cent. of its molecules split up into the corresponding ions.

Mercuric chloride is a typical example of an antiseptic which is used in aqueous solution, and at comparatively high dilution. The aqueous solutions of this salt used for antiseptic purposes range from 1-1000 to 1-10,000. In the former case the concentration is one molecular weight in 270 litres, while with the latter the concentration is one molecular weight in 2,700 litres. Both these dilutions fall in the range of high dilution, and it might be expected that a large percentage of the salt would be dissociated. This is the case, for at the strength of 1-1,000, mercuric chloride is well dissociated, while at 1-10,000 practically complete separation into ions has taken place.

Considering this to be so, the conclusion naturally follows that any effects experienced in the use of mercuric chloride must be due to the ions themselves, and not to the undissociated salt. As sodium chloride is ineffectual as an antiseptic although dissociated in aqueous solution, no antiseptic action can be ascribed to the chlorine ion.

Therefore the effect of the solution of mercuric chloride is due, necessarily, to the mercury ion, and any salt of mercury which for an equal dilution contains a less concentration of these ions must be less effective as an antiseptic. Any addition to the solution of mercuric chloride which tends to decrease the concentration of the mercuric ions will therefore diminish the toxicity of this salt.

Reasoning along this line Paul and Krönig (*Zeitsch f. phys. Chem., XXI., 428 [1896]*) investigated the action of different salts of mercury under varying conditions. The method pursued was to distribute evenly spores of bacillus anthracis, and streptococcus pyogenes aureus on garnets. These garnets were dried and immersed for a given length of time in the solutions to be tested, at the end of the immersion period the excess of mercury was precipitated, and the spores unattacked were sown in agar, grown and counted in Petri dishes. For a given concentration, the number of colonies fell rapidly according to the time of immersion in the antiseptic solution. This was to be expected. The experiments were therefore conducted so that the spores were immersed for equal length of time in the solution to be tested.

According to Bersch (*Zeitsch. f. phys. Chem., VII, 383 [1891]*), the salts of mercury for any given concentration dissociate in the following order:—

Mercuric chloride	$HgCl_2$
Mercuric bromide	$HgBr_2$
Mercuric sulphocyanide	$Hg(CNS)_2$
Mercuric iodide	HgI_2
Mercuric cyanide	$Hg(CN)_2$

That is to say, other things being equal, there are more mercury ions in a solution of mercuric chloride than in the bromide and so on. One should therefore expect that the antiseptic action of the solutions would range themselves in the same order. The following table shows the results obtained:—

Bacillus Anth. (Spores). Comparison $HgCl_2$ 16 litres 6 min. 6 col.

Solution.	20 min.	85 min.
$HgCl_2$ 64 litres	7 col.	0 col.
$HgBr_2$ 64 "	34 col.	0 col.
$Hg(CN)_2$ 16 "	∞	33 col.

From this table it will be seen that while in the 20 minute experiment an equal concentration of $HgBr_2$ was roughly 5 times less effective than $HgCl_2$, a solution of the cyanide 4 times as strong as the preceding two, the number of colonies for 20-minute immersion was so great as to be uncountable.

A similar result was obtained with Staphylococcus pyogenes aureus.

Solution.	3 min.
$HgCl_2$ 64 litres.	0 col.
$Hg(CN)_2$ 16 litres.	6700 col.

Mercuric cyanide stands alone among the simple salts of mercury owing to its feeble denociation.

In the case of silver, the salts and mixtures also range themselves, according to the concentration of the silver ions in the solution.

Bacillus Anth. (Spores). Comparison $HgCl_2$ 16 litres. 3 min. 32 col.

Solution.	15 min.	60 min.	525 min.
1. $AgNO_3$	28 col.	0 col.	0 col.
2. $AgClO_3$	39 "	0 "	0 "
3. $AgClO_4$	438	4	0
4. Ag_2SiF_6	840	194	0
5. $C_2H_5.SO_2OAg$	1187	450	0
6. $C_6H_4.OH.SO_2OAg$	1783	383	0
7. $AgNO_3 + 2.5\ NH_3$	∞	852	0
8. $AgNO_3 + 10.0\ NH_3$	∞	18.	0
9. $AgNO_3 + 1.5\ Na_2S_2O_3$	∞	4565	3627
10. $AgNO_3 + 2.0\ KCN$	∞	4395	3637
11. Argentamin	∞	....	4200

In reviewing this table it will be seen that the nitrate stands at the head of the list as an antiseptic, closely followed by the chlorate. As the anions become more complex the toxicity of the salt decreases. This is particularly the case with the silver ethylsulphate and silver hydroxy phenylsulphate.

It will be noticed that the toxicity suddenly falls on the addition of substances such as ammonia, sodium thiosulphate, and potassium cyanide to a solution of silver which previously has had full antiseptic power. It must also be remembered that all these reagents give a solution containing silver, and that the metal has not been removed from the solution as a precipitate.

Reasoning from the standpoint of physical chemistry, one would expect that this fall was due to the disappearance of ions of silver in the solution. Measurements of the electrical conductivity and other physical data show undoubtedly that on the addition of these salts to solutions of silver, complex salts are formed which are either dissociated with difficulty or that the silver dissociates in combination with something else, and is therefore not present as a free silver ion. A similar state of things with a somewhat different explanation is found in the case of mercuric chloride.

It is usual in order to increase the solubility of this salt to add a soluble chloride such as sodium or potassium chloride. Accordingly in such a solution there will be sodium chloride, mercuric chloride, sodium ions, mercury ions, and chlorine ions. It will be seen that for a given number of mercury ions previously in solution with an equiva-

lent number of chlorine ions there has been added a substance, sodium chloride, which also dissociates giving more chlorine ions. Hence, for the same number of mercury ions there is now an excess of chlorine ions in the solution. The effect of this will be in the language of the physical chemist towards a "forcing back of the dissociation." Fewer mercury ions will be found in the solution and therefore one will expect a loss in toxic power.

That this is the case will be seen in the following table:

Bacillus Ant. (Spores). Comparison $HgCl_2$ 16 litres, 8 col.

Solution.		6 min.
1. $HgCl_2$	16 litres	8
2. $HgCl_2$ + NaCl	"	32
3. " + 2NaCl	"	124
4. " + 3NaCl	"	282
5. " + 4NaCl	"	382
6. " + 4.6NaCl	"	410
7. " + 6NaCl	"	803
8. " + 10NaCl	"	1087

As will be seen a solution of mercuric chloride at this dilution is 130 times more effectual than the same solution to which has been added 10 equivalents of sodium chloride.

As Paul and Krönig remarked, this is of very practical importance. In the German pharmacopœia the officinal antiseptic tablet is made up with 4.6 equivalents of sodium chloride; with this amount of sodium chloride the toxic action of the solution is markedly decreased. This is less so in solutions of greater dilution owing to the relative increase in the dissociation, but even in a dilution of 256 litres, that is to say approximately 1-1,000, the difference is quite apparent.

It is therefore well in increasing the solubility of an antiseptic to take into account the possible effect of the reagent added on the general toxic properties of the resulting solution. It is beyond the limits of this article to take up the highly important results of Kahlenberg and True who worked with lupines, (*Botanical Gazette*, 22, 81 [1896]), of Dreser on the effect of mercury solutions on fish, frogs, yeast, (*Archiv. f. Exp. Path. u. Phar.* XXXII., 456, [1893]), of Clark on moulds (*Journal Phys. Chem.*, II., 263, [1899]), or of Paul and Sarwey (*Münch Med. Woch.*, XII. [1901]) on the disinfection of hands. It is sufficient to say that the statement made by Behring (*Zeit. f. Hygiene*, IX., 400 [1890]), that the disinfecting power of solutions of mercury was entirely due to the amount of soluble mercury in the solution has been entirely disproven.

Cornell University Medical College, Department of Chemistry, New York.

THE MECHANICAL TREATMENT OF HIP JOINT DISEASE.

BY

CHARLES OGILVY, M.D.,

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The diagnosis of hip joint disease having been made, the question of treatment immediately confronts us. We are called upon not only to relieve our patient from immediate suffering, but to direct our attention to the pathological condition present; to bring about by the application of scientific principles, that process of repair which will result in complete resolution of the diseased tissues to their normal or healthy condition.

Before we can scientifically treat hip joint disease we must first know the cause and course of the disease. The cause we most frequently trace to some traumatism. This sets up a local inflammatory condition. Then follows the invasion of the tubercle bacilli on these now inflamed tissues. There is a steady combat of the bacilli with the army of leucocytes supplied by nature to resist the onset of the invaders, and subsequently the final supremacy of the latter followed by the subjective and objective symptoms present.

Not until we have fully learned all the microscopic as well as the macroscopic changes taking place, can we expect to follow the disease to a successful issue.

Rest for inflammation and disease finds no exception here, and absolute fixation alone invariably gives relief. But when we consider that we have in the hip joint a diseased zone which is so prone to irritation from friction, owing to the proximity of the head of the bone to the acetabulum; then we have also to consider the best means of separating these surfaces and keeping them apart. By so doing we allow the process of repair to go on without constant irritation to the inflamed area which would be caused by the constant rubbing of the ball and socket joint. And thirdly, the joint must be protected from further injury. So that the three essentials are (1) immobilization, (2) extension, (3) protection.

We will now briefly consider the brace, splint or appliance which will best accomplish these ends.

Not infrequently do cases come to us in which, either from maltreatment or neglect, there is a greater or less amount of flexion at the

joint, and it is necessary to overcome this deformity in order that efficient extension may be obtained when the brace is applied.

If in this case there is a history of such deformity having been present for two or more years, an operation may be deemed necessary The patient is anæsthetized and the limb forcibly extended, tenotomies being performed where necessary; after which a plaster of paris spica is applied and allowed to remain on for some weeks, until a brace can be adjusted.

But a large majority of these cases can be straightened without operation and non-operative treatment should at least have a trial in all cases. When we consider the very grave liability of setting up an acute condition of the disease, which though smouldering at the time is readily fanned to a flame by the slightest traumatism, we can understand why it is that after forcible correction these cases may readily go on to abscess formation. Therefore should one always consider carefully before operating.

The non-operative treatment that I refer to is to put the patient to bed with extension applied. In applying extension for separation of the joint surface, it can be easily understood that the line of traction in order to get the best results, must be "in the direction of the axis of the neck of the femur." To obtain this we apply from 6 to 12 pounds of extension weight in line with the axis of the shaft of the femur, and from two to three pounds lateral traction at right angles to it. The resultant of these two forces thus applied is directly on the line of the axis of the neck of the bone.

Where the deformity of flexion is present as mentioned above, the extension made in the direction of the axis of the shaft is applied in line with the angle of deformity. This angle or deformity we gradually decrease by lowering the limb until the foot rests upon the bed and the limb is perfectly straight.

I have seen a contraction of eighteen months duration thus respond to treatment within four weeks.

Having overcome the deformity present, some urge us very strongly to continue the bed treatment, keeping the patient for months in bed with extension. But there are none of us who have carefully watched patients so confined, that have not noticed their gradual loss of vivacity and vitality, and have seen all degrees of anæmia develop, in a comparatively short time.

We have long since come to the conclusion that these cases must be kept up and out in the open air as much as possible.

Before discussing the hip brace, let me refer to what is frequently

resorted to in the treatment of these cases, viz., the plaster of paris spica. See Fig. 1. This may be applied as a temporary brace at any time when another brace is not available. It gives immobilization and protection to the joint, but little if any extension, and when the patient walks upon this spica, even when it has been most carefully applied, there is with every step taken a slight jarring of the joint, transmitted from the foot to the hip. Cases allowed to walk upon these spicas for any length of time not infrequently result in abscess.

But there are times, as I have said, that we are unable for various reasons to supply a brace and when it is particularly desirable to have our patient up and out of bed. Then the plaster of paris spica is particularly useful.

The mode of its application is as follows:—The patient is slightly elevated from the table. This can be most conveniently accomplished by using what is commonly known as the "spica rest," which is in its simplest form, a board of a couple of feet in length and almost a foot wide. From one end of this board, and projecting at right angles to it, is an "arm" of iron five to six inches long, which terminates in a flattened hand or support parallel to the board. On this support the sacrum of the patient rests. The shoulders and head are elevated and supported by pillows. The patient steadies himself with the other leg, the knee being flexed and the foot upon the table. The leg on the side of the diseased hip is extended to any angle desired, being brought down as straight as possible. The patient is then held firmly in position by an assistant.

The body, thigh, leg and foot are enveloped in a thin layer of cotton which is bandaged smoothly on. Over this the plaster of paris bandages are applied. It is well to carry the cotton well up on the thorax, leaving about two inches extending beyond the plaster of paris, so that having taken several turns of the plaster bandages round the body, the free edge of cotton may be turned down over the plaster already applied and be included in the next few turns of the plaster, by so doing, a collar of cotton surrounds the upper edge of the spica, which prevents any possibility of excoriation from the sharp cutting edge of the plaster. The spica should extend from the eighth rib down to the foot which it includes.

It will be found advantageous to strengthen the spica at the hip and knee joints with splints interwoven between the layers of plaster. Care should be taken to carefully pad the ends of these reinforcing splints.

But a plaster of paris spica as I have said can only be used efficiently

as a temporary splint and these cases need many months of brace treatment.

We have seen that the requisites for successful treatment are immobilization, extension and protection.

A brace that will immobilize the hip joint must of necessity be one that extends well up beyond the joint itself and well down upon the leg. If this consists of a rigid rod of steel or iron and is firmly secured to the body above and to the leg below, we are enabled to securely immobilize the joint. Figs. 2, 3, 4.

To obtain extension the brace extends beyond the foot. Leather straps are attached to the foot piece of the brace. Adhesive plaster with buckles attached are firmly bandaged to the leg.

Longitudinal traction is then made by buckling the straps of the foot-piece to the adhesives upon the leg. Counter extension is made against the "ring" as seen in figure, which gives a firm support.

In order to have extension made in the line of the neck of the femur we must have lateral traction of two to three pounds. This is obtained by having the brace made not in exact conformity to the outline of the thigh, but curving out from it to a distance of ¾ inch to 1 inch. The limb is then drawn out to the brace by a lateral traction strap adjusted several inches above the knee. The resultant of this traction at right angles to the shaft of the femur, and the longitudinal traction already referred to from below in line with the shaft, is directly in line with the neck of the bone.

A high shoe of from 3 to 3½ inch elevation is worn on the opposite foot. Crutches are worn. The patient, using the high shoe and crutches to walk upon, allows the leg on the affected side to swing free of the ground, with a pendulum-like motion. The pelvis and limb moving "en masse" and the brace swinging freely as I have said, does not permit of even the slightest jarring of the hip joint.

The length of time such a brace must be worn will depend entirely upon the case under treatment. No case of true hip joint disease can expect to be cured within eighteen months and the large majority of cases take considerably longer. A wise plan to follow is to keep the brace applied for at least one year after all the symptoms of the disease have disappeared.

The subject of "bracing" in hip joint disease is one on which not a few papers have been written. The question of lateral traction to relieve intra-articular pressure has been ably treated by Dr. A. M. Phelps and others, whose ideas I have repeated in the above. I am much indebted to Dr. Phelps for the cuts of the braces herein figured.

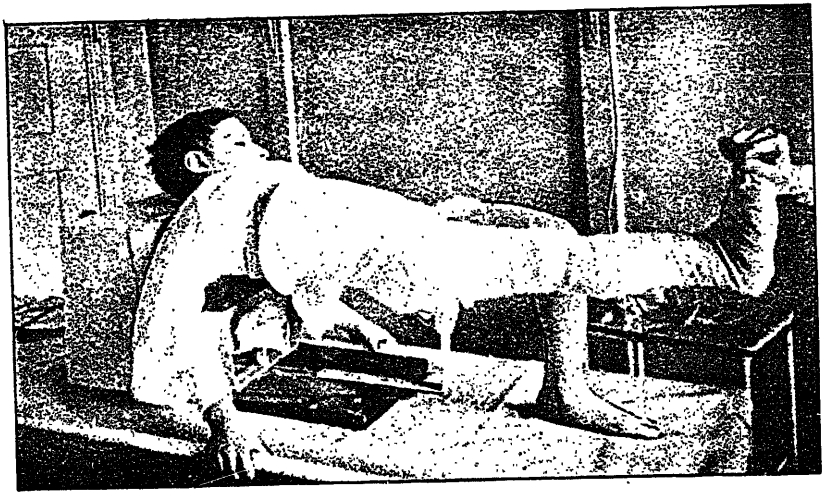

Fig. 1.

Fig. 4.

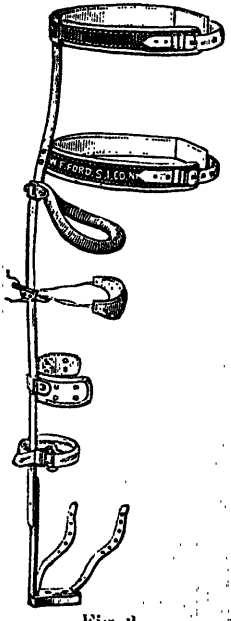

Fig. 2.

Fig. 3.

A CASE OF QUARTAN MALARIA.

BY

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The following case is of interest from the fact that although the records of the hospital show that every year there are a few cases of malaria admitted to the wards, this is the first case of the quartan type which has been noted in Montreal. The clinical history and microscopical appearances of the plasmodium clearly differentiate this from the more common, tertian, form.

F. T., male, aged 26 years, was admitted to the Montreal General Hospital (on October 26, 1901), under Dr. W. A. Molson, to whom I am indebted for permission to report the case.

Complaints:—(by interpreter). (1) "Fever and chills." (2) "Headache." (3) "Weakness," and (4) "Thirst."

Personal History:—Patient was born in Italy at the village of Campobasso, on the outskirts of Naples. He worked most of his life, before immigrating, on a farm. Four years ago he paid a visit to America, but returned to Italy after a few months. In September, 1901, he immigrated to Canada. Has been temperate in the use of alcohol and tobacco; no venereal history. Has been married for several years and has four children. Has always enjoyed good health, except for previous attacks of malaria, which is very prevalent in his district.

Family History:—Father died from malarial fever; otherwise negative.

Present Illness:—On September 29, 1901, while *en route* from Italy to America, patient was taken ill with headache and feeling of general malaise. This was shortly followed by chilly sensations (but no actual rigor) lasting 15 to 20 minutes. There now occurred an intense febrile stage which lasted several hours during which he was consumed with thirst, and this in turn was repleaced by a sweating stage. The paroxysm occupied the greater part of twenty-four hours. Then followed forty-eight hours without fever or any discomfort, when the paroxysm was repeated, and so on regularly every fourth day. On reaching Canada, as the disease continued, he sought medical advice, and was treated for typhoid fever for several days without any effect.

* Read before the Montreal Medico-Chirurgical Society, February 21, 1902.

On October 26, 1901, he applied to the hospital for treatment, being then in the height of a paroxysm.

Present Condition:—Patient is a young man of good nutrition and musculature. Average intelligence; nervous and excitable. Olive complexion of the race, with slight pallor of the mucous membrane. No herpes or other cutaneous eruption. Eyes bright; sclerotics creamy white. Slightly chilly. On admission, temperature 103° F.; respiration, 34; pulse, 100.

Lymphatic system:—Inguinal glands slightly enlarged and hard, otherwise negative.

Circulatory system:—Subjective, chilly sensation but not actual chill, coldness of extremities. Pulse 100, regular, large volume, and slightly increased tension. Visible pulsation in vessels of neck; slight cyanosis of lips and finger tips. Heart, apex beat faintly visible in fifth space internal to nipple line; no increase in dulness; sounds faint, and well marked bruit in vessels of neck.

Blood examination made half an hour after admission shows a few red cells containing typical plasmodia of Laveran with very large pigment granules in a state of sluggish motion, possibly of quartan variety. The containing cell is larger than normal and of a decidedly brassy hue. No rosettes or flagellated forms found.

Respiratory system:—Slight cough with small amount of blood-tinged muco-purulent expectoration. Physical examination negative.

Digestive system:—Appetite good; marked thirst. Tongue covered with whitish fur, moist and flabby, with marks of teeth evident.

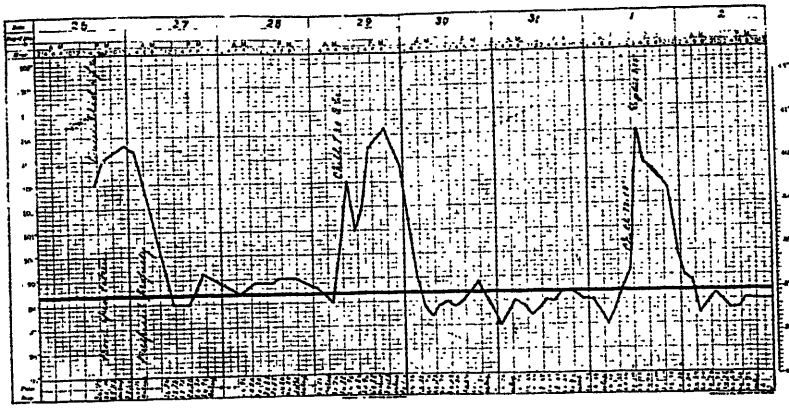
Abdomen flat and soft with slight prominence in left hypochrondrium. No rose spots. Liver: edge palpable below costal margin for one finger's breadth. Dulness in the right nipple line equals 12 cm. Spleen quite distinctly palpable, edge hard and round, reaches 4.5 cm. below the costal margin in the left nipple line, and extends forwards to the median line. Absolute dulness commences above at the upper border of the 7th rib in mid-axilla and extends downwards for 14 cm. Bowels constipated.

Genito-urinary system:—Urine neutral, sp. gr. 1013, straw colour, turbid, contains albumin and no sugar. Faint Erlich reaction.

Nervous system:—Headache frontal and slight. Is nervous and emotional. Reflexes normal.

DIARY:—

October 28th:—Patient is perfectly comfortable to-day. No headache and has hearty appetite. Temperature, 99°; pulse, 80; respiration, 20. Widal reaction negative. Urine still contains albumin and one granular cast was found. Erlich reaction negative.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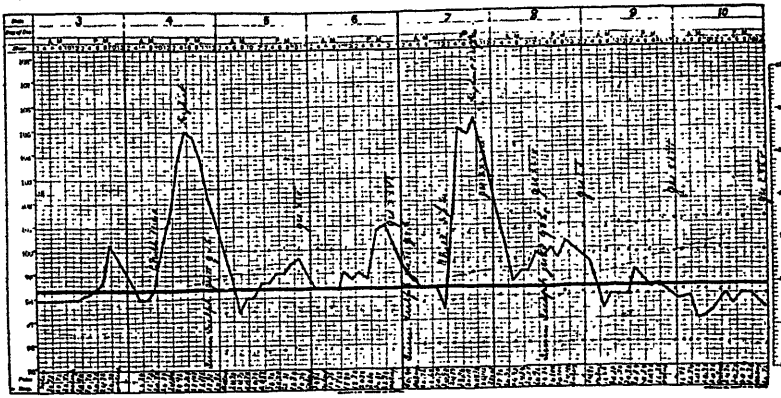
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Blood examination revealed numerous plasmodia with large, sluggish, active granules in periphery of cell.

October 29th:—Patient complained of slight headache at 7 a.m. with feeling of malaise and slight restlessness. At 7.30 a.m. had chilly sensations and shivered slightly for about fifteen minutes. Temperature gradually rose from 98 to 100 1-5° at 8 a.m.; 103° at 10 a.m.; then fell again to 101° at 12 noon; again reached 102° at 2 p.m.; 104 2-5° at 4 p.m.; 105 1-5° at 8 p.m. While the temperature was rising he complained of fever and tossed off all the heavy bed-clothes. Face was flushed, eyes bright, tongue dry, and pulse hard and accelerated. This stage lasted until 8 p.m., when he became bathed in sweat and the temperature gradually fell until it reached normal next morning at 6 a.m. No blood examination was made during the chill.

October 30th:—Patient perfectly comfortable to-day. Sat up and was very cheery, being anxious to get up; temperature normal. Blood examination revealed one or two plasmodia. Blood count revealed a secondary anæmia.

October 31st:—Patient well with subnormal temperature. Blood revealed numerous plasmodia, many with pigment clumped in the centre of the granules. One rosette found consisting of eight segments with sharp line of demarcation. One leucocyte found which had engulfed a plasmodium.

November 1st:—Had another paroxysm this day starting at 12.45 noon, reaching 105° at 2.15 p.m., and falling gradually towards evening. Characters similar to previous one.

November 2nd and 3rd :—Afebrile for 44 hours, when there was a slight rise in temperature to 100 1-5°. Blood specimens taken every hour during the night revealed a few typical rosettes.

November 4th:—Another paroxysm to-day with the usual characters. Quinine sulphate, grains 2 in solution, was started at 10 p.m., to be repeated every four hours.

November 5th and 6th:—Plasmodia present.

November 7th:—Patient had had 34 grains of quinine up to 10 a.m., but paroxysm of the usual character occurred.

November 8th:—Temperature reached 98 3-5° at 8 a.m. Had slight temperature all day ranging from 99° to 100 1-5°.

November 9th:—Few plasmodia found but with more difficulty and never two in a field as often previously.

November 10th:—Chill due to-day, but none occurred. This was after administration of 100 grains of quinine by 12 noon.

November 11th:—One or two plasmodia found.

November 15th:—Patient discharged cured, no plasmodia having been found since the 11th.

SOME OBSERVATIONS ON CONDITIONS PRESENT IN SCHOOLS OF MONTREAL.

BY

CHARLES H. CHURCH, M.D.

Early in December last the Committee of Hygiene instituted an inspection of the Montreal public and private schools to determine the extent to which vaccination had been practiced and to compel vaccination where the general order, which came into force in November, had not been complied with.

The inspection was carried out by six medical men, of whom I was one. Our orders were to inspect every arm where an effective vaccination had not been certified to by a medical certificate. The inspection was begun in the schools of the lower town and of the east end as they were judged to be probably the least immune, and were therefore the first to be visited. The original intention of continuing the inspection throughout the whole of the city schools had to be dropped owing to lack of funds at the disposal of the committee. Thus, my observations will be limited to only a few schools, dealing especially with three, which include about 1200 boys, one in the lower town, one in the centre of the city and one in the north end. All are public schools under the jurisdiction of a body of school commissioners. My observations will embrace general hygienic conditions, diseased and infected conditions, among the pupils of these three schools; and these observations, I would explain, were noted in what was necessarily a very rapid inspection and consequently only half of the truth is told. I feel satisfied that with closer observation many serious conditions would be made out which I overlooked in the enforced rapidity of my inspection.

The north end school is attended by a decidedly good class of boys, of whom there are some four hundred. The building is fifty years old with good large class-rooms and high ceilings. The rooms are however, in some cases very much overcrowded. There is no natural means of ventilation whatever, the only means of allowing the entrance of fresh air is by the opening of a sliding pane in the double windows, which may only be opened when the rooms are vacant on account of the draught. The air in the class-rooms after a couple of hours becomes very impure and oppressive, so much so that the principal, an exceptionally bright and up-to-date man, has seen fit to give a recess every two hours, during which time the rooms are aired as well as

* Read before the Montreal Medico-Chirurgical Society, February 7, 1902.

possible, but this rule can only apply in fairly mild weather. Of the closets and urinals in this school I had no opportunity of judging. The classrooms are designed irrespective of light conditions and the light consequently may be found on the right or left side, front or back, or a little of each as it may happen. The teachers complain bitterly of the poor ventilation and attribute ill health among themselves and pupils to it. Ample playgrounds are connected with this school; the desks and seats are most uncomfortable and faulty.

The centre town school is attended by the lower classes and numbers 250 boys. The building is an old one. Here the hygienic conditions are most dangerous, the classrooms are small and most terribly overcrowded. There is no attempt at all at ventilation during school hours, a few small slits in the outer windows alone can be opened in any case and these are kept carefully closed, making the atmosphere offensive in the extreme. One can imagine the atmospheric conditions present in a room sixty by fifty by ten, containing from sixty to seventy odoriferous boys with no ingress of fresh air whatever, after being occupied one hour. It is beyond description, and the terrible havoc among the children is apparent in every face. Weak, miserable, puny specimens they are, attributable, I am convinced, to the hours of incarceration in school. The closets and urinals are situated on each flat and are most defective and unhealthy with plumbing greatly in need of repairs, and a more modern system instituted. The lighting is like that in the north end school, merely a matter of chance. Everything about the place has an untidy and unwholesome appearance. The playground is much too small and the desks and stools are particularly uncomfortable and injurious.

In the lower town school the condition of affairs is absolutely unpardonable and nearly beyond description, an attempt at one I fear, will tax your credulity, nevertheless the facts will not be exaggerated one iota. Six hundred or more boys attend, of the mechanic or laboring class. The building is not an old one, hence there is no excuse for such a structure being erected in modern times. As one enters the building the odour of decomposing urine and defective plumbing is at once noticeable, and can be traced to the lavatory entrance, which is situated on the ground floor two feet below the level of the classrooms. The stench from this room is appalling. The lavatory is accessible by a door, which connects it with a central passage way communicating to all the corridors in the building, and into which several classrooms open, consequently the foul air is carried all through the building. On close inspection the closets were found in a filthy condition and the plumbing very defective, the urinals unflushed and dis-

gustingly filthy. All the windows were closed and two air pipes alone could I discover, which were stopped up or of little service. A more disgustingly foul place I have never entered. The masters were a most unhealthy looking lot of men, and I have the authority of the principal that they are continually ill from some malady or other, three having contracted typhoid fever last spring. The pupils also are continually absent from the school through ill health; typhoid fever, measles, scarlet fever, etc., being some of the diseases reported as the cause of their absence. The principal took me all over the building and implored me if possible to do something to better their condition, his attempts for years having been of no avail. The boys are visibly affected by the general toxæmia, being heavy and listless, so much so, that it was difficult to arouse them sufficiently to answer ordinary questions at all rapidly, big boys being unable to remember their house numbers, street names, and frequently their own names without an effort. As one leaves the more hygienic conditions, one is struck forcibly by the corresponding dulness and depressed condition of the pupils in these schools, as well as by the marked deterioration of the general health in boys of the same social class. The want of personal hygiene in the boys of this school was very noticeable, dirty faces and hands were no bar to the liberal education dispensed there. The class-rooms are terribly overcrowded, accommodating double the number of boys they might with safety contain. There is absolutely no ventilation whatever in any of the class-rooms during school hours, and while there may be a rule forbidding expectoration on the premises, there is ample evidence of its infraction. The desks and seats are defective, the light in faulty position and poor, and the playgrounds not one-third what they should be.

My attention was directed to the existence of disease among the pupils early in my inspection by the presence of a lad of about ten years af age, of a pale, emaciated appearance and bearing every external evidence of tuberculosis. On close observation I found a general, submaxillary, glandular enlargement with a caseating gland at one side of the jaw the size of an egg and about ready to rupture. His temperature was 102°, and altogether he had been a very sick boy for months. The principal had noticed how ill and weak he looked, but did not feel justified in refusing him admission, although he made his duties as light as possible. I at once ordered him home with a note advising immediate medical attendance, which he had not been receiving. The principal expressed his gratitude for my having brought the case to his notice and asked me to act similarly in any case I might discover of any dangerous nature to the pupil or school. I did so, and at the

end of my inspection fifteen boys had been notified to seek medical advice.

In the 1,200 pupils dealt with in this paper I found ample evidence of the following conditions:—Pulmonary tuberculosis in at least twelve cases, tuberculous adenitis in five cases, granular ophthalmia in three cases in one room and evidently infective. I am satisfied that in six or eight per cent. enlarged tonsils or adenoids, or both, existed with every external evidence and subjective symptom present. The parents in all probability were ignorant of the evil arising from such conditions, or even ignorant of its existence. General catarrhal conditions were numerous, with some of the worst cases of ozæna among them, rendering one nearly sick by their near approach and making it decidedly unpleasant for all around. Such cases should be compelled to seek treatment. Spinal deformity was marked in a few cases. Eye affections and defects of refraction untreated were frequent. Deafness was noted in quite a number of cases, and defective teeth in quite a large percentage. One also saw unmistakable evidence of the congenital type of syphilis.

Among skin diseases nearly every variety was met with, the following, however, were especially noticeable:—Seborrhœa, eczema, psoriasis of which last I do not over estimate when I say I saw fifteen cases. The effects of pediculi were very noticeable.

Regarding the private schools and orphan asylums in the city, I have had ample evidence of the great need of medical inspection to insure of efficient hygienic regulations being carried out in these institutions, and to eradicate contagious and infectious and other forms of disease from among them, for the protection of the public.

In conclusion, I would say that I have been struck with the injustice and danger to the community, to the masters and pupils, the unfortunate sufferers from the terrible conditions existing in some four schools, that I have felt it my duty to report to our society my observations, with the hope that we as a body might use all our influence to remedy the system which saps the vitality and impairs the future utility of the youth of our city and even sacrifices many lives annually.

A CASE OF RECENT ACUTE SUPPURATION OF THE CORNEA SUCCESSFULLY TREATED AFTER LIGATION OF THE CANALICULI.

BY

FRANK BULLER, M.D.,

Professor of Ophthalmology, McGill University; Ophthalmologist to the Royal Victoria Hospital, Montreal.

The case I propose showing you this evening is not in itself of much interest or importance being merely that of a cornea badly damaged by a recent, acute, suppurative keratitis; but there are some features in connection with this case which make it worth exhibiting as illustrating an idea, or perhaps I may say a principle of treatment, which seems to promise satisfactory results in a class of corneal lesions which too often turn out badly.

It is a matter of common knowledge that acute suppurative keratitis is always a dangerous and often a destructive disease of the eye. Authorities state that about one-third of all such cases are complicated by, and are in reality the result of, infection from purulent inflammation of the tear-sac. In the presence of this complication all authorities are agreed that corneal lesions are particularly dangerous, and they advise immediate treatment of the tear-sac, in order to obviate as far as possible the ill effects of a constant supply of virulent, pus-producing germs from this their favorite breeding ground. Unfortunately, however, the corneal disease makes more rapid progress than the cure of the dacryocystitis, and the eye is apt to perish despite our best directed efforts.

It is a well known fact that the presence of a dacryocystitis is a positive contra-indication to any operative procedure involving an opening into the eyeball. About a year ago I operated on a patient for cataract in whom, although no pus or mucus could be demonstrated in the tear-sac, the puncta lachrymalia had a somewhat unhealthy appearance. In spite of the usual antiseptic precautions, suppuration of the wound promptly set in, and the eye perished utterly. Assuming that the tear passages probably furnished the septic infection, it occurred to me that this might be prevented by ligating the canaliculi before removing the cataract. This was accordingly done by passing a ligature around each canaliculus, about two millimetres to the inner side of each punctum. I used for this purpose No. 2 iron-dyed silk,

* Read before the Montreal Medico-Chirurgical Society, February 7, 1902.

and drew the threads tightly enough to occlude the canals without cutting through them. In this eye the cataract operation was perfectly satisfactory. Encouraged by this result I determined to try the same means of shutting off the tear-sac from the conjunctiva in the first case of suppuration keratitis that I saw in connection with disease of the tear-sac, and the patient I now show you is the first one I have had an opportunity of treating in this way. He came to me just about the New Year with the right cornea apparently ulcerated extensively, and for about three-quarters of its extent transformed into a yellowish pulpy mass. Only a small extent of the cornea to its upper and inner side was sufficiently clear to afford a view of the iris, which was here close up to the cornea. Pressure over the tear-sac caused a free regurgitation of mucopus from the sac. The corneal trouble had commenced suddenly whilst driving on a windy day about two weeks previously. A more hopeless looking eye could hardly be imagined, and there was certainly nothing to be lost by heroic treatment.

This I commenced by washing out the tear-sac through the canaliculi by one in three thousand perchloride solution. I then ligated the canaliculi, thoroughly cleansed the conjunctiva, and having instilled a ten per cent. solution of cocaine, touched the diseased cornea with formaline one in sixty, then filled the conjunctival sac with ten per cent. airol ointment and applied a compress bandage. The subsequent local treatment consisted in hot boric acid fomentations and the free use of airol ointment. The formaline caused some reaction for a couple of days, then a steady improvement ensued and you see we have now quite a presentable-looking eye. There is, of course, a large adherent leucoma, but more than half the cornea is sufficiently transparent to show the iris behind a shallow anterior chamber, and there is a prospect of ultimately obtaining useful vision. It is quite certain that the effect of the treatment was an immediate and complete arrest of the corneal suppuration, and a large area that had been completely opaque has regained transparency. The result is infinitely more satisfactory than I had hoped.

I have found no difficulty in reopening the canaliculi after they have been ligated for two weeks, nor does their temporary closure lead to disturbance from increased accumulation in the tear-sac.

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OF
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UNDER THE CHARGE OF GEORGE E. ARMSTRONG.

Treatment of Lupus and Tuberculous Abscess with Hydrogen Peroxide.

CHARLES HERBERT GUNSON, M.B. "Hydrogen Peroxide in the Treatment of Lupus and Tuberculous Abscess." *Brit. Med. Jour., Feb. 22, 1902.*

The writer draws attention to the highly beneficial action of peroxide of hydrogen in ulcerative conditions, whether associated with abscess or not. He uses it in the form of a spray three or four times a day, subsequently dressing the granulated surface with a boro-iodoform ointment. The results are better if the peroxide is used slightly diluted, and Dr. Gunson thinks the mechanical action of effervescence which occurs whenever peroxide meets pus or blood, aids very much the elimination of poisonous toxins from the wounds.

The subject is no new one, but in the multitude of new germicidal agents it may be, as the writer suggests, that we are in danger of forgetting some very valuable old friends.

Traumatic Rupture of the Gall-Bladder.

DEFOREST WILLARD, M.D. "Traumatic Rupture of the Gall-bladder without injury of the Liver." *N. Y. Med. Jour., Mar. 1, 1902.*

This paper contains a very interesting account of a boy of five who was run over by the wheel of an express wagon. The skin was unbroken and there was no fracture of any bones; marked shock, but no collapse, as one gets in rupture of a viscus without hæmorrhage. For two weeks following injury there was fever, tympanites, abdominal tenderness, obstinate constipation, with clay-colored stools when a motion was secured, but no jaundice. At the end of two months in bed a tender spot was found in the spine in the lumbar region, and kyphosis fairly well marked,—evidently a traumatic spondylitis. This was treated by extension. The abdominal symptoms becoming more urgent an exploratory laparotomy gave exit to about two quarts of almost pure bile, not mixed with pus or blood. The patient's condition pre-

cluded any effort to find the source of the bile and the opening was simply packed with gauze and soon closed. Later on it became necessary to aspirate the peritoneal cavity for a re-accumulation of fluid, when another quart of bile was withdrawn and following this a biliary sinus persisted for several weeks, but no more fluid accumulated in the abdomen, and at the same time the patient gave evidence that the bile was passing through the proper channels and he made a perfect recovery.

It was, of course, impossible to say in what particular portion of the bile passages the rupture occurred, as the source of the bile in the abdomen had never been demonstrated. Still the writer of the article is probably correct in his assumption that it was the gall-bladder, judging from the analogy of the process of healing in this case to that of an ordinary cholecystotomy with drainage.

One is struck by the proof which such a case as this gives to the contention of Mr. Mayo Robson (Diseases of the Gall-Bladder and Bile-Ducts, pp. 21), that there is a large peritoneal pouch on the right side of the abdomen capable of retaining a quart or so of fluid. A drain in the loin would have been the proper treatment for such a case were one able to make a positive diagnosis, but so rare are these cases when not associated with the much more common condition of rupture of the liver, that a positive diagnosis would be very difficult indeed.

Operations on the Kidney.

HOWARD KELLY, M.D. "Methods of Incising, Searching and Entering the Kidney." *Brit. Med. Jour., Feb. 1, 1902.*

Dr. Kelly, in this interesting paper which he delivered before the New York State Medical Society, shows the need, on the part of operators in general, of a more careful study of the anatomical surface markings of the kidney itself. He points out that the anterior three-fifths of the kidney gets its blood supply from one set of vessels, while another set supplies the posterior two-fifths. The division between these two sets of blood vessels is marked on the convex surface of the kidney by a white line (Brœdel's line), which runs parallel with the posterior border of the organ. Here is the proper place for incision with the minimum amount of hæmorrhage and the maximum amount of access to the calyces and pelvis of the kidney for exploratory purposes. Be sure that the incision keeps parallel with the posterior border leaving about three-fifths of the kidney substance anterior to the line of incision.

In cases where the operator thinks it proper to suture the kidney substance after a nephrotomy, Dr. Kelly strongly recommends the mattress suture using a dull, round needle with catgut. These sutures coapt the cut edges accurately and produce sufficient pressure to control

hæmorrhage. The capsule may be subsequently closed by a continuous suture of fine catgut.

The Technique of Nephropexy.

EDEBOHLS. "The Technics of Nephropexy, etc." *Annals of Surgery, February, 1902.*

It is wonderful how surgical literature as gathered in the weekly and monthly journals appears to run in cycles. Just now we are in a distinct kidney zone, as it were, and one can scarcely pick up a surgical periodical without finding therein some article of reference to these organs. The able writer of the article at present under consideration first deals exhaustively with the subject of nephropexy and shows how rapidly the operation has come to the front and how successful it is in curing the many distressing symptoms arising from wandering or floating kidney. As aseptic technique has improved, it has become a very safe operation so that now there need be no hesitation in fixing both kidneys at one operation.

He first calls attention to the great advantages conferred upon the operator by the use of the circular air cushion (which he introduced) and which is placed at right angles under the abdomen, as the patient lies, face down, on the table. It may be inflated to any desired degree, and I can speak from experience as to its great usefulness in operating upon the kidney. No change of position on the part of the patient is necessary for a double operation.

As regards the operation itself, Edebohls strongly recommends "broad denudation of the kidney by stripping off a large area of capsule proper on the one hand, and laying bare the quadratus lumborum along its whole length of the other" as the co-aptation of those raw surfaces "will give us the best tissues and broadest surfaces available for firm and broad union."

As regards the proper method for anchoring out the organ itself, the writer takes strong grounds against perforating the kidney substance, but by means of mattress sutures of chromicized catgut, he attaches the detached flaps of capsule to the lumbar muscles, passing the sutures through the muscles and tying on the outside of the latissimus dorsi. There are four of these sutures, two in front and two behind. The kidney should not be sutured too high up as the consequent strain is likely to defeat the object of the operation. "The completed operation will leave the denuded convex surface of the outer half of the kidney in snug contact with the raw quadratus lumborum, throughout the entire length of the latter from rib to ilium."

The author gives a table showing the mortality after the operation as 1.65 per cent. His last 135 cases were entirely successful.

J. M. Elder.

Canadian Medical Literature.

UNDER THE CHARGE OF KENNETH CAMERON.

[The editors will be glad to receive any reprints, monographs, etc., by Canadian writers, on medical or allied subjects (including Canadian work published in other countries) for notice in the department of the JOURNAL. Such reprints should preferably be addressed to Dr. Kenneth Cameron, 903 Dorchester street, Montreal.]

Canada Medical Record (Montreal).

February, 1902.

1. Progress of Gynæcology. A. Lapthorn Smith.
2. Notes from the Case-Book of a General Practitioner. F. W. Campbell.

L'Union Medicale du Canada [Montreal).

Février, 1902.

1. Volumineux Sarcome Fuso-Cellulaire Développé dans la Cavité Utérine. A. Marien et O. Normandin.
2. L'Hygiène dans les Salons de Coiffure de la Ville de Montréal. J. E. Dubé.
3. Nephrite Aiguë dite "a Frigore." E. Montpetit.
4. La Vaccination. Ses Contra-Indications. H. Hervieux.

1. MARIEN and NORMANDIN relate the history of a woman from whom they removed an enormous spindle-celled sarcoma of the uterine cavity. The cavity was very much dilated and completely filled by the mass, the walls were hypertrophied and were as much thickened as in a five or six months pregnancy.

2. DUBÉ enumerates the diseases that may be contracted in the barber shops, and points out the various measures that have been adopted by the Province of Quebec and by the Provincial Board of Health to ameliorate these evils.

3. MONTPETIT describes a case of acute nephritis, coming on without any apparent cause and ending fatally from uræmia. Bleeding gave temporary benefit.

4. HERVIEUX points out that danger from vaccination does not depend only upon bad vaccine or the carelessness of the operator, but often upon the general state of health of the individual. Vaccination should not be performed on persons recovering from a severe general disease and especially if the organs of elimination are not doing their

work well. All acute and chronic skin diseases should be cured before vaccination.

La Revue Medicale du Canada (Montreal).

22 Janvier, 1902.

1. Kystes Multiples et Tumeur Congenitaux Coccygiens. M. T. Brennan et Choquette.

29 Janvier, 1902.

2. A propos de Vaccination. J. E. Laberge.
3. Insulte aux Médicins Canadiens.

1. BRENNAN and CHOQUETTE describe a congenital tumour springing from the coccyx of a child of three months of age. It was about the size of a hen's egg, attached by a pedicle, very hard, movable, and without fluctuation. On rectal examination several small elastic tumours could be felt beneath the mucous membrane and which seemed to replace the bones of the coccyx. The tumor was removed and was found to be of a fibro-cystic nature, and with no connection with the spinal canal.

Le Bulletin Medicale de Quebec (Quebec).

Février, 1902.

1. De l'Anévrysme Aortique. Type Récurrent Laryngé. D. Brochu.
2. Quelques Cas de Placenta Prævia. S. V. Vezina.
3. Des Signes Pathognomoniques dans le Pratique. S. V. Vezina.

The Canadian Practitioner and Review (Toronto).

February, 1902.

1. Smallpox and Vaccination. John Cavan. (To be continued.)
2. A Resume of Facts Relating to the Digestive Organs in the Infant. C. S. McKee.

2. MCKEE gives a collection of known facts relating to the digestive organs and processes of the infant.

The Canada Lancet (Toronto).

February, 1902.

1. Enlargement of the Middle Lobe of the Thyroid. J. G. Adami.
2. Foreign Bodies in the Vermiform Appendix. J. Corinth Stinson.
3. The Present Epidemic of Smallpox in America. H. M. Bracken.

4. Necessity for the Early Recognition and Treatment of Insanity. Samuel Bell.
5. Importance of Climate Treatment in Pulmonary Tuberculosis. L. B. L. Bentley.
6. Tuberculosis of the Eye. D. C. Trow.
7. Cyst in the Right Nasal Passage. B. F. Butler.

1. ADAMI relates a case of advanced goitrous enlargement of the thyroid affecting only the middle lobe. The symptoms which it gave rise to were periodical attacks of dyspnœa which had been mistaken for asthma. The enlargement of the isthmus unassociated with enlargement of the lateral lobes is extremely rare. The lesson to be learned from the case is that in districts where goitre is prevalent, periodical attacks of so-called asthma should be regarded with suspicion so that cyanosis accompanied by a certain amount of stridor should lead, in absence of other explanations, to a careful examination of the lower portions of the neck.

6. TROW gives a short synopsis from the recent literature on tuberculosis of the eye and the structures about it.

7. BUTLER describes a thin-walled cyst containing a yellowish liquid attached to the under surface of the turbinated bone near the posterior end. The naso-pharynx contained a large myxo-fibroma, attached to the upper edge of the posterior nares of the same side and extending nearly to the base of the tongue, both growths were easily removed and there was no recurrence.

The Canadian Journal of Medicine and Surgery (Toronto).

1. The Operative Treatment of Chronic Bright's Disease. A. Primrose.
2. Pulmonary Tuberculosis. Its Treatment and Prevention. A. P. Proctor.
3. Treatment of Tuberculosis Affections of the Bones and Joints. Clarence L. Starr.

1. The disappearance of albumin and casts from the urine after operation on the kidneys has been noted by many observers, but it is to Reginald Harrison, in England; and Edebohls, in America, that the profession is indebted for pointing out the bearing which these results have on the question of the possibility of curing albuminauria by surgical means. It was with the object of relieving grave symptoms in a case of chronic Bright's disease that PRIMROSE undertook to operate upon the kidneys. A child, ten years of age, suffering from nephritis. The history was obscure as to the onset of his

illness, but for six months before he came under observation he had general anasarca and ascites. During that time paracentesis abdominis had been performed seven times. On admission to hospital the urine contained 1.6 per cent. of albumin, the abdomen was enormously distended with fluid, and there was great swelling of the face and œdema of the extremities. The lad's general condition was considered very serious and a gloomy prognosis was given. Paracentesis abdominis was performed and 130 ounces of fluid were drawn off. The urine contained albumin, numerous hyaline, granular and epithelial casts. On Nov. 21st he cut down on the right kidney in the loin and found it much enlarged. An incision of two inches was made in the capsule and the wound was drained for a fortnight. As the result of the operation, the amount of urine secreted in twenty-four hours gradually increased from fourteen to twenty-four ounces on the seventh day after the operation, while the percentage amount of albuinin diminished from 1.6 per cent. to 0.8 per cent. The child's condition did not continue to improve and it appeared evident that permanent relief had not been secured, and it was thought justifiable to perform a more extensive operation upon the left kidney. Accordingly, on December 20th, the left kidney was exposed and the capsule removed in its entirety. The child was critically ill for some days subsequently, and contracted pneumonia, but he gradually recovered and the renal symptoms underwent a remarkable abatement, so that while the amount secreted in twenty-four hours rose to forty-four ounces, the amount of albumin diminished to .03 per cent., in fact, there was a mere trace, and the casts were very largely diminished in number. The general œdema vanished and the ascitic fluid disappeared. Sixty-two days after the last operation the boy was much stronger, the anæmia had largely disappeared, and the albumin was a mere trace. A few casts still remained but there had been no return of the ascites or œdema. The explanation of this remarkable and satisfactory result is to the writer's mind quite obscure, and the treatment has been so far purely empirical.

3. STARR treats of the methods employed for the relief of tuberculous affections of bones and joints.

Dominion Medical Monthly (Toronto).

February, 1902.

1. Vomiting of Pregnancy. W. McKeown.

1. McKEOWN believes that severe vomiting of pregnancy is much more frequently toxic than is generally recognized. The development of the fœtus must throw into the maternal circulation products not

present at other times, and which may produce the severe and dangerous forms of vomiting met with, and to which the term pernicious has been applied. He cites a case in which the fœtus had been dead for at least two weeks, during which time vomiting instead of abating increased in severity and the patient's general condition became rapidly worse.

The Maritime Medical News (Halifax).

January, 1902.

1. Report of a case of Appendicitis. Alexander Ross.
2. The Duty of the Medical Profession in the Prevention of Tuberculosis. J. F. Macdonald.
3. Rheumatism of the Eye. J. R. McIntosh.
4. Smallpox and Compulsory Vaccination. G. R. J. Crawford.
5. Notes on Smallpox Cases at Lawlor's Island. J. J. Doyle.
6. Case Book Reports. H. L. Dickey.
7. The Abdominal Bandage in Obstetric Practice. D. McIntosh.

1. Ross relates a case of appendicitis in which a temporary obstruction of the bowels followed operation.

2. MACDONALD defines the work of prevention of tuberculosis for which legislation is necessary.

5. DOYLE relates the histories of twenty-three cases of smallpox.

7. MACINTOSH has abandoned the routine practice of abdominal bandage in obstetric cases because, first, he could see no good in its use, and, secondly, because he fancied that it might do positive harm.

Reviews and Notices of Books.

HUMAN PLACENTATION: An account of the changes in the uterine mucosa and in the attached fœtal structures during pregnancy. By J. CLARENCE WEBSTER, B.A., M.D., L.R.C.P.E. With 233 illustrations. W. T. Keener & Co., Chicago.

We extend a warm welcome to this latest contribution to our knowledge of the human placenta, both for the sake of the work itself and also by reason of its authorship. With its appearance the "fierce battle ground of embryological research," for the greater part European, is still further extended, and though Dr. Webster is no partisan, the "Teutonic Host" is to be congratulated on having herein secured a doughty adherent.

Until the advent of this monograph, no serious work upon the placenta has appeared in English since Eden's communication in 1896. Yet, during this interval the most valuable addition of recent years has been made to the life history of the placenta, namely, its earliest chapter—a five days' gestation, published by Peters of Vienna in 1897.

"Human Placentation" gives us the results not only of the author's own investigations, which are considerable, but is also an epitome of our present knowledge of the placenta; it reveals incidentally how slow the growth of this knowledge has been, with what labor attained, and it indicates still more clearly the domain yet remaining of conjecture or of doubt. Synopses of the work of Peters, Leopold, Merttens, Reichert, Schwabe, Minot, and others—work which has given us descriptions of human embryos, the earliest yet published—are faithfully balanced and placed. Everywhere there is evidence of comprehensive grasp of the subject and of intimate knowledge of its literature.

The numerous illustrations, half-tone reproductions from photomicrographs, are placed together at the end of the book. In some instances these are not too clear, sufficient strengthening not having been employed in their reproduction, and their illustrative service to the text is somewhat impaired by reason of the absence of all cross references.

The author's actual research extends over a period of eleven years and includes an examination of the pregnant uterus "during the second, third, fourth, fifth, sixth, seventh and ninth months, in the first, second, and third stages of labor, and during various stages of

the puerperium." The results are embodied in nine chapters which follow a chronological order. A tenth chapter on the phylogeny of the placenta is added, and appended is an exhaustive bibliography.

Webster deals first with the structure of the uterine mucosa in the adult nullipara and describes it as varying in thickness and as showing always a differentiation into two zones—an outer zone next the muscular walls, spongy, and an inner zone compact. A special layer of connective tissue cells constitutes a basement membrane for the epithelium, both surface and glandular.

The life history of the placenta is begun at the fifth day in Peters' specimen, and is continued at the seventh, twelfth and fourteenth days by specimens of Leopold, Merttens and Reichert. Minot contributes a four week's specimen, and the author following here by means of the examination of early abortion sacs, takes up the actual research at the sixth week and continues it to full time.

In the vera we are told, decidual formation is found at the fifth day but only close to the ovary, subsequently these cells increasing in number, appear first in the innermost layer of the mucosa, the compacta. These cells are found to be derived exclusively from the pre-existing connective tissue cells of the corium, a view now very generally held, but no observation is made of any arrangement of these cells about the blood-vessels. Eden's view as to the extensive rupture of blood-vessels in the early vera is contradicted, but the author's contention that "in the great mass of mammalians the fertilized ovum enters into relationship with the *normal unaltered* mucosa," is scarcely, we think, to be maintained.

Peters' work throws light upon the origin and character of the reflexa, and with these observations Webster is in accord. The old view that the reflexa is formed by folds of the vera growing up round the ovum and so embedding it, is discarded. Instead, the ovum is the active agent, it becomes attached to the mucosa and excavates its way into the compacta, thereby embedding itself. This excavation is hereafter carried on laterally as well as deeply, and there results a portion of the mucosa which overhangs the ovum. This overhanging portion forms the reflexa, the gap through which the ovum entered, being closed by organized blood-clot. It results from this that the reflexa is merely the superficial part of the serotina. On the surface of the reflexa next the ovum there is no epithelium, and it is evident that Leopold's nomenclature, decidua capsularis (decidua reflexa) and decidua basalis (serotina) furnishes the more truthful description. Webster holds that the reflexa does not persist as a distinct membrane after the fifth month, for subsequently only scanty traces of it can be found save in the rare instances of the establishment of a reflexal placenta.

The early changes in the serotina during the first month are taken from the observations of Peters, Leopold and Reichert. The decidual cells are mentioned, but no definite statement is vouchsafed in respect of either their origin or arrangement. The suggestion made by Peters that the large polymorphic cells found in the compacta represent a beginning decidual cell formation is, as Webster suggests, open to question. These cells as described and figured by Peters seem to us more nearly to resemble the multinucleate protoplasmic masses, the result of the fragmentation of the solid plugs of epithelium formed by the proliferation of the maternal glandular cells, and which are so commonly seen in the placenta of rodents. The syncytium is described as fœtal in origin. It is at first cellular, the outer layers of the trophoblast, and becomes plasmodial only after its contact with maternal blood towards the end of the first week of pregnancy.

The decidua, we are told, reaches the point of highest development between the second and third months. Retrogressive changes subsequently appear and take the form of coagulation-necrosis,—*fatty degeneration is not found under normal conditions*—which results in a general fibrinous transformation. This degeneration is most marked in the serotina "possibly because of some influence of the fœtal epiblast."

In the chapter on the chorion the structure of the fœtal villi is fully discussed and the many interpretations that have been given by observers to the cellular covering of the mesoblastic core are tabulated. We strongly support the view held by Webster, Minot, Kostschenko and others, that this cellular covering, both syncytium and Langhans layer, is fœtal and epiblastic; but it seems to be more probable that the thin plasmodial layer which alone clothes the villus at term, represents Langhans layer become at length also plasmodial, rather than the remains of the outer syncytial layer. May not also the line of ingrowth of the villi into maternal tissue and their branching or further ingrowth, be determined here, as in the rabbit's placenta, by the disposition of the superficial maternal vessels?

A short section is given to the description of the amnion. The amniotic cavity is described by Peters as being already closed at the fifth day. We miss here all mention of any allantois or "Bauchstiel," or discussion as to the manner in which the chorion is vascularized.

The separation plane of the placenta is, Webster tells us, through the compact layer, the main thickness of decidual tissue remaining attached to the uterine surface after delivery of the complete secundines. There follows an admirable description of the shed placenta, wherein the nature of placental infarcts is discussed, and a short chapter on the phylogeny of the placenta completes the work.

Again we must congratulate Dr. Webster. Not only have his own contributions to the subject been large, but in the present work he has done signal scientific service, in that he has skilfully gathered into a coherent thesis the sum-total of our present-day knowledge of the human placenta.

W. W. C.

INTERNATIONAL CLINICS: A Quarterly of Clinical Lectures and Specially Prepared Articles on Medicine, Surgery, Neurology, Etc., Etc. By leading members of the Medical Profession throughout the world. Edited by Henry W. Cattell, A.M., M.D. Volume IV., Eleventh Series, 1902. Philadelphia, J. B. Lippincott Company, 1902. Canadian Agent, Charles Roberts, Montreal.

The fourth number of the Clinics for the present series is a volume of 500 odd pages containing some thirty articles and well illustrated. Among the lectures we note one by Horatio C. Wood, jr., on the methods of investigating the action of drugs, a case of pulmonary osteo-arthropathy reported by R. C. Newton and Elizabeth Mercelis. Both of these are well illustrated. William C. Krauss reports a typical case of Parkinson's disease, and the types of hemiplegia are well described by G. L. Walton. An interesting condition and one which has lately been brought to notice by several writers is that of the similarity in physical signs between a foreign body in the air passages and rapid phthisis, a case of which is reported by James B. Walker. The larval parasites of man are described by James J. Walsh, the various forms met with being depicted in the egg, the larva and the adult fly. Sir Dyce Duckworth in a paper on "Clinical Observations on Certain Diathetic Conditions," regrets that the teaching of the last generation with regard to the influence of diatheses has been so completely abandoned by present-day writers, and sets forth arguments to show that the idea of there being a scrofulous or arthritic diathesis in no way contradicts the latest teachings of modern medicine. Deformities in children from the standpoint of the general practitioner is the title of an able lecture by John Madison Taylor.

Altogether the book contains a large amount of both useful and interesting material and, taken with the three preceding volumes of the same series, we have no hesitation in saying that the claim of the publishers, that the present year would be the best in the history of this now well known serial, has been sustained.

Society Proceedings.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

Stated Meeting, January 3, 1902.

GEORGE E. ARMSTRONG, M.D., PRESIDENT IN THE CHAIR.

President's Address.

DR. JAMES PERRIGO delivered the annual address of the retiring President.

In vacating the president's chair, I am sure I am only echoing the sentiments of the members here present, that we are to be congratulated on having secured Dr. Armstrong as our next president; and I ask you in his behalf to give him the same kind consideration as you have given me during the past year. I thank you now for the honour you conferred upon me and the confidence you gave me. This last year has been an eventful one, as we have ceased our perambulations from one hall to another, and now occupy assembly rooms that no association need be ashamed of. This has not been accomplished without some labour, and our thanks are due to the different members of each committee that had the work in hand. The Bank is a considerate landlord, meeting all our requests with an open hand, even to the furnishing of the handsome lighting fixtures which have not cost us anything.

Of course, you will understand, our expenses have been heavier than usual. Furniture had to be purchased. This alone cost $593.84, and of this sum $335 was collected by special subscription from the members as a loan to be repaid when convenient. We have yet arrears to the amount of $635, and most of this is considered good. Altogether, at the beginning of the year, we had a cash balance of $527.16, and it is now at the end of this year $231.27. That the securing of these rooms has increased our attendance, is well shown by the Secretary's report as the average attendance for the whole year was forty. The year can well be divided into two sections: 16 meetings in the old rooms gave an average attendance of 35, and 10 meetings held here gave an average of 44. It is well to look back and see what has been our average attendance in past years:—1897-'98, 32; 1898-'99, 42; 1899-1900, 28; and 1900-'01, 40; and for the last ten meetings of this past year, 44. I do not think our average attendance will remain at this level, but I am sure now it will increase,

and our rooms will be a central point of attraction in the afternoons and evenings for those who wish to consult journals and works of reference. This is a desirable object to be obtained, and every effort should be made to further the move and to secure at least the beginnings of a respectable library.

The last year has not been a barren one, as we have had 19 papers read, 51 case reports given, 31 pathological specimens shown, 27 living cases exhibited and 2 demonstrations. I cannot help mentioning one paper, that on general septic peritonitis, inasmuch as it was the means of bringing out a general discussion, such as we have not seen here for some time.

While our meetings have been characterized by a larger attendance than usual, I am sorry to say the discussions, with the exception of the last meeting, have been of a limited nature, and in saying this I would recall your attention to the fact that most of your work has been clinical in character. The case-reports have been all of general interest, where you would expect every member would have some opinion of his own and some experience to relate. I am afraid the tendency is here, as elsewhere, to leave the discussions to hospital men and consultants. This is a great mistake. If it is to be followed, the status of the general practitioner will suffer and he will stand on a lower platform in life than others. It is a mistake to suppose that a general practitioner cannot be a scientific man. The matter is wholly in his own hands, and it is only by plodding, persistent work, and never allowing an opportunity to pass by, that he will save the situaiton. The persistent work of the average man tells in the end, and he usually leaves something for the next generation to make use of. The brilliant man shines during the lifetime of his own generation, and is afterwards forgotten. Now, if the younger members of this Society would become more active in its welfare, and, I would add, their own, by the reading of papers, by the reporting of cases, or by the bringing in of cases, there is no doubt they would be doing themselves a great deal of good and also adding to the interest of the work and helping in the object for which this Society was originally founded. If a member reads a paper here, it is to be supposed that he will come with it as well prepared as he can. This he is obliged to do out of respect to the members. If he should be sharply criticized, he must not feel that it is a hint to bring no more papers. He must simply be fearless and defend his paper, advancing his own views and giving his own opinions with the same confidence as do his critics, and he will all the more recognize the fact that this is not a mutual admiration association. His paper would be of no benefit if it were not criticized, as in the criticism some new and important facts may be brought out.

The future success of the Society depends on its younger members, and if they become active now there will be no danger of the future. I have no doubt some of you will be saying:—"Well, this is very fine and sounds well, but what have you done?" I must admit I have done very little, and I am ashamed of it, but it is because I have been such a sinner in the past that I do not wish my example to be followed. A good many will say that a busy general practitioner has no time to do all this. Not so; he can always develop his powers of clinical observation if he has had the proper foundation laid by ample bedside instruction, of which there is not enough at the present time. He can always know enough of bacteriology to help him in his diagnosis, and he can always know enough of pathology to help him in his study of the course and the results of disease. Without this, we are apt to become routine men, and do not add anything to the national reputation of the profession. What a country requires and demands now from its medical men is good practical up-to-date work, and to be able to give this you are obliged to know what others are doing, both in the clinical field and in the laboratory. You will therefore understand the necessity of belonging to some medical association in an active manner. To go to meetings simply to pick up pointers is not laudable, but you should go prepared to take your share of the work.

We have now 199 members all told, of which 165 are "resident members." Fifteen of this number were new members who joined during the year. Four are "non-resident," and 30 "temporary" members, making a total of 199. We have lost two members, one by resignation and the other by death, the late Dr. Hopkins.

In conclusion, I have to say it is the earnest wish of your retiring President that our Society will now continue to prosper and to increase in members, and that we may attain such a position in the eye of the public that suggestions we may feel justified in making to public sanitary bodies, may at least receive a respectful consideration.

Tuberculous Disease of the Seminal Vesicles.

DR. TURNER showed for Dr. Armstrong a man who had been operated upon six weeks previously for tuberculous disease of the seminal vesicles. The patient had first noticed anything wrong in March, 1901, when he complained of constant pain in the testicle, which became swollen and finally broke down, leaving a sinus which discharged until August, 1901. He came into hospital and had the testicle removed, and the sinus remained closed for three weeks, when it opened again just at the root of the sacrum, the discharge being almost watery in character. At the operation, six weeks previously, the left seminal vesicle was found hard, insensitive and enlarged, and it, to-

gether with the vas deferens, was as dissected off by blunt dissection through a perineal section.

Cardiac Arythmia.

Dr. Kenneth Cameron presented a report of this case. It will be published in full in our next number.

Dr. W. F. Hamilton pointed out two peculiar features of the case, apart from the explanations offered by Dr. Cameron. One was the evident precipitation of the attacks when the physician entered the room, and the suddenness of the change from consciousness to unconsciousness. It was a question whether a functional condition might not have played a very important part in the case, apart from the phenomena. He asked if the patient had been the subject of any special habit, or whether he had partaken of any canned foods, such as fish, etc., as some features of the case were not unlike those of ptomaine poisoning. The mental state and the pallor corresponded to the Cheyne-Stokes respirations, and of course might be due to some cerebral stimulation or to some form of poisoning.

Dr. Wesley Mills asked regarding the character of the respiration.

Dr. Cameron stated that the respiration was only slightly disturbed when the heart was not beating.

Dr. Wyatt Johnston inquired regarding the quality of the heart sounds in the so-called normal beats, whether they were accentuated.

Dr. Perrigo asked if Dr. Cameron had any knowledge of the condition of this man's heart previous to the present attack.

Dr. Lafleur thought that cardiac epilepsy would be a very good name for the condition described, which seemed to him to be a neurosis.

Dr. Deeks related the particulars of two cases of his own, which he thought helped to explain the unconsciousness. They were young people, growing rapidly and suffering from periodical attacks of loss of consciousness. In one case, a young lady, the attacks always came on when she was called suddenly to the bedside of her mother who was suffering from cardiac disease. The other was that of a young man who used to faint when rising suddenly. Nothing special was found on examination of the hearts, but Lauder Brunton had described such conditions as due to cerebral anæmia. One could conceive that when convulsions ensued on the setting up of cerebral anæmia, there would be increased blood pressure and this would bring the heart back to its normal condition.

Dr. Wesley Mills congratulated Dr. Cameron on his beautiful graphic representation of the cardiac condition. He regarded the con-

dition as most extraordinary, and knew of nothing like it from a physiological or clinical standpoint. The drawing suggested at once a cardiac inhibition through the vagus nerve. He presumed that the pallor might be wholly explained by the condition of the heart, without any reference to the arterioles, and the anæmia might explain the convulsive condition and also the loss of consciousness. Perhaps the most remarkable thing was the suddenness of transition from one condition to the other, especially in the matter of consciousness and convulsions.

Dr. Mills stated that the views with regard to cardiac rhythm had been somewhat modified of late by striking experiments made with solutions of sodium, calcium and potassium, so that some physiologists explained cardiac rhythm now purely from a chemical standpoint. In this case, owing to the shock with certain errors in diet and probable dilitation of the heart might there not have been alterations in some chemical constituents of the blood so that the rhythm of the heart was made to vary. It was, however, all a matter of speculation with regard to this case, the facts of which sounded like a clinical romance.

Dr. Cameron, in reply, said that he had never seen the old gentleman before. He had never had occasion to consult a physician since coming to this country, forty years before. He had been troubled with flatulency and a good deal of intestinal distress and constipation, but he was unable to say whether he had eaten any canned goods or anything likely to lead to ptomaine poisoning. As to the quality of the heart beat, he was unable to give very definite information as it was impossible to follow it. The diaphragm represented the pulse. He seemed to have a soft mitral murmur at first, but this disappeared after his recovery. With regard to the transition state, perhaps the idea of its rapidity had been somewhat exaggerated. It took about two seconds or so. The patient had been observed for about two hours on the first occasion, and one and a-half hours on the second occasion, and the notes presented were made at the time.

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DAILY MEDICAL INSPECTION OF SCHOOLS.

It is universally conceded that the primary education of every child is a subject demanding the supervision and fostering care of the Government. In many states in Europe attendance at schools maintained by public rates is compulsory. Throughout America it is felt that public opinion is so strongly in favor of education that it is not necessary to enforce attendance by compulsory measures; nevertheless the duty of the State is recognized in the maintenance by public rates of schools in which every child may obtain free a good primary education, sufficient to enable him intellectually to become a good citizen.

With this assumption of duty by the State comes the responsibility of taking precautions that the child while receiving intellectual benefit shall not receive physical harm, its health shall not be impaired, nor any avoidable risk of contracting disease be incurred. This responsibility has in some degree been met in the past by a regular inspection of the condition and the appointments of the various school houses to ensure that they conform to known laws of health. The lighting of

the school room, its heating and ventilation, the shape and height of its desks and seats, and the hygienic condition of its closets, must all be regarded as of the greatest importance to the health, development, and future well-being of the scholars; any neglect of such inspection must be regarded as a distinct breach of trust on the part of those in control.

Recently, however, in many cities a still further advance has been made by the daily inspection of the scholars themselves in regard to matters of personal hygiene and the presence of disease of all kinds, but especially of contagious disease. The first important movement in this direction was made in Brussels by Dr. Jannsens, who in 1874 obtained the appointment of Medical Inspectors for the various public schools, whose duties were not only to supervise and report on the school rooms, but also to inspect the children attending the school and to report on the condition of their health, and the presence of disease among them. In the report of these inspections for the year 1880 it is stated that attention had been given, not only to faults in the construction of the room and its appointments, its temperature and the amount of vitiation of the air, but also to the condition of each child, to the form and extent of gymnastic training it received, to the care of the eyes, ears, teeth, skin and body, to the duration of the lessons, and to the frequency of open-air instruction. Accurate anthropometrical records had been kept as an excellent guide to the condition of health of each pupil; at the same time careful watch had been kept on all children showing symptoms of disease, and rigid regulations had been made for the isolation of all infectious diseases. As a result of their supervision it was stated that at the time of the report there had been no epidemic of infectious disease in Brussels since their methods had been carefully carried out, although in other cities of Belgium and throughout Europe severe epidemics had occurred.

The marked success which attended this work attracted the attention of physicians and sanitarians throughout Europe and in America and new regulations calling for the more or less frequent hygienic and medical inspection of schools were promulgated in all the more important educational centres. In 1875 the French Minister of Public Instruction issued a circular to the prefects of all the departments of France directing that inspection should include both the hygienic conditions existing in the school and the health of the individual pupils. In Switzerland, in Italy, in St. Petersburg and in several of the larger towns in Germany, medical inspection of the scholars as well of the school room was instituted.

In the United States the regular hygienic inspection of scholars in

the public schools was urged as early as the year 1875 by many eminent physicians, and strong representations were made to the Boards of Health both in Boston and New York to have medical inspectors appointed for this purpose. Not, however, till the year 1890 were these representations successful in Boston. In this year the Board of Health divided the city into fifty districts, giving an average of about four school houses and 1400 pupils to each district. Well-qualified and discreet physicians were readily found to undertake for a small honorarium the duties prescribed. These were as follows: A daily visit was made to each school shortly after the beginning of the morning session, and an inspection made of all children reported by the teachers as showing any symptoms of illness. If a child was found too sick to remain in school it was sent home with a card stating the reason and recommending it to the care of its parents and their family physician: prescribing by the inspector was forbidden. If there was any symptom of contagious disease the case was at once reported to the Board of Health. In the examination of the children in the school it was directed that every facility was to be given to the doctor, while at the same time he was requested to reach his conclusions with the least possible delay and annoyance to the school.

In the report of the Boston Board of Health for 1896, it is stated that from November 1st, 1894, to October 31st, 1895, the number of children examined was 14,666. Of these 9,188 were found to be sick, 1,745 were ill enough to be sent home; of these 437 had some infectious or contagious disease.

Under the stimulus of the daily medical inspection, it was found that teachers became quicker and more expert in the detection of existing illness, sick children were promptly isolated, the danger of contracting infection was minimized and parents felt secure, even during the prevalence of disease in allowing their children to attend school. The number of children saved in this way from disease, possibly of a fatal character, is beyond computation, for undoubtedly the contact of children with one another in school is the most frequent method in which the contagions of the various infectious diseases are transmitted.

Statistics very similar to the above are to be found in the Reports of the boards of Health for New York from 1896 to 1899, and also in the Reports of the Boards of Health of Philadelphia and Chicago.

Not only does such an inspection do much for the direct well-being of the child itself, but it has an important influence in educating the scholars generally to the importance of hygiene, of pure air and good

water, and of cleanly habits and surroundings, and through them has an ultimate effect on the general mass of the people.

Our attention has been called to this subject by the very excellent address delivered before the Montreal Medico-Chirurgical Society by Professor Ruttan, and the paper which appeared in our last issue by Dr. Tait McKenzie, who has worked for some years among the youth in this city to develope physical culture under careful medical supervision. That such a state of affairs as recorded by Dr. Church, whose paper appears in this issue, should be permitted, certainly speaks very little for the supervision exercised by the Board of Health in this city over our public schools, and we earnestly hope that the resolution adopted by the Society will receive the careful consideration of both our Boards of Education.

AMERICAN MEDICO-PSYCHOLOGICAL ASSOCIATION.

Apropos of the coming meeting in Montreal (June 17, 18, 19 and 20), of the American Medico-Psychological Association, a few words as to the origin, constitution and objects of the organization might not be amiss.

The honor of first proposing the formation of the society is due to Dr. Samuel B. Woodward, Superintendent of the Massachusetts State Lunatic Hospital, at Worcester, and Dr. Francis T. Stribling, Superintendent of the Western Lunatic Asylum of Virginia, at Staunton. During a visit paid by the former to the latter, it was felt that the mutual benefit derived from their exchange of views on asylum management, made it but reasonable to suppose that the cause of the insane would be materially promoted by the meeting together at stated periods, for consultation, of all those in charge of similar institutions. It was accordingly arranged between them that Dr. Woodward should, on his way home from Virginia, call upon Dr. Thomas S. Kirkbride of the Pennsylvania Hospital for the Insane, at Philadelphia, and that they should, by mail or personal interview, confer with Dr. William M. Awl of the Ohio Lunatic Asylum, Columbus, and others interested in the good work.

The result was a meeting of medical superintendents of asylums at a then famous hostelry, Jones' Hotel, in Philadelphia, on October 16th, 1844, and the organization of an association, which it was resolved should be known as "The Association of Medical Superintendents of American Institutions for the Insane." It was further resolved that the medical superintendents of the various incorporated or other legally constituted institutions for the insane then existing in the

United States, or which might be commenced prior to the next meeting, should be elected members of the Association. At the following meeting, the scope of this resolution was enlarged so as to include the medical superintendents of all asylums on the continent.

The officers appointed at the first meeting were Dr. Samuel B. Woodward, President; Dr. Samuel White, Vice-President; and Dr. Thomas S. Kirkbride, Secretary and Treasurer.

It will thus be seen that the American Association is but three years the junior of the Medico-Psychological Association of Great Britain and Ireland, that body having been formed in June, 1841, and held its first annual meeting at Nottingham, in November of the same year.

Of the thirteen members present at the first meeting in Philadelphia, known among American alienists as the "Original Thirteen," all have passed to the bourne whence no traveller returns, Dr. Pliny Earle, the last, but by no means the least of that glorious band, departing this life on May 17th, 1892. But, though gone, the good work of which they laid the corner-stone stands as an everlasting monument to their greatness, benevolence, and philanthropy.

"We live in deeds, not years; in thoughts, not breaths;
In feelings, not in figures on a dial.
We should count time by heart-throbs. He most lives,
Who thinks most, feels the noblest, acts the best."

Even a very brief summary of the cardinal principles laid down on all important subjects relative to the care of the insane, at the early meetings of the Association, would require more time and space than can be here accorded. They covered a vast territory, embracing the construction and organization of hospitals for the insane; the medical, moral, and hygienic treatment of mental disorders; the statistics, causes, and prevention of insanity; the legal principles which should govern in the jurisprudence of insanity, etc., etc. Suffice it to say, that so broad and comprehensive were the foundations then laid that they form, even to this day, the basis of asylum management.

In 1892, the name of the organization was changed to the American Medico-Psychological Association, which it now bears, and its object re-defined as "The study of all subjects pertaining to mental disease, including the care, treatment, and promotion of the best interests of the insane." The active membership was made to include physicians resident in the United States and British America, especially interested in the treatment of insanity.

From its birth, in 1844, up to the present date, the Association has met yearly, with one exception. In consequence of the disturbed

state of the country caused by the outbreak of the great civil war, in April, 1861, the meeting set for that year, at Providence, Rhode Island, was postponed to 1862. In all that time, the organization has assembled but three times on Canadian soil, namely, at Quebec, in 1858, and at Toronto, in 1871 and 1881. This year it holds its fifty-eighth annual convention in Montreal never before honored by its presence, on invitation of the Medico-Chirurgical Society, and it behooves all members of the profession to put forth their most strenuous efforts to make its initial visit here a success, and to do honour to a society which has aided so largely in securing to American hospitals for the insane a reputation that places them on a par with any in the world. The present officers of the Association are: Dr. R. J. Preston, of Marion, Va., President; Dr. G. Alder Blumer, of Providence, R.I., Vice-President; and Dr. C. B. Burr, of Flint, Mich., Secretary and Treasurer.

The gathering will probably include not less than one hundred and fifty of those who have devoted their lives to the care of the mentally afflicted, among them many of the foremost alienists on the continent, and proposed functions incident to the occasion are addresses of welcome by the Lieutenant-Governor of the Province, the Mayor of Montreal, and the President of the Montreal Medico-Chirurgical Society. The delivery of the annual address, a task always delegated to one outside the ranks of the Association, has been entrusted to Dr. Wyatt Johnston, who has selected for his subject, "The Medico-Legal Appreciation of Trauma in its Relation to Abnormal Mental Conditions."

The Committee of Arrangements, appointed by the Association at its last meeting, held in Milwaukee, Wis., consists of Dr. T. J. W. Burgess, Dr. G. Villeneuve, Dr. J. V. Anglin, Dr. E. Philippe Chagnon, and Dr. James Perrigo, of Montreal, and Dr. A. Vallee, of Quebec. This committee has selected the following gentlemen to assist in making fitting preparation for the entertainment of our distinguished visitors: Dr. G. E. Armstrong, Dr. T. G. Roddick, Dr. Jas. Stewart, Dr. A. Macphail. Dr. F. J. Shepherd, Dr. A. R. Marsolais, Hon. Dr. Jas. Guerin, Dr. E. P. Lachapelle, Dr. R. Boulet, and Dr. F. Devlin.

The headquarters of the Association will be the Windsor Hotel, there the ladies' ordinary has been secured as a meeting room for the reading of papers, many of which of a highly interesting character have been promised; and the transaction of other business.

A LESSON FOR THE ANTI-VACCINATORS.

A most striking object lesson to the anti-vaccinators and one which would have been hard to improve upon had it been prearranged, has been furnished by the experience of a Dr. Immanuel Pfeiffer of Boston.

The story, the facts of which we glean from the *Boston Medical and Surgical Journal*, is of more than ordinary interest.

Dr. Pfeiffer, it seems, has been for years one of the most aggressive, and withal the most consistent, of the opponents of vaccination and of late has been giving the municipal authorities of Boston considerable trouble. As an outcome of the strength of the opposition aroused by him, the chairman of the Board of Health of Boston offered to allow any unvaccinated person, who desired to do so, to visit the smallpox hospital. No notice was taken of this at the time, but Dr. Pfeiffer subsequently applied for permission, giving as a reason that he wished to study the disease. The doctor, however, had only been vaccinated about 60 years before in childhood. The visit was made on January 23rd, and due precautions were taken at the time to prevent his carrying away infection on his clothes. Great publicity was given to his visit, both by the daily papers and by his appearing on the 28th before the committee on Public Health as a petitioner for the abolition of compulsory vaccination. Here he asserted that anyone, like himself, who had not been vaccinated for 60 years could expose himself to the danger of infection with impunity. Meanwhile the Board of Health, looking upon him as a suspect, had kept careful watch of his movements, and when he did not appear at the next meeting of the public health committee, 12 days after his exposure, search was made for him. It was not until four days later that they were able to locate him at his country residence in Bedford, where he was found to be seriously ill with smallpox, although his exposure to the infection had lasted not more than an hour. In contrast to this is the fact that of all the physicians and nurses in attendance at the hospital during the whole winter, not one had contracted the disease.

While there is nothing unusual in the contraction of the disease in the manner described, the great publicity which had been given to the matter by the victim himself and the way in which he was "hoisted with his own petard," will serve, we hope, as a wholesome lesson to those members of our profession who deny the most firmly established principles.

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Obituary

RICHARD MAURICE BUCKE, M.D.

Rarely has the news of the death of one of our professional brethren come with a greater shock or occasioned more profound sorrow than that of Dr. R. M. Bucke, Medical Superintendent of the Asylum for Insane, London, Ontario, and the genuine regret expressed thereat by all sections of the community, to which he was widely known, leaves no doubt that his merit and devotion to public duty were appreciated in a degree commensurate with their just claims. His splendid physique, buoyant spirits, and correct habits bespoke for him much more than man's allotted span of years, but alas! no physical strength can safeguard against accident, and to accident was due the loss of this truly valuable life.

Dr. Bucke, it appears, had just driven home from the city, and about 11.30 p.m., February, 19th, preparatory to retiring for the night, walked out alone on the verandah of his house on the asylum grounds to enjoy the beauties of the moonlit winter night. A few minutes later his family heard the sound of a fall, and, hurrying out, found that he had evidently slipped on a piece of ice, and falling, had struck heavily on the back of his head. He was immediately lifted and carried into the house, but life was already extinct. Drs. McCallum and Beemer, who were summoned without delay, found death to have been caused by concussion of the brain and hæmorrhage.

Richard Maurice Bucke was born at Methwold, Norfolk, England, March 18, 1837. On the side of his father, an English Church clergyman, the Rev. Horatio Walpole Bucke, he was descended from Sir Robert Walpole, first Earl of Orford, his mother, prior to her marriage, being a Miss Clarissa Andrews of Milden Hall, Suffolk. When he was only a year old, the family removed to Canada, where they settled upon a farm near the then village of London, Ontario, within a few rods of the spot where in later years was to be erected the asylum which, for nearly twenty-five years, he so ably superintended.

Schools at that time were few and inferior, and the early education of Maurice and his brothers was conducted by their father, who was a graduate of Trinity College, Cambridge, a fine linguist, and the possessor of a large and varied library to which the lads had free access. Later, he attended for a short time the London Grammar School.

In 1853, when but sixteen years of age, the boy, having lost his father and mother, left home and made his way to California overland,

on foot, returning by the Isthmus of Panama in 1858. During these five years of wandering through the Middle, Southern, and Western States, he saw much wild life in the placer mining districts of Nevada, and underwent many hardships. Crossing the continent, on the Humboldt River, midway between Salt Lake and California, he and his party fought for their lives half a day with the Shoshone Indians,—nearly died of thirst, and afterwards were well nigh starved to death. Later, in the fall of 1857, with a single companion he was lost in the Sierra Nevadas. They had been unavoidably delayed in starting to cross the mountains, and when half way over were caught in a blinding snow storm. For nearly a week they were shut up in a little valley in the heart of the mountains, and had to kill their pack-mule for food while waiting for the storm to cease. At last they forced their way across the divide, but were again arrested by the snow, and, having lost the trail, wandered aimlessly along, endeavouring to follow the course of a small stream downward. After five days and four nights, stumbling through the deep snow, without food or fire, and badly frozen, they struck a small mining camp in the mountains. Here his companion died from exhaustion, the result of the privations he had undergone, while Maurice himself was confined to bed for months, but escaped with the loss of one of his feet, which had to be amputated.

On his return to Canada, through a small sum of money left him by his dead mother, he was enabled to enter upon the study of medicine at McGill University, Montreal. His mind, after lying so long fallow, absorbed ideas with extraordinary facility, and he graduated therefrom as first prizeman, in 1862. The following two years were spent in additional professional study in England and France, after which he made a second trip of a year's duration to California in the interest of the Gould and Curry Silver Mining Company, on business connected with the celebrated Comstock lode.

Returning again to Canada, in 1865, he settled at Sarnia, Ontario, where he was married, the same year, to Miss Jessie M. Gurd, of Moore, Ontario, who, with four sons and two daughters, survives him. Here he continued the practice of his profession up to 1876, when he was appointed Medical Superintendent of the Asylum for Insane at Hamilton, Ont. The succeeding year, on the death of Dr. Henry Landor, he was promoted to the superintendency of the London Asylum, of which institution he continued in charge up to the time of his death.

During his asylum career, Dr. Bucke evinced wonderful ability in the care of the insane, his constant endeavour being to administer the interests confided to his charge by the Province, intelligently, faithfully and economically. He had long been regarded as one of the

leading authorities on the subject of mental diseases, and his services as an expert were sought in most important cases where sanity was in question. His *confrères'* appreciation of his abilities as an alienist was evinced by his selection, in 1897, to preside over the Psychological Section of the British Medical Association, which met in Montreal, and by his election, in 1898, to the Presidency of the American Medico-Psychological Association. He also held the professorship of Mental and Nervous Diseases in the Western University at London. To him is due the introduction in America, in 1883, of the absolute non-restraint system, which is now the accepted principle in the treatment of the insane throughout nearly all American institutions. This fact is of special interest and worthy of record, as at that time nearly every superintendent on the continent regarded the doctrine of absolute non-restraint as purely utopian, and to be ridiculed accordingly. To-day scarce one is bold enough to advocate the use of mechanical restraint, except for surgical or other very exceptional purposes.

Another important reform in Canadian asylum management inaugurated by Dr. Bucke was the discontinuance, as a beverage for the patients, of all beer, wine and spirits. In this step he was largely influenced by the precepts and teachings of his friend Sir Benjamin Ward Richardson. In recent years, too, he had devoted much time and thought to the benefit of systematic gynæcological surgery in the treatment of insane women, his published results in this respect showing the urgent necessity for always removing physical disease, where it exists, as a step toward the relief of mental alienation.

Dr. Bucke was a man of scholarly tastes and habit,—a man of wide cultivation and grasp of mind,—a man in whom were united intellectual and moral forces not often found combined. A realist as regards all the details incident to the proper discharge of his official duties, he was nevertheless an idealist and lived in a world of his own mental creation. The natural powers of a strong mind were in him refined by literary culture, his work never preventing his devoting a certain portion of the day to reading. In this way he kept in touch with all that was going on in the world, and had an intimate knowledge of most of the new works in literature and science. The wielder of a facile pen, he was one of the original Fellows of the Royal Society of Canada, having been chosen by its founder, the Marquis of Lorne, Governor-General of the Dominion, now the Duke of Argyle, as a representative on the English Literature Section.

In addition to his earliest work, "Man's Moral Nature," published 1879, in which he traces the development of the moral nature and contends that its physical basis is the great sympathetic nervous system,

Dr. Bucke was the author of a large number of papers, dealing directly or indirectly with the subject of mental evolution. Throughout all of them is maintained the opinion that the human mind has been slowly evolved by a species of unfolding, or growth, extending over millions of years, and that, in process of time, new faculties, even new senses, will probably be evolved. His latest work, "Cosmic Consciousness," published last year, is an epitome of all these, the product of thought and work extending over a period of nearly thirty years. In this he describes and traces the origin of a new faculty, now in course of development in the human race. To this faculty he gives the name cosmic consciousness. As he himself puts it, the object of the work is to show ;—"That the human mind is now in the very act of making this supposed step ; is now in the very act of stepping from the plane of self-consciousness to a higher plane than it, which I call Cosmic Consciousness." The nature of the new faculty is thus described, and contrasted with the simple consciousness of the higher animals and self-consciousness, by the possession of which man is distinguished from the brute creation.

"Cosmic Consciousness is a third form (of consciousness), which is as far above Self Consciousness as that is above Simple Consciousness. With this form, of course, both simple and self consciousness persist (as simple consciousness persists when self consciousness is acquired), but added to them is the new faculty so often named and to be named in this volume. The prime characteristic of cosmic consciousness, as its name implies, is a consciousness of the cosmos, that is, of the life and order of the universe. There are many elements belonging to the cosmic sense besides the central fact just alluded to. Of these a few may be mentioned. Along with the consciousness of the cosmos there occurs an intellectual enlightenment or illumination, which alone would place the individual on a new plane of existence—would make him almost a member of a new species. To this is added a state of moral exaltation, an indescribable feeling of elevation, elation and joyousness, and a quickening of the moral sense, which is fully as striking and more important both to the individual and the race than is the enhanced intellectual power. With these come, what may be called, a sense of immortality, a consciousness of eternal life, not a conviction that he shall have this, but the consciousness that he has it already."

Among the many possessors of the new faculty enumerated by Dr. Bucke, the following thirteen, he says, "are so great that they can never fade from human memory," Gaudama the Buddha, Jesus Christ, St. Paul, Plotinus, Mahommed, Dante, Las Casas, John Yepes, Jacob Behmen, William Blake, Balzac, Walt Whitman and Sir Francis Bacon.

Bacon, be it borne in mind, is with Dr. Bucke synonymous with Shakespeare. In these, as in all other cases of cosmic consciousness, there were certain phenomena connected with the on-coming of the new faculty, the most striking of which was a sudden sense of being immersed in flame or in a brilliant light,—this occuring entirely without warning or outward cause. From among those blessed with the new consciousness I might cite the following descriptions of individual experience with regard to this peculiar light.

Paul (in his speech to Agrippa) said : "As I journeyed to Damascus I saw on the way a light from heaven, above the brightness of the sun." Then he heard the voice.

Dante gave an account of the on-coming of the cosmic sense in these words : "On a sudden, day seemed to be added to day, as if He who is able had adorned the heaven with another sun."

Whitman described it thus :—

> "As in a swoon one instant,
> Another sun, ineffable, full dazzles me,
> And all the orbs I knew—and brighter unknown orbs ;
> One instant of the future land, Heaven's land."

Of other literary work from the pen of Dr. Bucke, the most notable is his biography of Walt Whitman, published in 1882, which is still the standard work on the subject. No one could have been better fitted for such a task than Dr. Bucke, who had been a life-long friend of the "Good Grey Poet," one of whose literary executors he was, and who was the possessor of the largest and best Whitman collection of books and manuscripts in the world.

Dr. Bucke was also an ardent partizan in the Bacon-Shakespeare controversy, and claimed to have discovered absolute proof of the Baconian authorship of the Shakespeare plays within themselves. This proof he had expected very soon to publish in extended form.

Take it for all in all, where shall one seek for a life of greater usefulness than that, the loss of which we now mourn ? Sadly shall we miss the sight of his picturesque, Whitmanic garb and face full of strong character, the sound of his bluff, cheery voice, and the hearty grasp of his hand,—and not one of us but will fervently echo the wish.—

> "Oh for the touch of a vanished hand,
> And the sound of a voice that is still."

In the death of Dr. Bucke Canada loses one of her foremost minds, psychiatry one of its ablest exponents, McGill one of her most distinguished graduates, and, saddest of all, his family a devoted husband and father. Peace to his ashes.

Proceedings of the McGill Medical Society of Undergraduates.

MALARIA, FROM MARSH POISON TO MOSQUITO BITE.

BY

STANLEY P. THOMAS.

From the earliest period in the history of medicine the question "What is malaria?" had been asked, but the answer had not been forthcoming. Theories innumerable were advanced only to be rejected each in its turn. It remained for the closing years of the 19th century, the century marked by so great advances in medical science generally and in its methods of observation in particular, to bring forth a solution of the problem,—a solution so complete, that now in the opening year of the 20th century, it can be said that malaria is one of the few diseases that can be positively diagnosed and rationally treated. Truly an important statement with regard to a disease which has been estimated to cause one half of the mortality of the human race and has been styled by one of the older writers "the Destroying Angel," to whom the task of keeping man within bounds has been specially assigned.

The word "malaria," as it is used to-day, has not the same significance as with the older writers. Dr. Barner in the Fothergillian Prize Essay of 1859, used malaria in its wide sense, "that is to say, air or a gas, or a compound of gases, which being absorbed by the lungs, gives rise to certain specific effects or symptoms which grouped together constitute a disease. But by the profession generally the word has been restricted to the train of symptoms caused by certain organisms which exist in the red corpuscles of the blood, and are called hæmamœbidæ or plasmodia malariæ.

The frequent references to the different forms of malarial fever show that the dire effects of the disease on the human system were well known to the earliest physicians. Hippocrates mentions the enlarged spleen, emaciation and diarrhœa, which he attributed to the drinking of marsh water. Galen and Avicenne refer to the exhalations from marshes, the latter attributing the evil effects produced to decaying vegetable matter. Lancisi in Italy, was the first to demonstrate that the disease was caused by a material substance. In 1695, he wrote his treatise, "De noxis paludis effluvis," championing the cause

of the "marsh poison" as the malarial agent. This poison he considered to be generated from stagnant waters containing the debris of animal and vegetable matter. The theory of the aëriform nature of the disease was accepted for many years, but all attempts to demonstrate by chemical means the poisonous ingredient of marsh air were without success. Hydrocyanic acid and sulphuretted hydrogen were suspected and accused and as vehemently defended. Livingstone observes of the Zambesi, "the flood water ran into a marsh some miles above the mountain and became as black as ink, and when it returned again to the river emitted a strong effluvium of sulphuretted hydrogen. We spent one night in it and suffered no ill effects, though we fully expected an attack of fever."

As the inorganic matter was shown to be incapable of being the agent of the disease, it was thought that the characteristic toxic effects might be brought about by the less known organic matter. A supporter of this theory defines it as being "a ferment which is probably a highly complex nitrogenous substance capable of being dried and carried by the wind far from the place where it was produced." Beneath the stream of theories and conjectures there had been, however, an under current of opinion that the cause of the disease was a living organism. As early as B.C. 14, Varro had surmised that this was the case, and again in 1778, Lucretius brought forward the same theory. This opinion became more and more pronounced as methods of observation and experiment increased in precision. Dr. Salisbury, of Ohio, by direct observation concluded that the malarial germ was an unicellular alga. Following in the same track, many other observers brought forward fresh germs to be deposed in turn by germs with more pressing claims. In 1870, Dr. Oldham struck a new chord abandoning the beaten track; he states that he found it impossible under any of the usually accepted theories to account satisfactorily for many of the phenomena attending the production of malaria. Malaria as a specific poison does not exist. "I am convinced," he says "that the diseases attributed to malarious influence are caused by chill." The search by the believers in the germ was, however, actively proceeding. In 1879, the bacillus malariæ was discovered and named by Klebs and Tommasi Crudeli. Symptoms resembling those of malarial fever were said to have occurred in rabbits inoculated with the culture fluid of the bacillus, and it seemed as if the long sought for germ had at last been found. But it failed, as all others before it, to stand the test of closer investigation. Dr. Sternberg, of the U. S. Army, showed that healthy rabbits sometimes exhibited diurnal variation of temperature as marked as those on the charts. The evidence on which the claims of the bacil-

lus malariæ were based, could not therefore be taken as conclusive. Dr. Strenberg himself, in his treatise on the subject, confessed the general ignorance of the real nature of the cause of malaria and defined it as being "an unknown poison of telluric origin."

Finally, in 1881, Laveran, of Paris, announced his discovery of a parasite which he believed to be the true malaria germ. These parasitic elements had been found by him in 180 out of 192 persons suffering from malarial poisoning, and they disappeared on the administration of quinine. Amid the conflicting claims of rival germs, but scant attention was paid to the discovery which made so great an acquisition to our knowledge, an acquisition stated to be "as important as that which revealed the true etiology and pathology of continued fevers in Europe." Sir Joseph Fayrer in his lecture on Indian Fevers, 1882, remarked that "the existence of malaria as a particulate thing has not yet been demonstrated, there are circumstances connected with its action which are difficult to reconcile with a parasitic origin." By degrees, however, the discovery of Laveran gained ground. His statements were confirmed by observers in different parts of the world. Richard in Algiers, Marchiafava and Celli in Italy, and Osler in America, endorsed the old facts and added new ones. Finally, Golgi pointed out the relation between the biological cycle of the parasite and the events of the fever cycle. There could no longer be any doubt that Laveran's parasite was the germ of malaria. It took its place as an established fact of pathology. The following description of the parasite, is taken from a lecture by Dr. Manson :—

On examining the blood of a patient suffering from malaria at the period of rigor, there can be seen floating amongst the red corpuscles, single spherical bodies which are quite isolated. These are the youngest forms of the parasite. A little later on, these bodies will have stormed the red corpuscles and appear as pale minute spots in or on the corpuscles. A few hours later, another examination will show, not the pale epicorpuscular specks, but actively moving, pale amœboid bodies, evidently within the corpuscles. These bodies push out pseudopodia into the surrounding hæmoglobin. They continue to increase in size, and after a time each one contains a few grains of a dark red pigment which is ever changing its position. Later on yet, we find similar pale bodies but now they are almost quiescent and nearly fill the corpuscles they occupy. The pigment is collected into clumps and is scarcely moving. A final examination will show the bodies as morula-like masses, consisting of 10 to 20 spherules heaped around a central mass of pigment grains. These bodies may be free or surrounded by the shell of a red corpuscle. The former appear to be

breaking up into individual spherules, some of which are seen floating free in the plasm. Here is evidently a cycle. The large pigmented body is the mature animal ready for sporulation. The segmented mass is the same with the spores formed and the isolated spherules are the free spores. The latter attach themselves to a corpuscle and the cycle begins afresh.

The existence of the malaria parasite being established beyond a doubt, it became necessary to discover the path by which it entered man in order to establish a complete cycle of its life history. It was certain that the malaria germ must come from without, but all attempts to find it in external nature were failures. There was but one other method of research—to follow the parasite from the human body back through its extra-corporeal life and back into man again. It was along this line that Dr. Manson carried out his inquiry in 1896 It was shown that the residence of the plasmodium in man was not accidental, but in the interest of its species. It was a true parasite, and obeying the laws of parasitism, must have acquired habits which make the continuance of its species possible, namely, the right way of entrance into the body of its host and the right way of exit from it. Certain well known facts pointed to the nature of this acquisition. The blood of a malarial patient suffering from a pernicious form of the disease, contains a form of the parasite termed the crescent body. These bodies, after the blood had been drawn for some time, were observed to take on a spherical shape and become flagellated. An interpretation was given to these facts by Dr. Manson, for the first time as follows:—"The crescent body which proceeds to flagellation is the extra-corporeal homologue of the intra-corporeal sporulating body, and the flagellum is the extra-corporeal homologue of the intra-corporeal spore. Both types of sporulating plasmodium have corresponding functions, both arise from the same source; one is the germ of the plasmodium inside the human body, the other, the germ of the plasmodium outside the human body." The fact that this process of flagellation only occurred when the blood was drawn from the containing host, led Manson to the inevitable conclusion that the plasmodium made its escape from the body through the agency of some suctorial insect, probably the musquito.

Long before Laveran's discovery of the parasite of malaria, it had been conjectured that the mosquito was in some way mixed up with the causation of the disease, and the fact that the mosquito and malaria are both paludal in habit is suggestive of such a connection. An article by King, in 1883, was the first written exposition of the mosquito-malaria theory, and Laveran in 1884, suggested that a connection

between the germ and the mosquito might exist. But the idea took no definite form until Manson formulated his hypothesis that the malaria parasite was common to man and the mosquito, which it should enter, depending on circumstances, and that it could be transferred from the one to the other. There were many observers, however, who disagreed with the evolution theory regarding the flagellate body. The Italian school for the most part held that the phenomenon of flagellation was not a life process of the plasmodium, but was one of involution or degeneration. It was due to a change brought about in the dying protoplasm. The future knowledge of the intra-corporeal life history of the malaria germ depended on proving that the nature of the process of exflagellation was developmental. With this end in view, Major Ross made Manson's hypothesis the basis of further investigation.

In his preliminary experiments he showed that the transformation of crescents into flagellate bodies, could be checked or produced at will according as certain conditions were present or not. The transformation could not, therefore, be a degenerative change. By feeding mosquitoes on crescent containing blood, he then made the important observation that the great majority of crescents were rapidly transformed into flagellate bodies very soon after entering the stomach of the insect. The flagellæ subsequently broke off and became free. Pursuing his observations in India, Ross succeeded in cultivating the human parasite in the dapple-winged mosquito of the genus Anopheles. The next year, 1898, by following the development of the parasite of birds in mosquitoes, and by infecting healthy birds by means of mosquitoes which had bitten infected birds, he completely traced the cycle of the life history of the parasite. This work was confirmed by Koch and by Italian observers in 1898, and by Daniel's in 1899. McCallum had in 1897, demonstrated that certain forms of the parasite were sexual in nature and every link in the chain was complete. A little later it was shown in Italy, by actual experiment that the human being could contract the disease by the bite of an infected insect of the genus anopheles. The life history of the parasite as given by Ross is as follows:—"The youngest forms exist in the red corpuscles of the vertebrate host and on reaching maturity, become either sporocytes or gametocytes. The former are to continue the species in the blood, and proceed to sporulation. The latter are sexual forms and remain unchanged in the blood. On being sucked into the stomach of the mosquito the female gametocyte emits a body which is fertilized by another body emitted by the male form. The resulting body is termed a zygote. This now pierces the stomach wall of the mosquito and

becomes affixed to its outer coat. Here it grows and becomes filled with a numerous progeny. Finally it ruptures and emits its contents, which are termed blasts. Guided by a marvellous prescience of their future destiny, the blasts work their way to the salivary glands of the mosquito, from which they are ejected through the proboscis into the blood of the next host, and the process recommences.

In 1899, the Liverpool School of Tropical Medicine, resolved to put the discovery thus made, to some practical use. Under its auspices a special expedition, of which Ross was one of the members, was sent out to the West Coast of Africa with the object of finding some better means for the prevention of malaria than those at present used.

A question which has a very important bearing on the prevention of the disease is whether anopheles is the only genus of mosquito hospitable to the human parasite. All evidence hitherto, including that of the African Expedition, points to this conclusion. To take one illustration.

It is a well known fact that large towns are unfavorable to malarial fever. This can be explained on the ground that Anopheles do not breed in tubs and vessels of water, and the stagnant puddles necessary for them are not found in well drained cities. The common mosquito on the other hand does breed in tubs of water and abounds in every city.

After a patient has once suffered from the disease which he has primarily got in some malarious region he may suffer from relapses for many years. Between the relapses the parasite still exists in his blood in small numbers, but its condition during this stage has not yet been fully determined.

Further research, will, no doubt, do much to solve various points in connection with malaria. The question of the prevention of the disease has of late become a considerable factor in imperial matters, and it has been said that Major Ross did more than anyone to add to the extent of the British Empire when he dissolved the darkness which enshrouded the action of the spirit of malaria. The British colony of Sierra Leone was chosen as the field of operations, and Ross and his associates succeeded in finding almost immediately two species of anopheles in which the human parasite would develop. It was found that anopheles breed only in pools of stagnant water; haunting the abodes of men by night, the female anopheles obtains the blood necessary for her fertilization and having inoculated her victim with malaria, returns to deposits her eggs in the stagnant water. Drainage of such pools, and destruction of larvæ, by pouring tar on the surface of the water were suggested by the expedition.....and mosquito

nets at night were also recommended and although anyone who has had actual experience will know that it is impossible to escape being bitten sometimes, yet the danger will be mimimized.

Before the mode of infection was known the only prophylactic measure taken was daily use of quinine.

In British Guiana, 10 to 15 grs. of the drug every morning is indispensable for the overseer of the sugar-cane plantations, if he is to escape the dread malarial disease. So well is this fact recognized that it is probable in the near future that no one will be chosen for government service in malarial regions, who cannot take large quantities of quinine.

THE MODERN BULLET, ITS EFFECTS AND THEIR TREATMENT.

BY

R. C. Cox, '02.

The paper which I shall read this evening, is a summary of facts concerning the modern bullet and its effiects which I have gathered from the reports of military surgeons and correspondents in Cuba, South Africa and the Phillipines, and of the treatment as carried out by them and advised by authorities at home.

At the very start let me impress upon you that there is a great difference in the modern bullet, as we see it in civil life, and the bullet with which the soldier makes acquaintance. So there are differences in its effects, and their treatment, but granted this, much can be learned from the experience of military surgeons on the battle field that will be of great value in civil practice.

First, to consider the bullet, and in so doing attention might be drawn to the rifle. It is somewhat extraordinary that the development of the rifle as an instrument of carrying the missile long distances, does not correspond with its destructive powers, because, although a great improvement, it does not destroy or disable as many men as the old ones, the point which in war is held to be the test for a good rifle. The bore of the rifle is small and rifled so as to give rotation to the ball in its long axis. A Mauser has a complete turn in every 22 inches, Lee Metford in every 10, and Martini Henry 8½ inches. The great object is to get a flat trajectory as this means greater accuracy in shooting, harder hitting, and increases the size of the danger zone. That is, a Martini Henry, sighted for 2000 yards, will have to rise 357 feet, so there is an immense area where a man could walk between the target and rifle. The Lee-Metford rises 194 feet. The muzzle velocity of the Lee-Metford is 2000 feet per second, of Mauser 2,300 feet. Cordite is the explosive used by the British. It is made from nitroglycerine and looks like strings of gelatine. Tommy Atkins has been known to dig it out of the cartridges and eat it as it is a mild stimulant. Smokeless powder is used, it is black and coarse resembling bits of charcoal.

"The power of the bullet to overcome resistance is directly proportional to its weight and inversely proportional to its cross section," is

the rule, and it would seem that the modern bullet was made strictly according to it.

They are cylinders 1¼ inches in length, ⅓ of an inch in diameter, and weigh about 20 grams, or a little over an ounce. They consist of a lead core, hardened with 2 per cent. antimony and of a shell made of 80 per cent. copper, and 20 per cent. nickel. The tips of these bullets are rounded off even to the extent of being quite pointed. So we have a long slim heavy bullet travelling with great velocity and revolving on its long axis. These are bullets of high velocity.

But we have another class of modern bullet. These are the missles from weapons of low velocity as the Remington and Springfield rifles and the revolver. These need no description, as they are known to us all more or less, but their effects must be noted, as it is wounds from these we will meet in civil practice. So much has been said of explosive bullets that perhaps a word concerning them would be of interest. Sir Frederick Treves says, "There is no such thing, but there may be expansile bullets which are simply the ordinary rifle bullet with its nickel coat either stripped off or split, which when it strikes bends back and the soft lead is exposed. The soft nosed bullet is a soft lead bullet with no metal coat on tip."

The bullets used by sportsmen for big game are hollow nosed Mauser bullets and produce wounds of terrible character. They may have a nose of soft lead or the sheath split.

Effects.—Having glanced at the bullet, we can now proceed to the effects on the individual so unfortunate as to encounter one. A good example of the penetrating power is seen in the case of a soldier wounded in the assault on Spion Kop. A Mauser bullet passed through the centre of a Lee-Metford cartridge in his belt, and hardly bent it, and left the cordite perfectly intact, it then went through his abdomen and out through the buttock and, as usually happens, produced no symptoms. One can hardly believe that a bullet, at as long a range as this must have been, would have struck a smooth round cylinder of brass like a cartridge, and have gone straight through without exploding the cordite and then through the man, to say nothing of its producing no effects. But this case is reported by no less an authority than Sir Frederick Treves, so we can feel confident that one effect of the modern bullet is a perforatory if not a penetrating wound.

We of the class of '02 have been told that "gunshot wounds are contused, lacerated, punctured wounds," damaging the tissues beyond where actually struck and in many instances failing to break the skin but producing extensive damage to the subcutaneous tissues; and that they being dirty, carried bacteria of all kinds as well as bits of clothing

into the wound, and death often resulted from comparatively slight wounds. What a different picture is presented by the modern gunshot wounds? First we notice the straight course the bullet has taken, the direction of which, of course, depends upon the position of the body at time of receipt of injury. Secondly, the small calibre of the track and slight contusion and condensation of the tissues immediately surrounding the wound. The force of the bullet seems to be mainly exerted on tissues immediately before it. Thirdly, the aperture of entry and exit are extremely small and in wounds of soft parts often differ little in appearance. If the bullet strikes at right angles the aperture of entry is circular, clean punctured out, about $\frac{1}{3}$ inch in diameter, margin just slightly depressed and contused wound of exit is more slit-like, and surrounding contusion even less marked, is about same size as entry and there are no signs of laceration. If it strikes obliquely, aperture of entry is oval, and when supported by bone as on head is of considerable size. The damage done depends on the range; at 1,500 to 2,000 yards it penetrates like a needle; at 500 yards it will smash a bone to fragments. And here is a point of interest and importance from a medico-legal standpoint in the fact that there has been no scorching and tatooing of the tissues, although the rifle has been held very close to the skin, as seen in cases of suicide and accident. So it appears that where cordite is used it is no longer possible to judge from these features at what distance from the surface of the body the muzzle of the rifle may have been at time of discharge.

Another remarkable feature is that wounds produced by the modern bullet are rarely infected, and tend to run an uneventful course to recovery. From this it is evident no bacteria are carried into the wound. So the bullet must be sterile. To what is this due? There are many answers. I will give some of them and leave you to judge as to their correctness:—

(1) Heat formed by explosive and friction of bullet against barrel of rifle during its discharge is sufficient to kill all germs. This is not generally accepted.

(2) The hard smooth surface of the bullet which bruises and lacerates tissues to slight extent and does not carry foreign substances into the wound, assisted by the velocity of the missile which in its flight is rendered sterile, and by the hard character of the kaki which is torn not punctured, so there is no piece to be carried away.

Thus theories are borne out by the fact that soft nosed bullets and those from low velocity projectiles are more commonly the cause of infected wounds.

Wounds in civil life differ from these in the greater after danger of

septic involvement. Revolver cartridges are more apt than rifle cartridges to have been handled frequently, to have been carried in dirty pockets, and to have come in contact with various infectious materials. Moreover, revolver cartridges are covered with a coating of grease, which encourages an accumulation of microbes, and all the favorable factors which sterilize rifle bullets (velocity, hard coat, and rifling) are lacking. And further, bits of clothing are more liable to be carried in as woolen clothing is worn and it is soft and easily punctured.

Let us for a moment glance at a few constitutional effects, and their treatment and then proceed to wounds of special regions of the body and their treatment.

Shock.—This symptom which so commonly follows severe injuries of any kind, has been seldom seen in South Africa, and it has been noted many times that wounds of vital parts have been followed by remarkably little shock. This is probably due to the humanity of the modern bullet, bruising and lacerating the tissues to a minimum extent.

Make as warm as possible, give small doses of brandy, by mouth or rectum, or give strychnine gr. 1/80, hypodermically, in the meantime raise feet and keep blood to head.

Primary Wound Fever.—In healing of aseptic wounds there is an absence of inflammation, but a slight febrile movement, temperature rising 3 to 4 degrees and not returning to normal for 3 to 4 days. It is thought to be due to absorption of pyogenic substances derived from the broken-down tissues and blood-clot. This is aseptic fever and calls for no treatment.

Traumatic Fever.—A fever which accompanies wounds which are not aseptic. It is due to absorption of ptomaines produced by bacteria in secretions of wounds. There is a rise of temperature 24 to 48 hours after the injury, accompanied by rapid pulse, hot dry skin, and considerable thirst. It lasts 7 to 10 days.

Examine the wound, and all infected areas should be evacuated. If edges are swollen and inflamed, clean with an antiseptic solution, bichloride or hydrogen peroxide, and drain; or reopen and apply moist dressings. If patient is in pain, administer nerve sedatives and opiates.

Secondary Wound Fever.—Takes after suppuration is established and is more marked when there is retention of pus. There is a sudden rise in temperature preceded by a chill. If not treated, fever keeps up, pulse becomes weak and rapid. There is marked prostration, so if temperature does not go down in a few days, suspect this and treat as in traumatic fever.

Simple Flesh Wounds.—Actual infliction gives rise to little pain, usually a sharp burning sensation, and is followed by remarkably little

shock. External hæmorrhage is slight except where a large vessel is struck, and even here it is more common to get secondary than primary bleeding. Though external hæmorrhage is slight, internal bleeding into limbs or cavities during first hours after injury, is common. Traumatic aneurisms are frequent, and contusion of nerves gives use to more or less paralysis or neuralgia. Tendency to run an aseptic course is marked, and deep suppuration or diffuse cellulitis is rare.

During progress of healing the aperture, and with them the tracts, gradually contract. Aperture of entry is closed by a dry clot. The aperture of exit heals with a red cicatrix. The denseness of the cicatrix is often of much importance as it binds parts together (tendons, nerves, etc.), and causes impairment of motion or signs of nerve pressure. The scars left do not differ from large acne scars.

Treatment.—The first treatment of any wound now in military life, is the "first aid," and to this the remarkable results reported obtained are due; it is simply the general application of antiseptic surgery. Every soldier carries his first aid package and will not be without it. It consists simply of little packets of sterilized gauze wrapped in a piece of oiled silk. As soon as injured, he himself or a companion binds this on the wound and it gets no further contamination, as he lies on the field waiting for the surgeon, who, when he arrives, finds the wound usually aseptic, or a little infection on the clot, at aperture of exit. He simply removes clot, dresses with new dressings, and wound being put at rest heals rapidly after a few days. If wound is infected it is opened and washed out and left to drain. The proceeding is advised in all flesh wounds produced by a revolver bullet. There is some disagreement as to this being the proper treatment, Tarel argues that antiseptic washes and medicinal cleaning only weaken resistance of tissues.

Blood Vessels.—It is wonderful how the blood vessels have escaped injury in many cases where it would seem impossible. Cases are reported of bullets penetrating the neck and finding their way among the great vessels there without injuring them. From the number of such cases, it is thought the vessels are pushed aside by the rapidly moving bullet, unless struck fair, when, if the artery is large, fatal hæmorrhage ensues. If the artery is small it is cut clean off, and the ends curl up. This explains the absence of primary bleeding. Often the artery is grazed and aneurisms develop, which may rupture in a few days and cause secondary hæmorrhage and, if not treated, death. Or the bullet may cause an aneurysmal varix. Severe external hæmorrhage or symptoms of internal hæmorrhage (rapid, weak, fluttering pulse, blanched face, profuse perspiration), demand immediate operation. Cut down

upon and tie the vessel at once, then elevate the feet, inject salines, and give stimulants. If the hæmorrhage is not so severe, packing the wound may be sufficient. In all cases of aneurysm or aneurysmal varix, when situated where it is possible, cut down and ligature, the collateral circulation will supply parts beyond, if not, after a few days amputation is indicated.

Bones.—Few injuries are more common or more important than these. Few exhibit more remarkable features and tax the skill and patience of surgeons more. The damage done to bones by the modern bullet depends:—

(1) Upon the thickness of its metallic sheath. The thicker it is, the less effect, as it will not split when it strikes the bone.

(2) Upon the range from which the bullet is fired. If the shaft of the bone is struck at short range, it will be badly shattered and a fragment of bone will be carried out through wound of exit. In this respect it resembles the effects of the old bullet, but there is rarely any infective material carried in, so osteomyelitis is rare. At long range, if not interfered with, the bullet is more likely to penetrate or groove than shatter the bones.

(3) Upon the bone and the portion of it struck. The illia, scapulæ, sternum and most of the cancellous ends of long bones are drilled. Shafts of long bones upper ends of humerus, and tibia, same of pubis and ischii and the patellæ are often drilled, but often fractured.

Complications of Fractures.—

(1) Impairment of mobility in neighboring joint owing to large amount of callous.

(2) Great thickening, due to fragments of bone being attached to periosteum, thus retaining vitality and throwing out callous.

(3) Nerves being involved in callous lose their function.

(4) Injuries to blood vessels by fragments of bone.

Treatment.—If bone is simply bored, treat as a simple flesh wound. When fractured, and there is little comminution as usually happens, put up in splints and treat as simple compound fractures. Bone union and soft callous are met with occasionally and should be treated by freshening edges of bone, wiring, etc. If bone is comminuted, put in apposition as well as possible, and as there is not the danger of septic inflammation and necrosis, leave all the pieces in, leave wound open, and treat aseptically, and if small amount of necrosed bone results, it can be removed later, with equal safety and much less loss of bone tissue. If marked infection occurs, wound should be laid open freely, fragments removed, and free drainage provided. This treatment has

been advised in all cases of revolver wounds and in addition search for bullet, and foreign bodies and curette and pack cavity, as extreme infection often is set up by this class of wounds. Amputation is seldom called for.

Joints.—In the Civil War of the United States, 60 per cent. of gunshot wounds of knee-joint were fatal, and 51 per cent. of those who had the limb amputated, died. During the late war the percentage of deaths due to joint injuries is comparatively small. These injuries, like others, seem to run an uneventful course to recovery.

Treves writes that in a case of his "a bullet penetrated the knee-joint, entering the centre of the patella and passing out the centre of the popliteal space, and led to no trouble in the joint." Although this is the rule, these wounds are sometimes infected. If no damage is done to joint, treatment is not required beyond dressing, but, if joint is damaged, as maintenance of joint function is chief end desired, an operation must be performed, and rigid asepsis must be guaranteed. So have operation purely instrumental, keep fingers away, also sponges, so do bloodless operation, do not irrigate. If joint is infected, by multiple incisions, by free exposure of pockets, and antiseptic drainage it is possible to avoid amputation.

Wounds of Abdomen.—In penetrating and perforating wounds of the abdomen, symptoms were trifling, such as one would have after eating a green apple, and "bullet stories" are as bad as "fish stories." For example—A soldier was crawling up a ridge toward the enemy when he was struck by a bullet, which entered above the collar-bone on the neck, and came out on the inner side of the opposite thigh without producing any serious inconvenience or symptoms, except that the man being wounded thought he had better take advantage of it and get the bread and other luxuries there might be for the wounded.

In abdominal wounds the point of entry is small. "Tommy Atkins" likens it to a bug bite, and it is not difficult to overlook. Point of exit is small and apt to be more slit-like. Several cases have been shot through without any inconvenience following; in some cases bowel has been penetrated as shown by blood in the motions. Penetrating wounds of liver and kidneys, have been followed by no symptoms. One officer had a bullet pass through his liver and kidney. He had little collapse, and beyond some temporary tympanites and hæmaturia, he had no trouble of any sort. Wounds of spleen are usually followed by fatal hæmorrhage. Bladder wounds are not very frequent and are liable to be extreme and lacerated. Few cases recover, so prognosis is unfavorable. Cases in which large intestine was injured and recovery was complete, are rare.

Among the many lessons surgeons have learned during the campaign in South Africa, there are none more unexpected than those concerning the treatment of wounds of the abdomen. Before the war the rule was, "that even if the most remote chance of a wound of the gut exist, the abdomen should be opened at the first opportunity." In the early part of the campaign, a number of these cases were operated on, and it was seen that the puncture made, was so small it was difficult to recognize, especially after a few hours, and these minute openings did not leak to any extent, so it was suggested that the impact of the swiftly moving bullet had the happy effect of exhibiting peritonitis. A rapid closure of the bowel is likely to occur when patient has been long without food, a common condition among soldiers. So the majority of gunshot wounds were treated by the expectant method, and under it 60 per cent. recovered, which bears contrasting with the 90 per cent. mortality of the American Civil War. This expectant treatment is simply, dress wound, put patient at rest, nourish by rectum, and a light diet until wound is entirely closed.

Treves advises operation in these cases: if seen before seven hours after receipt of injury. If patient had short and easy transport, and if patient had an empty stomach.

Do not operate—in cases not seen until seven hours or more after receipt of wound. Those wounded after a meal. All oblique and transverse wounds above umbilicus. All cases of retained bullet. Most cases below umbilicus. All wounds of liver, spleen and kidneys. When you think colon is injured.

So according to this, the cases suitable for operation are few. Dent says,—as we are never sure of extent of the injury, an operation is only an experimental procedure, so is not justifiable and should not be resorted to unless there are evidences of effusion of blood into peritoneal cavity. This may be the better practice in military life, but surgeons at home do not think it a practical treatment of bullet wounds met with in civil practice, and I think we can refer to the treatment of Wm. McKinley as an example of the treatment adopted by civil surgeons in general. External wound is cleaned, remove omentum, wash intestines, with boracic acid solution, or carbolic (1-60), repair wound of stomach with Lembert's sutures. Close wounds of intestines, close parietal wound leaving a tube or gauze in, if any fear of infection, if not, close carefully to prevent hernia. The after treatment is same as any operation on abdomen. Rest, nourishment, and watch bowels, kidneys and temperature. Morphine is generally given as soon as patient is seen to relieve pain.

Thoracic Wounds.—Perforation of lungs seem to have healed rapidly

and to give rise to few acute symptoms, probably here also contraction has immediately taken place around the narrow track of the bullet rapidly followed by permanent occlusion. After penetrating wounds of lung there may be no symptoms beyond an immediate hæmoptysis which is not repeated; in other cases there is surgical emphysema, hæmothorax, pneumothorax and an example or two of empyema. On the whole gunshot wounds of lung do well. It has been said that if a bullet from the modern rifle so much as graze the heart, it imparts to the fluid contents such rapid vibration as to hurt the organ. Treat on general surgical principles. Do not use small probe, but one with a large bulb on end, if any at all. If shock is marked, stimulate patient by external heat, strychnine, whiskey and absolute quiet. Morphine is specific in such cases by relieving pain, quieting the mind, stimulating the heart, and slowing respirations. Ordinary penetrating wounds seldom require any operative treatment, unless to remove splinters of bone. Hæmothorax as a rule subsides spontaneously. If breathing is much interfered with, aspirate pleural cavity, but do not do so unless it is absolutely necessary. Hæmoptysis is stopped by pressure or ligature. It has been advised that all endeavours to obtain asepsis should stop at the parietal wound, as irrigation of pleural cavity does harm by increasing shock and encouraging internal bleeding. If empyema follows, treat in ordinary way, remove portions of ribs, and drain, do not put drains deep as a lesson learned during the war was, that convalescence is often retarded by too long and too deep use of drainage tubes. Another point is the stuffing of gauze into any form of wound called by the Germans "cavernous." When it is removed 24 to 48 hours later, it is adherent to walls of cavity, causes pain, and is liable to start fresh bleeding and to lead to exhudation of lymph which is better for cultivation of toxic organisms than blood-clot itself. When the gauze is removed, the walls of the cavity are rigid and the wound which might have fallen together naturally and closed quickly is left gaping open. A case illustrating the treatment of these wounds in our hospitals, is seen in A ward of the M. G. H. at present. A revolver cartridge, No. 22, pierced 6th rib in nipple line on left side. When admitted to hospital two hours after, was in a very bad state. Pulse rapid and weak, and death seemed certain. Stimulants were given and operation was performed to stop internal bleeding. The ball had grazed pericardium and perforated the thin edge of lung over-lapping the heart, severing an artery which was bleeding profusely. A cautery was passed through the wound in lung and then carried out to the edge. The two tags of lung thus formed were ligatured and left to slough off. The operation was carried no further beside sponging blood from

cavity. Drains were left in the wound. After operation two subcutaneous injections of saline were given ½ pint each, and 3 of 3 ounces each, by rectum. Strychnine and camphor were given hypodermically alternating every hour. Patient was kept on fluid diet (beef juice) for 3 to 4 days, after this was given extract bone marrow in addition, to give strength. Kept under the influence of morphine for 10 days, ¼ gr. every 5 hours. Respirations were kept at 18. Morphine is always indicated in hæmorrhage, especially if there is a bad cough. Patient gained in strength and was in a fair way to recovery when empyema set in. An X-ray was taken and bullet located in 7th rib midway between angle and tubercle, and she was operated upon again for the empyema, and at the same time bullet was recovered. Since then she has gained strength and the prognosis is good.

Nerves.—Sometimes the nerves are severed, but it is more common for the symptoms to be caused by bruising and grazing of trunk or to the pressure of blood-clot. And it has been thought that even if the small bore bullet moving at high velocity did drill a perfectly clean hole through tissues, the effects are felt far from the wound, as ecchymosis often appears at some distance when it seems doubtful if extravasated blood could have extended and it is probably due to stretching of distant parts. So this may be the effect of bullets on nerves, causing symptoms without actually touching them. The symptoms are loss of sensation and motion, often with severe neuralgic pains. Nerve injuries are met with in abundance, but cases in which surgical interference is of any avail, are rare. If patient is in severe pain, it is hard to withold such chance of amelioration as may be brought about by surgical interference, but, however justifiable, results are far from encouraging. More hopeful, is when nerve is in cicatrix. If nerve is dissected out and set free there should be improvement, and it has been successful in cases where sciatic, median and ulnar were implanted. Nerve section is good practice when nerve is cut, but this condition is often diagnosed, and when cut down upon the nerve is found intact. If symptoms keep up, Dent advises cutting nerve above injury. It is thought morphine increases the amount of neurosis.

Spinal Cord.—No cases seem more hopeless, none more distressing than gunshot wounds of the cord. Degeneration is very rapid, in a day or two, deep sloughy sores have formed on the sacrum, and even where there is not the slightest pressure. Cystitis sets in early. If there is any grave lesion of cord from bullet, or fragments of bone, the wound may be considered as fatal. Sometimes when bullet does not touch cord, the hæmorrhage causes the symptoms (loss of motion and sensation below lesion, incontinence of urine and fæces. There is a

zone of hyperalgia just above paralyzed area. In some cases where bullet has passed close to cord, symptoms similar to actual lesions show at once, but after a few days some sensation and a little motion is noticed. This is difficult to explain, may be due to blood-clot, and may be the same as causes these symptoms in nerve trunks, etc., may be due to vibratory effects.

Bullet wounds of spine are not necessarily fatal, and whether bullet should be removed or not will depend largely upon its location. The X-rays serve a most useful purpose in locating the bullet. If bullet is in an accessible position, it should be removed. It may, however, be in such relations to the intrathoracic viscera as to make it hazardous and unless the wound has been infected by clothing or injudicious probing, it is well in such cases not to interfere. In any surgical interference, the strictest cleanliness must of course be observed. The telephone probe may be employed to advantage in exploring for the bullet. If cord is compressed by fragments of bone or blood, or the bullet, it should be freed by operation. If bullet has passed through the body, but injured cord in its transit, it is proper to operate if symptoms do not improve in a few days, as they may be due to pressure that can be relieved.

Head Injuries.—Bullet wounds actually penetrating the skull and contents constitute some of the most remarkable cases met with. The range greatly influences the amount of injury inflicted on the bone. Also the more oblique the bullet enters, the greater the damage to the inner tissues. If entrance and exit are at right angles to axis of skull, holes are bored clean through and are scarcely seen on external inspection, but inner table of bone would be more or less broken up at aperture of entrance. Symptoms of this class of injuries vary with position of the wound, but it is wonderful the severity of the injury patients recover from. Injuries of internal table of skull is more marked in wounds caused by the modern than with the old fashioned bullet. The scalp wound heals so rapidly, the significance of the case may the more easily be overlooked. The Mauser sometimes causes external oblique fractures and splits bone badly even when it does not strike obliquely.

Another form of wounds to skull is the so-called "gutter fractures," where the bullet grazes surfaces of vault inflicting a superficial injury. No cerebral symptoms are set up, and one is liable to consider it as a slight injury, but the inner table is usually broken badly and it seldom happens that some of the sharp fragments are not driven into the dura mater, and even penetrating and wounding the brain tissue and if not removed will cause cerebral or meningeal irritation. In some of these

cases operation was refused, and all went well for some time, then symptoms of sunstroke (headache, mental disturbance, rising of temperature, etc.), followed the least exposure.

A third class of head injuries, are the depressed fractures, which are produced when ball does not penetrate skull, it is really a gutter fracture, giving all signs of compression (slow pulse, paralysis of opposite side, etc.). In great majority of cases, operation is advisable, and in a large percentage imperatively called for. There is no class of cases in which surgeons can effect more. Trepanning is done in all depressed and gutter fractures, also in perforating wounds of cranium, it has been rewarded by good results. Being followed by good air and rest, there is little danger of cerebral hernia or of septic complications. Put patient at rest as soon as possible with hot water bottles around him. Give brandy to stimulate, and then inject morphine hypodermically. As soon as he is in condition give anæsthetic and remove fragments of bone, and after cleaning bring lacerated tissues together. Some use hare-lip pins for face injuries, passed as deeply as possible so as to bring deep tissues together, then unite skin by silk sutures after trimming of any loose tags, put in small drains, and dust with some aseptic powder. After operation, if stimulants are needed give brandy per rectum. Afterwards treat as any operation.

Should Bullets be Extracted ?—There is a great difference of opinion on this subject. Some say it is unnecessary to remove a bullet which is not giving rise to pain or other inconvenience. Others say remove, as they are movable and are liable to reach places where their presence will cause pain and danger. Another thing is, if removed (when no contraindications) they free the mind of the wounded from all apprehension as to future complications and dangers. With aid of X-rays and telephone probe we can tell the position of bullet and make rules.

Remove the bullet.— (1) If subcutaneous. (2) If pressing on nerves. (3) If deformed. (4) If likely to interfere with union of bone. (5) If there is suppuration. Limbs should be amputated when (1) Severe wounds shattering a whole limb. (2) Infected gunshot wounds which resist treatment. (3) Extensive lacerations of muscles and shattering of bone. (4) Injuries to arteries when collateral circulation will not nourish parts beyond.

Summary.—It is safe to conclude that: (1) The modern bullet is more humane than the old one, as only one is killed to every four wounded, and 95 per cent. of wounded recover. (2) That the liability of infection is less, and the cases of empyema, erysipelas, septicæmia, tetanus, osteomyelitis, and the rest of this train are less common. (3) That conditions or surgery are different on the field than in civil prac-

tice, and especially so in abdominal cases, but as a penetrating wound of the abdomen is a rare occurrence in civil life, the information derivel from so many cases cannot fail to be of the greatest value and may modify the views at present held, but where a wound is received after a meal and by a bullet of low velocity, as the cases in civil practice, and patient can immediately be surrounded by every facility for modern aseptic proceedings, there is no doubt his chances for recovery are better when operated upon.

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