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VOL. III.

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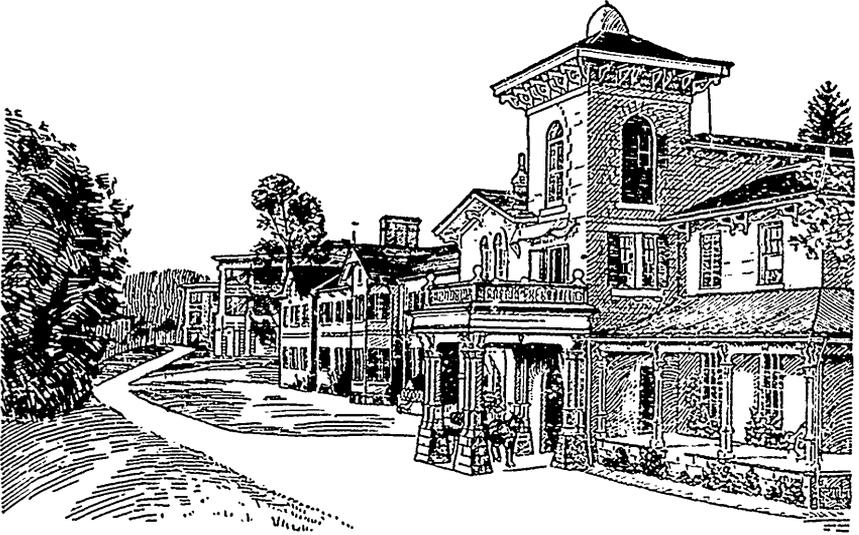
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WESTERN CANADA MEDICAL JOURNAL

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ORIGINAL COMMUNICATIONS.

ON GALL STONES AND MORE PARTICULARLY UPON THEIR CHOLESTERIN CONSTITUENTS*

By

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MONTREAL.

Cholelithiasis is so common a condition that I make no apology for taking it up, save for inevitably passing in review certain data that must be familiar to every medical man. Even if I have to do this, I hope that I may also present the subject in what will be to most a somewhat new aspect. I cannot pretend to cover the whole subject: I must in the main concern myself with the one topic of the etiology or the mode of genesis of gall-stones,—and of them not every variety but one important group.

I need scarce remind you that these gall-stones are of several orders, ranging from at the one extreme, conglomerations of almost pure bile pigment, through admixtures in

* The fire, which consumed the greater part of the McGill Medical building in April of 1907, destroyed, at the same time, the completed copy of an address upon this subject, which I delivered before the Buffalo Academy of Medicine in March, 1907. I have incorporated here the main matter of that address, together with some newer matter based upon more recent investigations.

varying proportions of bilirubin-calcium or biliverdin-calcium and cholesterin to, at the other extreme, calculi formed of close upon a hundred per cent. of cholesterin. Between these two extremes we encounter a series of forms passing almost imperceptibly the one into the other and characterized by possessing a larger or smaller proportion of the one and the other main ingredient. The only disturbing element in the series is a variable admixture of calcium carbonate. Minute accumulation of the salt may be detected in many gall-stones. Very rarely do we meet with small calculi of which this is the dominant constituent, so rarely that for our immediate purposes we may neglect them.

It is thus obvious that there are two prime constituents of gall-stones—Cholesterin and the bile pigments in combination with calcium.* It is also to be noted that one bile pigment may take the place of another. This need not trouble us for we know that the whole series are but different stages of oxidation of the one substance bilirubin. Yet another constant constituent of all forms has to be kept in mind, namely the mucinous matrix which remains when these constituents are dissolved out. Such a matrix is found in all calculi-urinary, pancreatic, salivary as well as biliary; it is essential to their formation. In the pure cholesterin calculi it is reduced to the lowest limit.

On this occasion, I propose in the main to consider one of these constituents only, the cholesterin, how it comes to appear in the bile, how it is liberated and what are the factors leading to the formation of cholesterin calculi.

We shall best arrive at a knowledge of how these calculi are formed by discussing first the mode in which cholesterin makes its appearance in the bile. There are, it will be seen, three possibilities (1) that it is excreted by the liver cells, (2) that it is derived from the mucous membrane of the gall-bladder and bile ducts, and (3) that it is derived from both

*It is possibly more accurate and more suggestive to state that there are three—cholesterin, bile pigment and calcium salts, it being revealed that apart from the calcium carbonate above noted, there is in the ordinary gall-stones an interaction between these calcium salts and the bile pigments leading to the formation of bilirubin calcium compounds, etc.

sources. In each case several possibilities present themselves, namely that it passes out into the bile in a state of solution, the solvent becoming (1) subsequently resorbed or undergoing modification whereby the cholesterol becomes precipitated, or, on the other hand, that it is excreted in chemical combination with some other substance, in the form of a soluble compound which later undergoes dissociation with liberation of the relatively insoluble cholesterol.

We will discuss first the site of origin.

Here we immediately find ourselves in the middle of an active discussion. The conclusion reached by Naunyn, who still remains the authority upon the subject of gall-stones, was that the cholesterol in the bile is derived, not as an excretion from the liver cells, but as a discharge from the mucous membrane of the gall-bladder and bile ducts, and he based this view upon the observations that (1) the amount of cholesterol in gall-bladder bile is much greater than that in bile obtained direct from the liver by means of a fistula, that (2) the amount of cholesterol in fistula bile remains fairly constant, and (3) that feeding animals with cholesterol in a dissolved state leads to no increased discharge of this substance from the liver. To other observations of Naunyn bearing out this view reference will be made shortly.

Within the last three years several papers have been published casting grave doubts upon this view. Notably we have the observations of Professor Aschoff* that if the gall-bladder of dogs be emptied and then ligated the only cholesterol to be observed at the end of a month is in the inspissated bile (apparently that which had not been wholly removed at the time of operation) separated from the mucosa by a thick layer of mucin; and when the gall-bladder prior to ligation was filled with cholesterol dissolved in oil, after eleven days no cholesterol could be detected by microchemical means; at most there were clumps of what might be a combination of fatty acid with cholesterol. Instead, that is, of an excretion of cholesterol from the mucosa of the gall-bladder there was evidence of definite absorption of the same.

* Aschoff, Verhandl. d. Deutsch. Pathol. Gesellsch., 1905, 1906.

Then too, contrary to the observations of Naunyn's pupil, Thomas, that the cholesterin content of normal bile is singularly constant, Goodmann** has shown that this is liable to considerable variations, undergoing increase more particularly as the result of increased protein diet; observations that indicate active secretion rather than the outcome of a process of uniform daily disintegration of the biliary mucous membrane, or of its cytoplasm. To explain this latter phrase, I should say that elsewhere in the body—in the arterial wall, in tumors, etc.—cholesterin crystals make their appearance as the result of simple tissue necrosis, with accompanying fatty degeneration, and that Naunyn's views of cholesterin discharge presuppose somewhat similar process as occurring in connection with the biliary epithelium.

So also Kramer* has shown that if to filtered normal bile diluted with peptone-broth, cultures of the *B. typhosus* or *B. coli* be added then in the test tube outside the body, there gradually appears in the course of months a deposit of all the constituents of gall-stones—of bile pigment, cholesterin and calcium salts. Thus growth of these bacteria in normal bile leads to the appearance in that bile of crystalline cholesterin, or, in other words, it is not necessary to demand increased cholesterin discharge from the mucous membrane of the gall-bladder and bile ducts to explain that present in gall-stones, since conditions exist in which cholesterin is capable of precipitation from normal bile. These observations of Kramer have been confirmed and extended by Bacmeister** working in Aschoff's laboratory. Bacmeister shows that not only the *B. typhosus* and the *B. coli* but also the *B. pyocyaneus* (and this to a notable extent), certain paratyphoid bacilli and yet other organisms are capable of causing a precipitation of cholesterin when grown in previously sterilized normal bile; and he makes the further most interesting observation that cholesterin, unmixed with bile pigments undergoes a still more extensive precipitation from gall-bladder bile, when that contains cast off or scraped off gall-bladder epithelium and

** Goodmann, *Beitraege z. chem. Physiologie*, 9: 1907.

* Kramer. *Journ. f. Experim. Medicine*, 9. 1907.

** Bacmeister, *Muenchener Med. Wochenschr.*, 1908, Nos. 5, 6, 7.

has been sterilized by subjection to a relatively low temperature (59° C.) on successive days. The on'y conclusion he could reach was that through the autolysis of the epithelial cells something was liberated which led to the precipitation. This last observation is most important in this that for the first time* we are afforded rational basis of fact in explanation of the existance of pure cholesterin as distinguished from mixed gall-stones.* In an address given by me at Buffalo (upon which this article is largely based), I had urged that the pure cholesterin calculi were of non-microbic causation. I had found the surrounding fluid sterile. Aschoff similarly working over Kehr's abundant material had noted that pure cholesterin calculi occurred in cases of simple obstruction without evidence of cholecystitis. Bacmeister here shows that bacterial growth leads to the precipitation of all the constituents of the mixed gall-stones, whereas, when bacteria are absent, the cholesterin alone is thrown down.

But now there is another series of equally well authenticated cases, which appear at first sight to give the lie direct to these observations upon the origin of cholesterin from the liver bile.

My attention was forcibly directed to this matter some years ago by a case of hydrōps cystidis felleae accidentally encountered at post-mortem. The gall-bladder here was distended with a colorless thin fluid without a trace of bile pigment, and clear and transparent save for the shimmer of abundant glistening cholesterin crystals. The cause of the condition was discovered in a stone which blocked the origin of the cystic duct. This was roughly pear-shaped. The narrower end, imprisoned in the duct, was of mixed formation and pigmented—the free larger end protruding into the gall-bladder was of pure cholesterin. The absolutely colorless

* This is perhaps an incorrect statement, for some years previously Brockbank (On Gall-stones or Cholelithiasis, London, Churchill, 1896, p. 21) had noted that bile taken post-mortem from the bodies of middle aged or elderly individuals who died from cardiac or various chronic diseases without exhibiting cholelithiasis contains when first examined numerous desquamated epithelial cells with but few crystals of cholesterin. In the course of a few days the cells begin to disappear, but the cholesterin becomes abundant. Finally no cells may be found, but the crystals are in great profusion.

fluid distending the gall-bladder was in itself evidence that the occlusion was complete; it was impossible that the bile originally imprisoned could have given origin by precipitation to so large an amount of cholesterin as was present in the free portion of the stone and was floating in the fluid; that cholesterin must have been derived from the gall-bladder. Budd in 1857, Naunyn, Brockbank and others record similar cases.

Equally positive evidence is afforded by the independent observations of Bristowe * and Brockbank** on the presence of small accumulations of cholesterin actually within the mucous membrane of the gall-bladder. The latter in two cases, noting small black specks in the mucous membrane, examined them microscopically and found they were formed of crystals of cholesterin lying apparently in retention cysts. Bristowe found crystalline masses one-eighth by one-sixth of an inch in size, imbedded in cavities in the wall of a thickened and obstructed gall-bladder, the cavities being evidently dilated mucous crypts.

In cases like this there is no escaping the conclusion that the mucous membrane of the gall-bladder has afforded the cholesterin. Nor is evidence wanting of other mucous membranes, notably the inflamed bronchial epithelium, affording crystals of cholesterin.

And there is evidence of another nature, which is at least suggestive if not conclusive. The amount of cholesterin found in fresh bile obtained from the gall-bladder is constantly from three to six times as much as that recoverable from bile obtained direct from the liver through fistulae. It may be urged—and has been—that this striking difference is due to resorption of fluid and concentration of the bile during its stay in the bladder. Noting the great variation in the other constituents of gall-bladder as compared with fistula bile it is difficult to accept this explanation; the increase in the amounts of fats and soaps is even more marked. Lastly

* Bristowe, Lancet, Lond., Feb. 19th, 1887.

** Brockbank, London, Churchill, 1896, p. 22.

* Analysis of Hoppe-Seyler, Hammarsten, Frerichs, Gorup-Besanez, Jacobson, Mayo Robson, Noel Paton and Balfour.

Herter and Workman have shown that the injection of minute amounts of corrosive sublimate or of phenol into the gall-bladder of dogs leads to an increase in the amount of cholesterol in the contained bile.

The discrepancy can only be explained, it seems to me, on the hypothesis that there is a definite if varying discharge of certain substances from the gall-bladder epithelium, including cholesterol, at the same time as there is resorption of other substances.

When we meet with the apparently opposed sets of facts, such as these it is not for us to act after the manner of old women. We all, I imagine, can bring to mind certain old women, and it may well be certain young women, of our acquaintance who either constitutionally or through defective education are incapable of recognizing that something may be said with justice on both sides of a case: to whom there is but one right aspect and no other, with whom, therefore, it is not only impossible but absolutely impolitic to attempt to debate a matter and that because the opinion they hold is in their view the only right one, and your opinion, if it differs from theirs, is absolutely and unmitigatedly wrong; nay more to hold an opinion opposed to theirs is held by them to be evidence of either mental or moral obliquity. Men, who have had to deal with their fellows on terms of equality and of give and take are not so liable to exhibit this lamentable failing, though indications of the same occasionally show themselves in the form of unwillingness to consider and accept facts opposed to any pet theory. The only scientific conclusion to reach in this particular case is that both sources of cholesterol have to be taken into account; that cholesterol is normally excreted by the liver and also that it may be discharged from the mucosa of the gall-bladder and larger bile ducts. Nor is this found contrary to reason when it is remembered that liver cells and bile ducts and gall-bladder epithelium have origin from a single source or embryonic anlage.

Thus far, then, we are led to conclude that the cholesterol which forms cholesterol calculi is derivable in part from

** Herter and Wakeman, Trans. Congr. Amer. Phys., 6; 1903; 158.

the liver cells, in certain conditions largely from the gall-bladder or bile duct epithelium.

But cholesterin as it appears in calculi is as every one knows a crystalline substance, in the form most often of rhombic plates. It is contrary to experience that it should be excreted in this form; nay more Brockbank and Kramer's observations already noted show that from being in solution in normal bile it is capable of precipitation. Or otherwise it is obvious that it is excreted into the bile in a soluble state only later undergoing precipitation. Here there are two possibilities, either that it is excreted and is present in normal bile as a chemical compound of cholesterin which is soluble in the bile and then subsequently undergoes dissociation with liberation and precipitation of the crystalline cholesterin moiety, or that it passes through the cells in a state of solution and becomes precipitated subsequently owing to altered conditions in the medium in which it finds itself.

We here come to a very debateable point. A few months ago I should have answered this question unhesitatingly in the sense that cholesterin passes through the cells as a definite cholesterin compound. Now Craven Moore and Powell White have brought forward evidence tending somewhat to throw doubt upon the point. Let us, therefore, present the evidence for and against.

If one examines the bile obtained at post-mortem from the gall-bladder, provided the post-mortem be not made immediately after death, (and if there has been cholelithiasis even in these early autopsies), microscopic examination shows the presence in it of more or less numerous epithelial cells, now solitary, now in groups.

In young individuals these cells are pale and present no peculiarities; in those more elderly and more particularly in those who had suffered from acute fever, tuberculosis, heart-disease and constantly in the subjects of cholelithiasis, they show extensive fatty change; they may be filled with fatty globules, while in addition they contain myelin bodies. It is to these myelin bodies that I wish specially to direct your attention. At first sight they may be mistaken for fatty globules; they are similarly highly refractive; but closer examina-

tion shows that they are not quite regular in outline; if water be added they become swollen and distinctly irregular in shape presenting a double contour. Naunyn observed that through breaking down of the discharged cells, the myelin bodies are liberated into the bile, where swelling up they undergo fusion into small clumps; he saw in these free glassy highly refractile masses the preliminary stage in formation of gall-stones. For along with them and of identical size he found firm aggregations formed of crystalline cholesterin,—cholesterin gravel. He noted that under the microscope when a little acid was added—acetic acid—the amorphous glassy masses showed the development throughout their substance of crystals of cholesterin. His conclusion was that in these cases we deal with the development of a nucleus of pure “amorphous-cholesterin” which becomes converted later into the crystalline form. In other case he found the origin in a sediment frequently noted in bile, consisting of brownish pigmented clumps consisting of pigment granules, fat droplets and a yellow granular matrix which often contains also crystals of Cholesterin. He regarded this debris as wholly distinct, though even here he noticed that this debris contains much more cholesterin than the bile in general, there being close upon 25 per cent. of cholesterin in the dried substance of this matter though at the same time bilirubin calcium might form 33 per cent. and fats as much as 20 per cent.

What is this “amorphous cholesterin?” Or what in the first place are the myelin droplets from which it may be derived? Time forbids that I should discuss these fully. I will only say that, as* Professor Aschoff of Freiburg and I were the first to indicate, they are of the nature of fluid crystals, that unlike fat droplets they are doubly refractive or anisotropic, that cooled further they become converted into definite crystals and that under no known conditions does pure cholesterin exhibit this fluid crystalline state. It may, therefore, safely be laid down that the myelin—and the same holds for the clumps of ‘amorphous cholesterin’—is not an allotropic modification of cholesterin, and, if, as Naunyn points out, and I can confirm, acetic acid converts this into crystals of cholesterin, it does so by dissociation. We can, as Brock-

* Adami and Aschoff, Proc. Roy. Soc., London, B., Vol. 78, 1906, p. 359; and also Adami, Journ. of Am. Med. Assoc., Feb. 9, 1907, p. 463. (Harvey Society Lectures, 1906-07.

bank has shown, reverse the process. If crystals of cholesterin be placed in a solution of animal, (i. e. ordinary) soap in distilled water, the crystals at once become covered with minute clear colorless outgrowths, which rapidly increase in size and appear like microscopic intestinal villi in shape. These villous-like processes enlarge very rapidly and finally become detached from the parent mass and float freely in the surrounding soap solution. What was originally a typical solid crystal of cholesterin is eventually changed into many of those new bodies which are of a myelin nature, and he recognized these as identical with Naunyn's 'amorphous cholesterin'. Employing pure oleate soaps, I have been able wholly to confirm Brockbank's observations, and what is more, have determined that these myelin processes and bodies so produced are doubly refractive. What is more, on acidifying the solution, I have gained from these bodies crystals of cholesterin.

Now this very remarkable phenomenon of the formation of myelin bodies is certainly not a mere process of solution. The formation of doubly refractive globules is, as shown by Lehmann, Schenck and other physicists a definite property possessed by a long series of compounds. It is what may be termed an intermediate state in the process of crystallization. At a temperature varying for each member of the series these compounds are absolutely fluid and isotropous; below this, for a certain generally somewhat limited range of temperature, while still absolutely fluid the substance becomes anisotropous or doubly refractive, takes on properties that is, which hitherto we have associated with the solid crystalline state; below this temperature again it becomes converted into solid crystals. Cholesterin itself has not this capacity of assuring the fluid crystalline state. As shown by Rinitzer, its compound with oleic acid does not possess this property.

We find further that:—

(I) The stagnating bile in the gall-bladder contains (unprecipitated) a much larger amount of cholesterin than does fistula bile.

(II) There characteristically it is associated with fats, soaps and lipoid substances, lecithin, etc. According to a large number of analyses gall-bladder bile contains about five times

as much fats as does that flowing freely from a biliary fistula, and thirteen times as much soaps.

(III) In the circulating blood, as shown by Haerthle, cholesterolin is present in the form of cholesteryl esters.

(IV) The only bodies so far known which assume the fluid crystalline state at the room temperature are sundry oleic acid compounds.

I could not, therefore, but conclude, (1) that the myelin globules in the gall-bladder epithelium and Naunyn's amorphous cholesterolin were essentially cholesteryl oleate, (2) that this under normal conditions passes into the bile in a state of solution, but under certain conditions (in the gall-bladder) is liberated in the solid state, then tending to collect into clumps, (3) and that under other conditions this becomes dissociated with precipitatum of crystalline cholesterolin. These views, I may say, I enunciated before the Academy of Medicine at Buffalo in the early spring of 1907. Professor Aschoff* had, I found later, enunciated similar views, some months earlier, namely that with dissociation of the cells the myelin cholesteryl oleate is set free and under the action of pure alkalies of the alkaline bile the cholesteryl oleate becomes dissociated and the cholesterolin precipitated, the fatty acid liberated and converted into soaps which tend to become absorbed.

Since then there have appeared an extended study of the chemistry of cholesterolin by** Craven Moore, and a study of the fluid crystals of the body by Powell White, which appear to throw doubt upon these conclusions. To which of the two we are to credit the observations that follow it is impossible to state with accuracy. Both belong to the one school, both publish the same journal, in successive numbers. The fact that the prior publication was granted to Moore and that throughout the work he does not make a single acknowledgement to White, makes us believe that credit is his. But White refers to the peculiar combinations to be presently mentioned

* Aschoff, Verhandl. d. Deutsch. Path. Gesellsch. (for 1905) 10, 1907.

** Moore, Craven, Medical Chronicle, Manchester. 47: 1908: 204. White, F. Powell, Ibid., p. 403; and Journal of Pathology, 13: 1908. pp. 3 and 11.

as being those 'which I have described' and makes no reference to his colleague's work, save to state that these bodies are being further investigated by Dr. Craven Moore. From internal evidence I am inclined to give the credit to the latter and that because it would seem to be a failing on the part of Dr. Powell White to neglect to credit other workers.*

This is not the place to enter into an extended criticism of either Moore's or White's articles, which I may say both contain important observations, even if some of their conclusions are not absolutely convincing and others, in my opinion, incorrect. I can only discuss the bearing of their work upon the matter before us.

Moore, therefore, declares, and White confirms, that the compound, cholesteryl oleate, the only compound of these two substances hitherto recognized, does not conform in its properties with the properties exhibited by the anisotropic myelin globules; that, for example, it melts in the neighborhood of 40° C.; from which it follows that at the room temperature it should appear in the solid crystalline state; that it does not possess the property characteristic of myelin substances in general, of absorbing and swelling up with water; that it does not readily undergo saponification. "These authors," says White, "prepared their cholesteryl esters by heating together cholesterol (=cholesterin) and a fatty acid"

* Thus from anything he says to the contrary (Medical Chronicle, Manchester, 47: 1908: 403 and Journal of Pathology, 13: 1908: 10), one might imagine that to him must be given the credit of noting that the anisotropic globules seen in tissues become converted into minute crystals under the action of formalin, whereas this observation should be credited to Loebelin; that (save for an incidental observation by Podwyssozky) his were the pioneer studies upon the presence of these globules in tumours (Journ. of Path. loc. cit. p. 3), whereas some years previously attention had been called to the fact by Kaiserling and Orgler, who also, though Powell White never mentions it, were the first to study and record the presence of these myelin globules in the adrenal cortex. That his work upon 'Cholesterol, fluid crystals and myelin bodies' owed its inception to the recognition by Adami and Aschoff of the physical nature of the myelin bodies as fluid crystals, no one could in the least gather from perusing White's paper in which indeed there appears to be an endeavor to minimize to a vanishing point any service performed by these workers in making their observations. It may be that this conduct is unintentional, but it deserves notice as contrary to the spirit of English scientific writings.

and he continues "These cholesterol esters are not formed by heating together cholesterol and a fatty acid in presence of water." This statement of our method is, I may say, a gratuitous assumption on Dr. White's part. We did not so prepare our cholesteryl oleate, nor do we state anywhere that we so prepared it. Nevertheless, I have still to learn, despite White's implication, that cholesteryl esters cannot be formed by heating together cholesterol and a fatty acid.

If not cholesteryl oleate, what, according to those authors, is the nature of the myelin-like intermixture of cholesteryl and fatty acid? Here there is not a little confusion. Moore, for example, devotes some pages to a discussion of the colloidal state of physical association of cholesterol and lecithin and from his own observations, confirmed by others of Buenz, Tebb and Woldridge concludes that the whole of the cholesterol present in nervous tissue, red corpuscles and the bile exists in a free state and not in ethereal combination. Here it may be noted that he is in opposition to such observers as Hartmann and Schultze (wool fats), Liebreich and Salkowski (in keratinized strictures), Baumstark (brain), Huerthle, Letsche and Hepner (blood serum), Aschoff (bile). At most certain of these observers conclude that while some of the cholesterol is free, the rest is in a state of combination. To this very definite extent Moore comes forward as an upholder of the solution theory. But on the other hand, in the earlier part of his work he lays stress upon the fact that the association of cholesterol and fatty acid is something beyond mere solution. He shows that cholesterol and fatty acids best afford fluid crystals and the myelin-like characteristics when they are united in equimolecular proportions. He confirms Lindenmayer in observing that cholesterol crystallizes out from solution in fatty acid in combination with one molecule of the acid and states that Salkowski is incorrect in stating that these crystals are those of the esters; pointing out that the true nature of the association is at once evident from the action of water, alcohol and solution of the alkaline carbonates upon these crystals, and from the effect of heating them to a temperature above their melting point. All these result in the acid being withdrawn from the combination,

with precipitation of pure cholesterin. The true esters, he declares, are unaltered by water, alcohol or sodium carbonate and are only with considerable difficulty saponified by the caustic alkalis. He concludes, therefore, that here we deal with a purely physical association, non-existent in solution and only coming into being with the phenomenon of crystallization and that the relation of the acid to the cholesterin is that which obtains between water or alcohol and cholesterin when the latter crystallizes for either moist or anhydrous alcohol; that in short it is present as 'acid of crystallization.'

Now I am not prepared at the present moment to state categorically that Moore is wrong in his contention that we deal (with a combination, it is true) but not with the development of a true ethereal salt. My own observations have not proceeded far enough for me to reach an absolute demonstration one way or the other. What does impress me in studying the matter is that oleic acid is a very weak acid, so weak that, as Schenck points out, it is practically impossible to gain pure salts; they are singularly unstable, the oleic acid readily undergoing dissociation. What is equally noticeable is, as emphasized by Professor Aschoff and myself, the peculiar property possessed by these crystalline fluids of dissolving other substances and still undergoing crystallization. As we pointed out, the varying optical properties of the myelin droplets, in the adrenal, for example, is proof conclusive that we do not deal with pure substances but with varying admixtures of fatty acids with the substance affording the fluid crystals. Nay more, we showed that these admixtures markedly effect the melting point of the same, or more accurately the temperature below which they assume the solid crystalline state. Both Moore and White wholly neglect this side of the matter, which, to say the least, deserved consideration. We were careful to point out that the myelin droplets were admixtures, and the argument that cholesteryl oleate when pure melts at a point higher than the body temperature does not affect the question.

* Loc. cit. p. 364. See also Adami. Harvey Society Lectures, 1906-07, p. 132.

There is, however, one consideration which, unless I am mistaken, absolutely militates against Moore's conception. It is this, that, as shown by Lehmann and Schenck, bodies possessing this property of exhibiting an intermediate state exhibit the anisotropic fluid crystalline globules when melted in an inert medium; that the crystalline state is always the indication of the presence of a definite chemical compound and this is true of the intermediate fluid crystalline state; that, therefore, if matter containing cholesterol exhibits this fluid crystalline state, it does it in virtue of the presence of some definite chemical compound; that pure cholesterol has not been proved by Moore, nor again by White, to possess an intermediate stage, nor so far have I been able myself to determine that it does. From this it follows that when cholesterol-containing fluids exhibit anisotropism they do this in virtue of the presence of some definite chemical combination of cholesterol with other substances and not of a mere physical association between these substances and fatty acids or other lipid bodies; that in short the doubly refractive cholesterol fatty acid bodies are as much true chemical compounds as are the equally doubly refractive soaps, or chemical compounds of potassium, sodium, and ammonium with fatty acids. That (as White shows), similar bodies are produced by the interaction of cholesterol and glycerine or cetyl alcohol has no direct bearing on this matter; then again it must be urged that we deal with definite compounds. I have no experience with cetyl alcohol which does not occur in the human organism; as regards glycerine, which does, I would point out that the cholesterol-glycerine, myelin bodies and droplets are of a different type from the fatty acid compounds; in the first case they give curiously pale 'crosses' between crossed Nicols; in the second, save at very high temperature, they form solid spheruliths, not fluid. Neither of these compounds, therefore, need here to be considered seriously.

I conclude, therefore, that cholesterol is capable of existing in the organism in the form of definite combination with fatty-acid and lipid substances. Whether these combinations are true ethereal salts or no must be left an open question, although I cannot consider it proved that they are not, and

it is difficult to imagine what is the nature of the combination if it be not of this order. For our purposes this is after all a matter of secondary importance. As bearing on the problem before us, what is important is the conclusion that cholesterol is present in the cells of the organism not as an inert substance in a state of solution, but in a state of combination and in a state in which through the remarkable absorptive powers of the compound it is capable of playing a very remarkable part in the metabolic exchanges. This, however, introduces new matter, matter not germane to the present paper. I have dealt with those potentialities of the 'potential fluid crystals' of the organism elsewhere

It will be seen, then, that I adhere to the view that cholesterol is discharged or excreted into the bile in the form of an easily soluble compound, which compound may become dissociated in the bile there either undergoing solution (for many potential solvents are present—fats, soaps, lecithin and bile salts) or, under conditions where these solvents are not present in adequate amount, undergoing precipitation and so becoming portions of gall-stones.

Finally a word must be said regarding the apparent absolute antagonism between the observations of Budd, Bristowe, Naunyn and others bearing upon the liberation of myelin bodies from the mucous membrane of the gall-bladder—bodies evidently containing cholesterol—and Professor Aschoff's observations that, on the contrary, cholesterol introduced into the healthy gall-bladder undergoes rapid absorption. Here I would point out a means of harmonizing these observations. Both in my opinion are right; but all depends upon our conception of cell activities. We are too apt to conceive the cells as acting as it were in one direction only, whereas the probability is that cells excrete from a given surface or absorb from that surface according to circumstances; that a layer of cells like the biliary mucous membrane may be regarded as a living membrane, which permits the passage of substances into and through itself according, *inter alia*, to the relative richness of the fluids bathing the two surfaces of the

membrane, in these particular substances. The work of Croft Hill and others has demonstrated to us the reversibility of enzyme action; has shown us how the cell metabolism controlled by these enzymes at one time is effective in forming glycogen from the soluble carbohydrates brought to it; at another moment through the activity of identical enzymes reconverts such glycogen into soluble enzymes which now can diffuse out of the cell, all depending on the relative richness of the circulation fluids in soluble sugars. We must, I would say, recognize also the reversibility of cell action. Where cholesterin is present in the gall-bladder (whether in solution or in combination) in such a form that it can be taken up by the mucous membrane, and in amounts greatly in excess of that present in the blood and lymph, there, through the intermediation of the cells of the mucous membrane, there may be absorption from the bile into the body fluids. We must suppose on the other hand that the ratio between the circulating cholesterin compounds and those present in the gall-bladder bile is ordinarily such as to favour the passage in the opposite direction. The very fact that cholesterin calculi can be formed is indeed another argument in favor of the view that cholesterin exists in the blood and in the normal bile in some form of combination rather than in solution, for otherwise we should expect absorption to take place from the bile into the blood when the cholesterin in the bile approached the saturation point, an absorption which would thus prevent precipitation and the formation of gall-stones.

GENERAL ANAESTHESIA

BY

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EDMONTON.

In his presidential address made this year to the American Gynaecological Society, Dr. J. W. Baldy of Philadelphia said:—"We may yet develop a field—the vast importance of which has been too long neglected by all—anaesthesia. The general administration of anaesthetics as performed to-day is the shame of modern surgery, is a disgrace to a learned profession, and if the full unvarnished truth concerning it were known, it would be but a short while before it were interfered with by legislative means."

It was after this effort of mine had passed its preliminary stage that these words were brought to my notice. They express my own sentiments so accurately and fully that I can do no better than quote them as my introduction to the subject of "Anaesthesia," upon which I make so bold as to address you; because in these days of innumerable operations too much stress can surely not be laid upon it.

The reasons for its neglect are not far to seek. To-day is the day of the surgeon. On all sides the performance of operations is attracting the lion's share of attention. In surgery the most spectacular of the recent advances have been made. In the conditions with which the surgeon deals, results follow upon treatment in a most obvious manner, and there are few dark and unexplored mysteries still defying solution. In addition to all this there is also the material fact to be reckoned with that the hire of the laborer in the field of operative surgery has undoubtedly a powerful influence upon the young man choosing the specialty to which he hopes, as he grows older, to devote his whole attention. Of the other branches of our art least of all does that of the anaesthetist hold out any similar or equivalent inducements.

Notwithstanding this zeal for surgery, its inevitable ac-

companiment, the administration of the anaesthetic which makes it possible, is relegated to a position of minimum importance. Its attractions being so few, it is entrusted to anyone who may be at hand. To quote Dr. Baldy again,—“This position of trust in the operating room, second only in importance to that of the surgeon, is conferred almost universally upon a boy just from his books, with no practical knowledge of anaesthetics, and with less teaching,” or to “any available doctor in the neighborhood,” without any reference to his ability or experience.

It is the opinion of not a few surgeons that anyone can give chloroform; that it requires no special training or experience to be able to administer to a fellow creature a poisonous drug in quantities sufficient, and no more than sufficient, to render him unconscious and relaxed. The absurdity of such a notion is self evident. In planning an operation which, from the shock and depression necessarily involved, calls upon the patient for every ounce of his recuperative ability, who does not consider what steps had best be taken to meet the situation by the administration of salines, stimulating hypodermics, etc.? The one matter not thought of at all is the decisive effect that the anaesthetic, well or ill given, may have upon the patient's chances of recovery, and I am quite confident that a partial explanation at any rate of the differences in the results obtained by various surgeons for the same operative procedure lies in the fact that some of them have the tremendous advantage which results from the services of an experienced anaesthetist; that in some cases the best anaesthetic has been selected and the smallest possible amount of it has been given; and that neither has a return of the reflexes and muscular rigidity been allowed to occur, nor have the patient's vital centres been depressed beyond their functioning point, either of which errors of administration delays the operation and adds materially to its dangers.

The ideal anaesthetic is that compound which fulfils the following conditions:—

1. Its use must be free from danger.
2. It must produce insensibility to pain, and muscular

relaxation.

3. It must prevent shock and be non-depressant.
4. It must be easy of administration.
5. It must not be followed by severe after-effects.

We have at our command a fairly large number of drugs which answer more or less satisfactorily to these demands. There are, however, only two which deserve any lengthy discussion—Chloroform and Ether. As for the remainder, I intend merely to mention them and pass on.

In the Hyoscine-Morphine-Cactine compound we have an anaesthetic which finds its chief usefulness in obstetrical work, and as a preliminary to Ether narcosis. It is also of service in the performance of minor surgery and the setting of fractures; but its action being variable, one cannot put much confidence in its results. In some cases it produces almost complete unconsciousness and relaxation, while in others it seems to have little or no effect. In using it in obstetrical work I have held it on several occasions guilty of so obtunding the nervous system of the babe as to render the establishment of respiration very difficult, and I therefore consider that a note of warning should be sounded with regard to its use in these cases, except perhaps in the very smallest doses.

The Scopolamine-morphine narcosis has been weighed in the balance and found wanting. In the one case in which I have used it, while it did not produce complete unconsciousness, the patient at the same time was so restless and rigid as to necessitate the administration of chloroform in addition.

With Lumbar anaesthesia I have had no experience. Its advocates are very enthusiastic over its merits, but it can never become very popular because it not only requires peculiar skill in its administration, but also is occasionally followed by such an exceedingly unfortunate sequel as the development of a permanent paralysis of the lower extremities.

Of the volatile anaesthetics only Chloroform and Ether produce anything but temporary relaxation. The others therefore do not enter into this discussion, and I will proceed to consider how each of these compare with the ideal I have outlined.

The first requirement is safety. Anyone of you who has seen, as I have, an apparently healthy patient die with terrible suddenness as the result of Chloroform, administered neither carelessly nor in an amount which anyone would have considered excessive, will have no hesitation in pronouncing upon the dangers inevitably associated with the administration of this drug. Undoubtedly in the majority of cases the results of an overdose are first seen in its effect upon the respiratory centre. The breathing becomes feeble and shallow, and if the administration is persisted in, finally ceases; while at the same time the heart, though depressed, is not as yet sufficiently poisoned to cause a cessation of its action. This feature is the salvation of many a patient anaesthetized with Chloroform. There occur however not infrequently cases in which the first evidence of an overdose is seen in a failure, partial or complete, of the cardio-vascular system, the respiration at the same time presenting so little evidence of poisoning as to convey to the anaesthetist no warning of danger. It is under this heading that we must classify those patients with the Lymphatic Diathesis, for whom Chloroform, even in the smallest doses, is almost inevitably fatal.

A further danger, and one into which we all are at times only too liable to fall, is the facility with which an overdose may be given. When one considers that there is required for good surgical anaesthesia only 2 per cent. of Chloroform in the blood-stream, that larger amounts are highly dangerous, and the tremendous width of variation in this percentage that must occur when it is given in the usual way by inhalation with varying inspiratory and expiratory efforts, through a mask which is now saturated with, now free from the drug, then and then only does one realize the risks that one inevitably runs in its use.

It is no argument to say that because one has so given it again and again and has never had trouble, that the drug is therefore safe. The man who says that he has given Chloroform a hundred or a thousand times and has never had a death and that he knows it is a safe anaesthetic, reminds me of an old lady I knew in the East with whom I had occasion to discuss the feeding of babies. She did not like the limits

I set in the matter of her grandchild's diet, and said "Potatoes! Not give baby potatoes! Young man, I've raised thirteen and buried six and I fed them all potatoes as soon as they would take them; I know potatoes are good for children." One realizes that this man's good fortune is not universal, when one reads the investigations recently held in London as to the cause of so many deaths under anaesthetics, in the hospitals, Chloroform being the drug most commonly used, and one wonders how long the use of the drug will be permitted.

There are facts, however, which lend verisimilitude to the fallacy that anybody can give Chloroform. An experience of my own is one of them. I was confining a patient in the country 15 miles over bad roads from anywhere. The baby was large and illplaced and the mother was a little woman who weighed not more than 100 pounds; I anaesthetized and handed the Chloroform to an old lady who was my only assistant. For an hour that uneducated and totally inexperienced farmer's wife gave a beautiful anaesthetic, to the surgical degree, till things were straightened out, and then more lightly till I had delivered. Contrast this however with another story. Not long ago I had a minor operation to perform and asked an able confrere to give Chloroform for me. Before I touched the patient he had had to resort to tongue traction and artificial respiration; the patient was in miserable shape throughout, and it was with a feeling of tremendous relief that I was finally able, after hurrying through my task at my utmost speed, to order a discontinuance of the anaesthetic.

Here is another case which exemplifies one of the peculiar accidents that one meets with in using this drug. Some years ago I was called to a confinement and on arriving at the house found the patient suffering very intensely. I opened my bag and as rapidly as possible made ready the mask, poured a little Chloroform upon it and put over the patient's face. To my astonishment her respiration almost immediately stopped, however, by knocking the mask off, and stimulating her I got her to resume breathing in a few moments. Not caring to take any more liberties with her, I washed up and made

an examination which revealed an occiput almost at the introitus. I then undertook to try a little Chloroform again, giving it myself very carefully. After three or four breaths the patient stopped breathing again, but was rallied a second time with comparative ease. Fortunately her labor was nearly concluded for I had to let her go on without any easement. Finally I should like to give you an example of the facility with which an overdose may be given. I was giving Chloroform for the extraction of teeth. The patient was absolutely prone on a chair-table. The first stage proved very arduous, probably because the patient was an alcoholic, but finally after a fairly large amount had been given, he went well under, and the dentist began his work. Before its completion, however, the patient began to struggle; I poured some Chloroform, about 15 or 20 drops, on the mask and put it over his mouth. After two or three deep respirations he stopped breathing; his face became ashen grey; his lips blue; his jaw dropped, and there was no pulse to be felt at the wrist. To lower his head, and inject Strychnine hypodermically took only a few seconds, and artificial respiration was immediately begun and combined with tongue traction. The suspense lasted for a minute or so, but fortunately he began to breathe again. The dentist successfully extracted the remaining teeth before he regained consciousness.

The conclusions to be drawn from these cases and others of a similar nature which no doubt occur to all of you from your own experience, are firstly,—that Chloroform is essentially a dangerous drug, and that this fact must be kept constantly in mind; secondly,—that there are people to whom it is impossible to administer it at all; and thirdly,—that it is alarmingly easy to give an overdose, the effects of which occur with lightening like rapidity, and from which there may be no recovery.

With regard to the next requirement, viz.—insensibility to pain and muscular relaxation, there is no doubt that Chloroform provides these very satisfactorily. In respect of prevention of shock and non-depression of the system, no one will disagree with me when I state emphatically that Chloroform falls far below the ideal. Being itself a powerful depressant

it adds to the shock very materially. This is best observed in cases where the operative procedure, such as the removal of tonsils or the excision of a nail, is accomplished by a negligible amount of shock. These operations done under local anaesthesia do not produce shock to any recognizable extent, whereas done under Chloroform, even the patient who is not nauseated occasionally exhibits a depression of the cardiovascular system indistinguishable from that produced by surgical shock.

There is no anaesthetic which is easier of administration than Chloroform. Its small bulk, its inoffensive smell, its freedom from strangling effect, the unessentiality of apparatus, and the ease with which the patient ordinarily goes under, all render it without doubt the simplest of all to give, and explain its popularity. Finally as to after-effects, the great majority of patients suffer from more or less vomiting after taking Chloroform, which persists for 12 to 48 or rarely for 72 hours after the completion of the operation.

Turning now to Ether, it is necessary first of all to distinguish between Ether given in a closed inhaler and Ether given by the drop, or open method on the ordinary mask. I propose to discuss the former first.

The dangers of administering Ether by the closed method are not immediate, but remote. The un-aerated tissue, depressed by lack of oxygen, must undoubtedly fall an easier prey to any organisms to which it may be exposed than it would had its oxygen supply been free. This is the explanation of the pneumonias, nephritis, etc., with which we are not infrequently confronted as sequels to Ether anaesthesia. The immediate dangers are conspicuous by their absence. Barring the poisoning of the respiratory centre by a combination of too much Ether with too little fresh air, I have never seen any untoward events occur during its administration. Of the sequelae one must speak more cautiously. There is no doubt that they often are as effectual in turning the scale against the patient as the depression engendered by Chloroform. It is these later developing dangers which have given rise to the belief that Ether should not be administered to a patient at either extreme of life, when the resistance to infection is

poorest.

Some of the other requirements Ether, given by means of the closed inhaler, fulfils. It produces complete insensibility to pain and muscular relaxation; it is non-depressant, therefore produces shock to a far less degree than chloroform.

As far as the ease of administration and the freedom from after-effects are concerned it falls lamentably short of the ideal. One requires more preliminary training to handle a Clover's inhaler properly than is necessary in any other method of administering an anaesthetic. The apparatus itself is large and cumbersome. It is impossible, in my experience, to prevent the accumulation of mucus in the throat and this is provocative of vomiting by its stimulation of the palatal reflex, and to my mind it is very difficult to follow from moment to moment the condition of the patient, which is the essence of the work of the anaesthetist. No one can watch a fellow-being, whose every breath rattles in his throat as though he were in his death agony, with his face and ears exhibiting in their deeply cynosed hue the extent of the lack of oxygen from which his tissues are suffering, and believe that in this method the ideal in anaesthesia has been attained. On the other hand by the preliminary use of Laughing-gas one can induce anaesthesia very rapidly and with less distress to the patient, either physical or mental, than with any other combination of drugs or form of apparatus.

There is no need for me to expatiate upon the after-effects of this anaesthetic. There is no distress greater or deserving of more sympathy on our part,—for are we not practically helpless to relieve it?—than that presented by a poor unfortunate who has been subjected to its influence. In many, if not most cases, vomiting, frequently excessive, occurs for 48 hours after the operation, and nausea lasts as long again, and there can be no denying the fact that an ordeal of this kind is the last to which we should submit a patient in the exhausted condition necessarily consequent upon any major operation.

Till very recently these two drugs—Chloroform and Ether, thus administered,—completed or practically completed the armamentarium of the anaesthetist. To recapitulate



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briefly their merits and demerits: The chief drawback to Chloroform is its danger, its advantages lying in the ease of administration and in its comparatively light after-effects; while the chief drawbacks to either administered by the closed method consist in its after-effects and in the sequelae of pneumonia and nephritis; its superiority lying in the comparative safety with which it may be given.

Recently a new anaesthetic, or a new method of administering one of these drugs, has been elaborated: a method which, while it retains the advantages, does away almost entirely with the drawbacks. It fulfils indeed nearly perfectly the requirements laid down for the ideal. I refer to Ether administered by the open, or drop method. Since October, 1907, I have given this anaesthetic on 63 occasions—31 of which were for the performance of one or the other of the commoner intra-abdominal operations. The remaining 37 cases include amputations, herniotomies, lithotomies, nephrectomies, prostatectomies, Whitehead operations, excision of the breast, etc. Among the laparotomies are included four cases of general peritonitis following appendicitis. Of these only one is dead. The patients thus anaesthetized were not selected in any way and the list includes children and adults of all ages. Two were women who weighed over 250 pounds and one was a three months old infant of 9 pounds. This baby was suffering from excessive shock—the result of an intussusception,—and was put upon the table in a moribund condition, pulseless at the wrist, uncountable gallop rhythm of the heart, cyanosed and with cold extremities. She died almost immediately after the belly was opened, but it had seemed to me that her circulation showed some slight signs of improvement as the Ether was being administered and before the operation was begun. It was undoubtedly the shock that proved fatal.

The conclusion I have drawn from this experience is that given in this way Ether is an absolutely safe anaesthetic, both immediately and remotely. It is practically impossible to give too much, but if one does succeed in so doing, there is ample warning given by the respiration which ceases long before the heart is affected to any appreciable extent. Indeed

the heart is stimulated by the Ether and the pulse is of good quality, strong and full, even throughout a long and arduous operation. Most of my patients went off the table with a pulse rate of about 80. On one or two occasions too much Ether was given and I observed that expiration became less and less strong. This failure or weakening of the expiratory effort is the sign I now watch for most carefully as a guide to the patient's condition. In not one of these cases has there occurred either of the usual sequelae to Ether narcosis by the closed method, pneumonia or nephritis. In one case an empyema developed three weeks after an appendectomy with abscess,—an infection of the pleura with colon bacillus—, but other than this there have been no complications. I think then that we may safely say that Ether thus administered is absolutely free from danger, and this conclusion agrees with the experience of others as reported in the medical literature.

Turning now to its effects in producing insensibility to pain and muscular relaxation, we find that it not infrequently produces these satisfactorily only when preceded by Morphine or the Hyocine-Morphine-Cactine compound. Once they are produced there is less tendency towards a return of the reflexes than obtains with Chloroform. Not long ago during an operation for chronic appendicitis, while the appendix was being freed from its adhesions, I deliberately let the patient "come out" to a considerable extent, at the same time keeping an eye upon the flaccidity of the abdominal wall. I asked the operator if the belly was quite-soft; to my astonishment the patient opened his eyes and said: "What?" In spite of this evidence of consciousness there was absolutely no muscular rigidity of any kind.

With regard to the prevention of shock, the exhaustion seen after either of the older anaesthetics is never encountered after the administration of Ether by the open method. Frequently the patient is, comparatively speaking, well within a few hours of the completion of a severe operation. This may be partly explained by the mild character of the after-effects, but it must also be remembered that the drug is essentially a stimulant, as is shown by its effect upon the circulatory system. It is true that during the administration of the

drug there almost invariably occurs very free perspiration. The sweat stands out on the face and neck in large drops, and there is sufficient to wet everything with which the patient is in contact. I do not think that this is an indication of shock; but if it is, it is the only symptom of depression that has been observed.

It is more difficult to administer Ether by the drop method than Chloroform—though this method is easier to master than that involving the use of a closed inhaler. One whose experience of anaesthetizing has been restricted to Chloroform from a dropping bottle, and Ether from a closed inhaler, will find it hard at first to use the apparatus of the former drug for the administration of the latter, and will be very much inclined to give too little Ether. Ether also has the disadvantage of producing a rather long stage of excitement, and given by this method is apt to exhaust the patience of both surgeon and anaesthetist before there is established a narcosis sufficiently deep to allow of the commencement of the operation. This drawback may be overcome by giving the patient a hypodermic injection of a Hyoscine-Morphine-Cactine tablet or Morphine sulph. grs. $\frac{1}{4}$, half an hour before beginning the anaesthetic. If, even after this, this stage prove arduous and prolonged, a second injection similar in size to the first may be given upon the table, without any fear of evil consequences. This preliminary administration of a sedative serves several purposes. The nervousness of the patient is greatly lessened, the stage of excitement is materially shortened, the establishment of a proper degree of anaesthesia is more easily effected, and there is required a far smaller amount of Ether to maintain the narcosis.

The patient's eyes should be covered with a dressing or small folded towel, wrung out of water, and his face should be liberally smeared with vaseline. The mask should have two thicknesses of stockinette, and another wet towel should be wrapped around its edges to prevent the escape of air between it and the face. The Ether should be dropped upon the mask slowly and steadily; upon the maintenance of this uniformity in the administration depends to a large extent the success of the anaesthetic. To pour a large quantity upon the mask

and to allow it all to evaporate before more is given, is to produce choking and strangling, the accumulation of mucus in the throat, and an irregular and unsatisfactory narcosis. If, however, it is given continuously, drop by drop, keeping the mask well saturated all the time, the resulting narcosis is uniform and satisfactory, and vomiting very rarely occurs.

The unpleasantness entailed by the inhalation of Ether may be overcome by beginning the anaesthetic with some other drugs less irritating to the nasal and pharyngeal mucus membrane. I have generally used Chloroform for this purpose, giving it only until consciousness was lost and then immediately substituting Ether. Recently, however, I have been trying the effect of beginning the anaesthetic with Somnoform, a French preparation, which is, I think, no more than Ethyl Bromide. It is put up in a glass tube containing 5 cc., the whole of which is used at once and is given in a special inhaler. It produces a very rapid anaesthesia and will, I think, prove very satisfactory as a preliminary drug. I have, however, had too little experience with it to speak any more definitely about it.

Finally as to after-effects, these are far less marked than with Chloroform, and there is absolutely none of the terrible nausea and depression caused by Ether given by the closed method. Usually the patient complains of nothing more than gastric malaise, and the taste of Ether in his mouth. Very occasionally there is vomiting but in none of my cases did this occur more than once after the patient became conscious. Some of them did not vomit at all either immediately after the withdrawal of the drug (though this is fairly frequent) or later when consciousness was returning. One of the greatest advantages this anaesthetic possesses is the fact that patients to whom it has been given rarely, if ever, complain of that terrible post-operative thirst to which we have become more or less inured. The suffering it entailed was very considerable, and if this were the only advantage that this method of inducing anaesthesia possessed, it would be a sufficiently strong argument for its superseding the other drugs more commonly used.

Briefly then the conditions laid down as essential to the

ideal anaesthetic are very satisfactorily fulfilled. The drug is absolutely safe. It produces insensibility to pain and muscular relaxation, provided that certain precautions are observed. Patients thus anaesthetized exhibit far less shock and depression than that which follows the same operation performed under the old anaesthetics. Its administration is not difficult and its after-effects are far milder than those of its predecessors.

In conclusion I wish to emphasize two points. Firstly, Ether administered by the open method is an anaesthetic which, so far as we have been able to discover, is free from any serious drawback, being vastly superior to Chloroform in that its use is free from danger; and to Ether given in a closed inhaler in that it is followed neither by serious sequelae nor by severe after-effects.

Secondly, the administration of anaesthetics is a study worthy of being undertaken by any physician. It is a task which demands one's whole attention and cannot be properly performed by anyone whose interest in it is but casual and superficial. And, as in all other branches of our art, experience is the only mistress whose teachings result in the thorough mastery of the subject.

Edmonton, August 8th, 1908.

EDITORIAL NOTES

THE OATH

I swear by Apollo the physician and Aesculapius, and Health and All-heal, and all the gods and goddesses, that, according to my ability and judgement I will keep this Oath and this stipulation—to reckon him who taught me this Art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring in the same footing as my own brothers and to teach them this art if they wish to learn it without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the Art to my own sons, and those of my teachers and to disciples bound by a stipulation and oath according to the law of medicine but to none others. I will follow that system of regimen which according to my ability and judgement I consider for the benefit—of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to any one if asked, nor suggest any such counsel, and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practice my Art. I will not cut people laboring under the stone, but will leave this to be done by men who are practitioners of this work. into whatever houses I enter, I will go into them for the benefit of the sick and will abstain from every voluntary act of mischief and corruption; and further from the seduction of females or males, of freemen and slaves. Whatever, in connection with my professional practice or not in connection with it, I see or hear, in the life of men which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this oath unviolated, may it be granted to me to enjoy life and practice of the Art, respected by all men, in all times! But should I trespass and violate this oath, may the reverse be my lot.—(From the Genuine Works of Hippocrates; translated by Francis Adams.)

The great desire of those interested in Western Medical Progress is that the year 1909 will record the formation of the Western Canada Medical Association and bring near the completion of Interprovincial Reciprocity. Judging from the opinions expressed by the rank and file of the profession one would imagine both these two forward steps could be easily taken. What is the obstacle? Simply the lack of a leader of experience in Western and general Medical matters—one who is enthusiastically interested also in present Western medical progress. Such a man could guide the western profession by the light of his experience in the past. The force is there waiting—an adequate force which could be easily organ-

ized into a splendidly active Association. One can readily think of several who should be fitted for such work—who have nearly all the qualifications. For some reasons the former leaders have abnegated their responsibilities—by such abnegation they have blocked progress. At present it seems to be the system in the West to have leaders who dare not lead and followers who dare not follow. Naturally, the result is Anarchy. When leaders have no clear opinion on matters before their profession but just let things drift—the general profession must inevitably suffer. The respect of the public and professional progress can only be attained when a leader comes forward who knows his own mind and is not afraid to pursue a definite policy. We have earnest and able men in the West. Then what is the cause of the suppression of such? Simply this, that before professional and public weal comes the interest of the private affairs of some of the present leaders. The true interest of the medical profession is set aside in the interest of Interests.—When one realizes that medicine is one of the most important factors in national life, that this should be so, is despicable, and the sooner those who acknowledge the seriousness of the effect of this combine, the better for the public, the profession and themselves. Let us drop all rivalries and work heartily till the need for a strong Western Association to administer Western affairs is fully understood. All the nonsense talked about such a Society bringing in lack of harmony and breaking up the Dominion is not worth discussion. It is so obviously absurd. We can be loyal members of the Dominion and yet conscious of our own individuality. Note, too, that any working against such an Association is done in an undercurrent way. What does this tell the observer? The day is passing in the West when the mole-ish way of working ends successfully—the results of such are being recognized. “Square Deals” are being strenuously asked for. One thing is clear, that if the West has not the gumption to look after itself, the East will not do it. The East seems to have enough to do to manage its own affairs. Again, regarding this provincial spirit. Such an Association will not prevent us each being proud of our profession in the narrower sphere of local and provincial work.

if we avoid provincial and personal jealousies. The main object of each Society is the profession's welfare. We are all links in the chain of professional life and as such each has a value—alone we are nothing. Above all, let everyone realize his individual responsibility and remember that the greatest man is not indispensable and the least can contribute something to the advancement of his profession. It is a hopeful sign to note that those who seem to be working hard to raise their own province are also the men who do not refuse to work for the West as a whole. The Press, the musicians, the clergy, the businessmen, etc., all have felt this need. Provincialism is fast dying out and a strong Western spirit growing up.

When we consider the invaluable suggestions, the ideas derived from practical experiences and other educative influences which would result from frank and brotherly discussion by the men of the West, the reason for the formation of such an Association is obvious. More important than any of us should be our profession's welfare and of more importance than our profession should be the welfare of the human race or we are unworthy followers of hippocrates. We to our profession, she to humanity, have a great duty laid upon us. Therefore let us so labour together to enable us to carry out our responsibilities. And in the furtherance of this great end unity is the greatest need.

Meetings

We hope the Manitoba men will do all possible to make the provincial meeting in June a great success. Do not forget the date, nor to write the Secretary if you have a paper to read or any suggestions to make.

Also remember to note the Dominion Meeting in Winnipeg is August 21st to 25th. We hope Western men will endeavour to be present and help the success of the gathering.

CORRESPONDENCE

To the Editor of the Western Canada Medical Journal.

Dear Sir:—

Thirty years ago, more or less, I attended a meeting of the Dominion Medical Association, where I heard the subject of Dominion Registration discussed and finally referred to a committee with instructions to report the following year.

Eleven years passed before I had the privilege of again attending a meeting of the same Association, when the subject was again discussed and again referred to a committee.

I have good reason to believe during these eleven years and for about eleven years after my second meeting, Dominion Registration was a *hardy annual, coming up at every meeting*, having a year's rest in committee and bobbing up at the next with unflinching regularity.

Then came Dr. Roddick with his Bill and we all hoped. It was a good bill. Dr. Roddick put into it, and the effort to make it effective, years of arduous work, and intellect of a high order and energy and influence which would almost have served to ensure success, but at the last it was balked by the jealousies and rivalries of the educational institutions of Ontario and Quebec. And so we settled down to the status quo hoping for something to turn up, but pretty well despairing of realizing the ideal.

The last couple of years, we in the West have thought it possible that we might have a partial sort of Dominion registration (A misnomer of course) by an arrangement of the four western Provinces to have a common examination and a common registration—that is one examination for the four provinces, the passing of which would entitle one to be registered in any of them on payment of the prescribed fee.

It would seem that there could be no valid objection to such a scheme, but during my tenure of office as president of the Alberta Medical Council, when tentative propositions were made in this direction, one province agreed to the principal only if registration were made retro-active and another turned it down altogether.

Perhaps because I am by nature optimistic, I still believe that there is a strong sentiment through the mass of the profession that the present situation savours more of the petty jealousies of little parish councils than of the standing and dignity of a learned profession, and that there should be found some reasons of at least bettering the condition of affairs which is a continuous reproach to us as a body of intelligent and educated men.

I venture, therefore, to make a suggestion:—

I believe that one of the difficulties—perhaps the main one—has been that we have wanted to legislate for ourselves. We have wanted reciprocity or a common registration because we might want to practice in another province by ourselves. Suppose that we sink the idea of self altogether and try and make it better for those who come after us. Let our status remain as it is, or if we want to practice in another province, pass the prescribed examination—if we can.

But from now on, is there any earthly reason why there should not be one examination for the four Western Provinces held simultaneously say at Winnipeg, Regina, Calgary or Edmonton and Vic-

toria, the passing of which would enable a man to practice in Manitoba, Saskatchewan, Alberta and British Columbia on payment of the registration fee. Such an examination conducted by the best men in the four provinces would command respect. It would ensure British recognition. It would remove a standing reproach and—who knows?—it might almost bring about Dominion Registration.

You have always taken a keen interest in matters such as this and the Journal reaches probably more of the men living in the four Provinces than any other. May I hope then that you will give my proposal your serious consideration and if it seems good and feasible to you, present it to your readers with more debate and argument than can be compressed in the scope of a letter.

I have still another suggestion. The Dominion Medical Association meets in Winnipeg next summer and it would seem to be an opportune time for a meeting of say two representatives from each of the four Medical Councils to discuss the matter and if possible, arrive at some basis of agreement. There are now six months to work in and it ought to be possible in that time to find out, whether the plan proposed finds favour in the eyes of the profession in the West.

Yours truly,

G. A. Kennedy, M.D.

Macleod, Alta.

Editor's Note.—Dr. Kennedy is to be congratulated on the stand he takes. The profession at large are behind him and it is to be hoped the Councils of the Western Provinces will listen to the proposal of one who expresses the real sentiments of the profession of the West.

PROCEEDINGS OF THE WINNIPEG CLINICAL SOCIETY

The Winnipeg Clinical Society met on Tuesday, December 1st, with the President, Dr. Nichols, in the Chair. The minutes of the previous meeting were read and adopted.

Dr. Leney showed a case, male, age 41, cookee on railway construction for four months. Family history good. Came from England three years ago, worked as drummer for a brewery and in that business he started taking liquor, often 10 or 20 glasses a day for two or three years. Six years ago he developed tuberculosis, treated in sanitarium and pronounced cured.

!!! since August. Pains in feet and hands, especially around knees and ankles, and previous to this he felt a little numbness and tingling sensation; pain in back and neck; shooting pains in feet. He went to Hospital in Kenora first week in September, and stayed there three or four weeks, but no improvement. Patient has been in Winnipeg four weeks and slight improvement noticed. After examination, Dr. Leney thought it a case of multiple neuritis. Considerable wasting in muscles of legs, arms and hands. Increased knee jerks, ankle clonus is very marked. He trips over things. Toes have been dragging; foot drop also noticed to some extent. Patient lost 20 or 30 pounds since July. Nothing in urine.

Dr. Hunter gave an outline of the case, as elicited by him from the patient, confirming Dr. Leney's remarks and said that he could find no actual paralysis of the muscles, although the extensors of the arm are perhaps a little weak. Owing to loss of weight, he recommended feeding patient on tuberculosis diet—milk, eggs, butter, cream, and advised patient to avoid heavy smoking.

Dr. Nichols—Would it be necessary that there should be a change in the sensory side, wouldn't it be on the motor side?

Dr. Hunter—In poliomyelitis, either acute or chronic, you get the pure motor affection with no affection of sensation. Combined with the motor affection, there is some degree of sensory impairment in peripheral neuritis.

Dr. Nichols—In lead poisoning (is there much change in sensation?

Dr. Hunter—There is some change; the amount varies with the cause of the peripheral neuritis, but in practically all peripheral neuritis one counts on getting some sensory change.

Dr. Leney said that, at times, the patient experienced pains like red hot irons shooting down his back, arms and legs.

Dr. Hunter did not think such pains were suggestive of peripheral neuritis.

Dr. Nichols asked as to treatment by galvanic current, but Dr. Hunter thought that it would not prove beneficial when the patient could use his muscles to the extent he can at present.

Dr. Bond said that in this case one could get muscle reaction; it was only when the reaction of degeneration became complete that the muscle would not react. Dr. Bond thought that this patient would be benefited by electrical treatment.

Dr. Nichols asked whether increased knee jerks might be expected in a pure case of peripheral neuritis, and Dr. Milroy said lessened knee jerks would be expected.

Dr. Leney said that while text books say knee jerks are lost in

peripheral neuritis, still he had seen two or three cases in Montreal where, in the early stages, the knee jerks were increased, but in this case the knee jerks are not so prominent as they were weeks ago when he saw the patient first.

Dr. Hunter's case of Disseminated Sclerosis—A Frenchman, aet. 26, never sick up to time of present illness. Tended bar for many years, but only took a little beer, every day. No syphilitic history. Till six months before sickness commenced, he was cook in a lumber camp. He noticed a little weakness in the legs then. Last November he walked about 20 miles in the snow. After that walk he was very tired and wet, and the next morning he found he wasn't able to use his limbs at all. He remained in the hospital, improving some, but four or five days after he went in, he lost the power of speech, which was absent for two or three weeks. Limbs steadily improved so in a month or so he could move around with a cane. Speech returned, but left him with a peculiar style of speech which he now has. He got worse again, and went to St. Boniface Hospital 5 or 6 weeks ago, and was confined to bed when I first saw him. He has a marked spastic paretic gait. He walks with broad base, marked spastic and quite paretic. No ataxia; a little difficulty in putting his feet together, but once he gets them together there is no true ataxia. Knee jerks are marked, increased ankle clonus, has Babinski's sign; also while lying there are no spontaneous movements, but usually on getting up there is a good deal of wiggling of body and slight intention tremor of the arms and also of the face, but that has improved. There is marked spasticity of the lower extremities, what might be called the clasp-knife rigidity; there is an inclination toward adductor spasm, also pretty active arm jerks and the tricep jerk is pretty well marked. His tongue, when he opens his mouth, is lying at rest. No atrophy of tongue, but when he is asked to put out his tongue, there is a jerking backwards and forwards; no nystagmus, and Dr. Brown reports there is no atrophy of the optic nerve. Pupils react to light and accommodation. Of disseminated sclerosis, I think this is an undoubted example, but in typical disseminated sclerosis the speech is a scanning syllabic speech, but here there is a bulbar speech. He has no difficulty in feeding himself or any other bulbar symptoms. Sensation seemed at one time to be vaguely impaired, he wasn't anaesthetic but he wasn't as sensitive and quick in replying as usual. Intelligence apparently is unimpaired, he answers pretty fully and his memory seems all right. Once or twice a little precipitancy in micturition but he has no trouble at all now. His mental clearness for over a year would be a strong point, in fact, it would settle the diagnosis from general paralysis of the insane.

Dr. Milroy agreed with Dr. Hunter that it was disseminated sclerosis. In disseminated sclerosis one usually gets the ataxic condition combined with muscular rigidity. In regard to tremors what is called the intentional tremor or tremor of voluntary muscular action has been present although not to a very great extent at the present time. The only symptom I would look on as a tremor is the peculiar protruding of the tongue. It may be a bulbar symptom, but that tremor of the tongue and lips present I think is perhaps the intentional tremor of disseminated sclerosis. In other respects that symptom in this case on present examination is practically absent. Whether speech is typical, scanning, or bulbar is hard to determine. No pitching of the eye-balls—nystagmus. No symptoms of optic atrophy. From present examination I wouldn't definitely diagnose it as disseminated sclerosis, but together with past history, and the

age, I should say that was the correct diagnosis. This trouble is usually found in people between the ages of 20 and 40.

Dr. Hunter pointed out that disseminated sclerosis is a progressive disease, with constantly changing conditions and symptoms. For instance, at the beginning, one may find a hemi-anaesthesia or an external strabismus, and these may disappear and the whole history may be one of a hysterical patient. If the condition develops acutely it is not uncommon for the symptoms to disappear rapidly and the condition may disappear so largely that the patient is called cured, until it comes back again later on. Post-mortem one finds spots up and down the cerebro-spinal cord, very thick around the medulla and if one remembers that one can understand the multiplicity of symptoms. One finds if one can examine a case post-mortem a thickening of the glia, but the axis cylinders are intact.

Dr. Hughes asked if it wasn't more common in females.

Dr. Hunter replied that it is more common in females. He also referred to the aphasia present for 2 weeks in this case, referring to cases of disseminated sclerosis where for a day or two or a week or two a passing case of aphasia was seen following an apoplectic attack.

Dr. Milroy asked if it is usual for this disease to come on suddenly, and Dr. Hunter replied that it doesn't come on suddenly but is accentuated suddenly. In this case the accentuating cause was the long walk in the snow.

Dr. Hunter spoke on the etiology, and said that infectious diseases are given as the causes, also trauma. Also from the vascular changes it is supposed to be toxic in origin and in most cases the toxin is carried through the blood vessels.

Dr. Milroy asked as to the bearing of syphilis on this disease, as in other scleroses.

Dr. Hunter replied that syphilis has absolutely no connection with disseminated sclerosis. Syphilis of the cord will give rise to other symptoms, especially pain in the spine. There has been an entire absence of pain in this man.

Dr. Kennedy asked as to what was meant by vascular disturbances.

Dr. Hunter—I meant in connection with these little grey spots of sclerosis one sometimes gets some infiltration and thickening of the vessels in the neighborhood and some thrombosis.

Dr. Hughes presented a patient exhibited some six weeks previously, suffering from a rodent ulcer on the temple. Dr. Bond has given her ten X-ray treatments at intervals, and steady improvement was noticed. The condition began to improve about the third treatment. The first sign of improvement was a shrinkage of the little reddened nodule in the middle of the growth. That vanished and left a shell of skin and that peeled off and the pearly lumps disappeared and left the scarred condition there is to-day.

In the discussion following, Dr. Hughes was asked the distinction between rodent ulcer and lupus, and replied that in lupus it is a tuberculous condition of the skin and a different arrangement of the cells is found. In rodent ulcer it is a carcinomatous condition. Dr. Hughes made a negative reply to Dr. Bond's enquiry as to whether this case hadn't more the appearance of a lupus rather than rodent ulcer. Dr. Bond then stated that he had diagnosed it as lupus and treated it for that. In describing this mode of treatment, he said: I used a low tube, one that has a spark gap of about two inches, one I keep for treating superficial skin troubles and the exposure was made for eight to ten minutes rather near the skin, I noted the

effect, and if it had any reddening effect I took the tube off ten inches and left it there five minutes, but it is a low tube, calculated to act superficially.

Dr. Lehmann said the rapid reduction was a clue to diagnosis, that no lupus could go down so quickly under the treatment, and that rodent ulcer is most amenable to such treatment.

Dr. Bond showed some interesting radiographs of Colles' fracture, and the patient was also present for examination. The patient had fallen from his horse and landed on the wrist. Before the X-ray examination, the diagnosis was that some ligaments were injured but nothing wrong. The radiograph showed there was something else evidently wrong. Colles' fracture, and injury to the styloid process of the ulna and crushing in of the carpal bones, especially those in the direction of the radius.

Dr. Kenny also showed a radiograph of injury to the scaphoid bone. Patient complains of weakness and pain on any use of the wrist and also pain with change of weather. Radiograph shows that outer third of scaphoid bone was separated from the rest of the bone, or that there is some disease of that portion of the bone. I thought I got some crepitus. History of injury to that wrist dating back six years. The hand was on the ground, and a number of men playing football piled on top of it, and it was sore for some months after and from time to time, depending a great deal on the amount of use given the wrist and the change of season giving pain in the wrist.

Dr. Galloway had a marked case of kyphosis of the spine to show, in a young man aged 10, which had probably been developing for several years, but attracted attention during the past year. Contraction of the chest; no pain; nothing in family history.

Dr. Lehmann did not think there was an inflammatory condition going on.

Dr. McKenty thought the kyphosis began when the boy was between two and five years old, and increased greatly as he grew, probably due to a greater amount of manual work than his tissues could endure. Farmer's sons are set to work when their tissues are not fully developed and bones not sufficiently hard. He didn't think there was any diseased condition of the cartilages or bones or discs. He asked as to the ancestors' spines.

Dr. Galloway—I have seen the mother; the father is dead. I have no knowledge of the father having deformity of the spine. I think this case is caused from purely mechanical conditions, and is a pure case of kyphosis of adolescence. I do not doubt the condition was present back in infancy but the development to the extent of becoming a deformity has been since the period of adolescence set in. The boy is tall and grew rapidly, and once the spine became bent over, the weight of the head became a lever and the weight of the arms also became weights attached to that lever and this has increased the kyphosis. I have excluded the vertebral lesions—Pott's disease—I have seen that condition of spine brought about by tuberculosis of the vertebrae, but after close examination and enquiry into history I have no doubt this is kyphosis of adolescence and brought about by purely mechanical causes, rather than any destructive pathological condition unless one puts behind that some diminished resistance of the cartilages, but this diminished resistance could be found in the rapid growth of the patient and the fact that he is very vigorous.

The treatment seems to be very important. The course I outline may seem rather formidable but I can't see any way to simplify

it. The patient is attending my private gymnasium and receiving exercises for the purpose of producing increased flexibility of the spine chiefly. With the spine bent over in the shape it is, there must have been a great deal of accumulated shortening of the ligaments and muscles and it is necessary to overcome those things which maintain the deformity before one can expect to accomplish any reducing of the spine. After a month of that treatment I intend to put on a retaining plaster jacket in order to have spine deformity corrected as much as possible, allowing it to remain several weeks and then repeat it three or four times, each time hoping to gain more correction, much in the same way as gradual correction of club foot. When I have regained all I think I can by that treatment I will return to gymnastic treatment, because that treatment will cause the muscles to atrophy to some extent and it will be necessary for means of protection to have him practice gymnastics under supervision and under strict treatment. He will be expected to continue this at home. In order to maintain the erect attitude until he is older and the skeleton is fully developed, I think it will be a good idea to put a steel spinal brace on, and make him sleep on a hard mattress without any large pillow under his head.

If one does not correct the present deformity, it seems to me a very considerable increase in deformity is inevitable unless means be taken to intercept it. Although he was standing straighter to-night, you would notice he was doubled across the anterior surface of the trunk and from the conformation of his thorax I think it is beyond dispute his lungs are not working to their capacity, and it would become more marked in time. That contracted condition of the thorax would make the patient more vulnerable to tuberculosis and the diminished lung capacity would certainly give him less chance of recovery should he be attacked by any acute illness such as pneumonia or typhoid, and I think the case of round shoulders should not be lightly passed over, outside of any cosmetic condition.

An absolutely symmetrical spine is very rare and in nearly every patient I examined there is some lateral curvature of the spine and in this case there is some lateral curvature. In these cases it is not uncommon to get a fair degree of symmetry and a pure backward bending. I think I could pick out flaws in the spines of most people who are normal. Most lateral curvatures of the spine are, I think, congenital, and are seen in babies under a year old. Many cases of severe curvature seen in children 14 or 16 years of age, where it is supposed to be from sitting in wrong positions at school desks and carrying school books under one arm and trifling mechanical causes, I think that the lesion that led up to pronounced symptoms was present at birth.

I have seen almost as severe cases of kyphosis in female patients but not in many cases. In females one gets the condition referred to as round shoulders.

I hope to show a case where the inferior angle of the scapula digs into the ribs and causes a pain in the scapular region. I operated on this young woman of about 21 years of age, and removed the upper angle of the scapula and relieved the pain. The operation is not at all a serious one, and gives complete relief in these cases.

The Winnipeg Clinical Society met on Tuesday, December 16th, with the President, Dr. Nichols, in the Chair. The minutes of the previous meeting were read and adopted.

Dr. Dorman presented a case of Mongolian imbecility, in a boy, aet. 5 years, born at eight months; suckled until six months old, when mother again became pregnant. Abnormally quiet baby; at eleven months just able to sit alone; first teeth appeared at this age;

also had an illness described as rheumatism with indigestion. At 16 months had an attack of diarrhoea. Child had not yet made any attempt to walk or talk, so frænum was snipped with scissors, but child made no attempt to cry. Was placed on Thyroid Gr. 1, but it was discontinued as it made child fretful and disturbed sleep. Child later took measles and was very ill with them. Often used to suck his tongue. Small features; tongue is lolling out; good deal of slavering; has reddish pink face; some spots on iris; head is short and neck thick; hands and feet are blue and ligaments are lax and he can extend himself in many positions the ordinary child cannot; little finger is bent towards ring finger; fingers are thick and taper down toward the ends; suffers from cold and likes heat; abdomen is prominent but less so than a year ago. One testicle is absent and the other not very well developed; basic murmur, systolic in time. Inclined to be dirty; teeth late in coming and have decayed early; vocabulary limited to about six words; two years ago only "daddy," "mama" and "here". Child is cleanly in habits and makes his wants known by signs understood by the mother; high arched palate. Sister two years younger is quite as large as the boy and much more advanced as regards speech.

Dr. R. G. Montgomery examined the child for adenoids, and pronounced them present and advised their removal. He gave a lengthy discourse on the subject of adenoids and their relationship to mental and physical development of a child, pointing out that they were one of the factors in producing pigeon-breast, want of development and want of mentality.

Dr. Hunter pointed out that there was no sign of discharge from the ear, nor any signs of chronic deafness in the child, but the other features, the appearance of the child, high arched palate, open mouth and marked backwardness in speech were indicative of Mongolian imbecility.

Dr. Lansdowne—The adenoids resulted from the conditions preceding, rather than causing the condition. I don't think the face is a type of adenoids.

Dr. Dorman—I think the lack of circulation, perhaps beginning in utero has something to do with the cold extremities and flabbiness of the tissues. The child can hear perfectly.

Dr. Raymond Brown—The Mongolian type of eyes is not significant of adenoids, and perhaps you will find in this child that he has the lymphoid tissue very abundant all over the body and that this adenoid tissue is part of it.

Dr. Watson—I had a child brought to me, deaf at three years, and I removed the adenoids, and a month later the child started to talk. Adenoids have a lot to do with the non-development of children, and I think they should be removed.

Dr. Lehmann did not think the face typical of adenoids; although adenoids probably had something to do with it, still he thought there was a great deal more than adenoids there.

Dr. Hugh Mackay—I think the patient a very typical case of Mongolian idiocy, and while it has a suggestion of adenoids, still the Mongolian idiocy would first suggest itself.

Dr. Lachance showed a patient, age 32, upon whom he had operated three weeks ago for hernia complicated with ectopic testicle. The testicle would remain most of the time inside the abdomen, sometimes coming down with the hernia, producing a large amount of pain. A blackboard illustration showed the position of the sac. After cutting into the canal the testicle was at a level of the internal ring, and lower down there was the sac of the hernia. One of two

operations were indicated, one taking the testicle down to the scrotum and suturing, but the cord was too short; the other operation, the removal of the testicle, but this the patient would not consent to, he being under spinal anaesthesia. The testicle was accordingly fixed inside the abdomen. The veins of the other testicle were very much varicosed. The ordinary Bassini operation was performed. The nervous symptoms were very strong, but patient felt a good deal of pain in vicinity of testicle, but these have now subsided. Patient is married and has a family.

Dr. Lehmann—I congratulate Dr. Lachance on the results obtained in his operation. I think it was the only right thing to do; I don't see there is any chance of bringing a testicle like that down, or any object in removing it, and I don't see it is doing any harm in the abdomen. About two years ago I had a case very similar; one testicle was undescended, which I discovered in the internal ring, and the other in the perineum. I did the same thing as Dr. Lachance, and I have not heard anything of the case since. I haven't found anything in the literature as to replacing the testicle in the abdomen. In the case I had, one testicle was about as faulty as the other.

Dr. Hunter—Isn't one of the dangers of leaving an undescended testicle in this position a danger of malignant trouble afterwards?

Dr. Lachance—There are reports of malignant tumors of an undescended testicle and that is exactly why I would very likely have removed the testicle if I had been allowed. It may be that the malignant condition comes from the testicle moving up and down in the canal, but I think it will not be so now that the testicle is sutured. I have had cases of undescended testicle in young boys, bringing down the testicle and suturing to the scrotum with good results, but my experience is not sufficiently long to know whether the good results will continue. The pulling on the cord in a man of that age would have caused more trouble than suturing the testicle in the abdomen.

Dr. D. S. Mackay—I agree with Dr. Lehmann and Dr. Lachance. I see no object in trying to bring down the testicle where the vas deferens is so short that it will be done with a great deal of strain. They are not, in recent years, so afraid of malignancy in undescended testicle.

Dr. Dorman—The testicle is often of very little use, it being atrophied; and the other reasons for removing it are malignancy and gonorrhoeal orchitis with possibly resultant suppuration if it was placed in the abdomen; another reason for removal is that it was impossible to deal with the hernia while the testicle was there.

Dr. Lachance—The testicle being high up in the abdomen is not so liable to infection from gonococcus as when suspended in the scrotum.

Dr. Hughes showed a case of a young man suffering from gonorrhoea with arthritis which commenced six weeks ago. Various rheumatoid symptoms have appeared, first in the heel, and then he developed a pain in the costal cartilages of left side, a perichondritis, and now has a swelling on the right elbow joint.

Dr. Hunter—I saw the case about ten days ago. He was complaining of severe pain for 24 hours, over the 6th, 7th and 8th costal cartilages, well in front of the mammary line, on the left side. It was extremely tender and showed a swelling, and when he brought the rectus into action it was especially tender. No heart, lung or abdominal affections discernable, which could account for the tenderness. It seemed to be a case of gonorrhoeal perichondritis. There was no fluid taken from the joint.

Dr. Young—I have found this most unsatisfactory to treat. I had a case a couple of years ago who suffered from a second attack of gonorrhoea; the first one had been some years before. A rheumatic condition had developed which had been treated very unsatisfactorily. Patient was well satisfied with treatment he received under hot air treatment. The second attack was some time later, during the latter part of an attack of urethritis. The discharge wasn't much past its height when I saw him. The rheumatism was quite marked and affected the larger joints of the legs and arms, as well as the wrist and tendons. These affections were not so severe as one might expect from the description of the disease and I decided it was not gonorrhoea. The pain moved from one joint to the other in a typical rheumatic manner. Salicylates had no effect whatever. The joints were afterwards quite stiff and he went to California and took the hot baths there where he got great relief. Is there a better method of diagnosis than the withdrawal of fluid?

Dr. Nichols said his results from use of salicylates had been very unsatisfactory.

Dr. Lehmann—While I was in Berlin, I had ample opportunity of seeing a good many gonorrhoeal arthritis, and the invariable treatment was the Bier's constriction band. The pain left almost immediately and the movement returns in a short time. The older cases improve but they don't give the rapid results the acute cases do. The pain in acute cases leaves almost immediately and in two or three weeks the joint is absolutely healthy as far as appearance and function goes. I saw fifty or sixty cases.

The question of serum treatment was raised, and several expressed their opinion that the cost of serum was too great to make it practicable. Dr. Hart has used it in one case, but the result wasn't satisfactory. He used about 30 cc., starting with 2 cc. to dose, increasing to 6 cc., and the cost was about \$15.

Dr. Hughes said he had been using Bier's Hyperaemia with very good results, especially in knee joints, but in the elbow and upper arm the results weren't so good. The pain subsided for a time, but recurred. He tried it in epididymitis in several cases: in some it was good, others it was not. In regard to rheumatic affections he thought gonorrhoeal rheumatism was not taken into consideration often enough in making diagnosis.

Dr. Nichols—In cases where all the joints of the spine are affected, I don't think the Bier's treatment could be applied.

Dr. Lehmann—In well-equipped institutions there are varied and elaborate contrivances for application of hyperaemia treatment. The only places this treatment doesn't readily respond to are the shoulder and the hip joint. They leave the band on for 22 hours, to begin with, and only 2 hours off. The patients are very anxious to get it on again as soon as possible and they try to get it on before the oedema is off, resorting to all sorts of tricks to get it on in order to relieve the pain. As far as getting functional results I haven't seen an ankylosed joint following gonorrhoea, where the Bier treatment was used early.

Dr. Hughes—I had one case in which there was some pain along the vas, especially at the internal ring, and I tried Bier's hyperaemia and the result was excellent.

Dr. Dorman—Since reading Dr. Lehmann's paper I think most of us have had reason to try it one way and another, and I tried it on cases of boils and it gave a very excellent result and the relief of pain is much marked. I used the glass portion of a glass nipple shield and used a pump in applying it. I also have a case of tuber-

cular knee joint; I would ask Dr. Lehmann if he thinks it would be a good plan to try it in this case.

Dr. Lehmann—The application for tubercular joints is quite different than it is in acute septic inflammation. The way it is applied in tubercular joints is a much firmer constriction, left on a much shorter time. The results are good, but I think that they probably have been overstated in the enthusiasm of the new method. I think even in the Bier's clinic they are not so enthusiastic about the treatment of tubercular joints as they were, although they claim it is better than any other method.

Dr. Bond asked Dr. Hughes if the condition of gonorrhoea was acute or chronic in the case cited by him, and Dr. Hughes replied that it was acute.

Dr. Bond—The rheumatic trouble coming with gleet is often improved with high frequency treatment. In acute conditions where there is any ulceration it is very painful and not to be recommended. In the case I mentioned, the trouble was in the bottom of the heel and the trouble disappeared with that treatment. The treatment of the sciatic nerve had no effect at all, but when the high frequency treatment was applied to the urethra the trouble disappeared.

Dr. Hunter suggested having Dr. Lehmann give a practical demonstration of the proper method of applying Bier's hyperhaemia at the next meeting.

Dr. Hutchinson opened a discussion as to the Society purchasing as complete an outfit for giving the hyperhaemia treatment as possible. Dr. Lehmann replied that a good working outfit would cost only about twenty dollars.

GENERAL MEDICAL NEWS

VITAL STATISTICS

Winnipeg, December—Births, 319; Deaths, 137; Marriages, 150.

Disease	Cases.	Deaths.
Typhoid	26	2
Scarlet Fever	18	—
Diphtheria	16	1
Measles	174	—
Scabies	6	—
Erysipelas	2	—
Whooping Cough	1	—
Chickenpox	24	—
Smallpox	1	—
	<hr/>	<hr/>
	268	3

Vancouver, 1908—Births, 1245; Marriages, 873; Deaths, 849. 1907—Births, 1035; Marriages, 707; Deaths, 888.

December—Births, 119; Marriages, 71; Deaths, 75.

Edmonton—Births, 53; Deaths, 12; Marriages, 18.

MEDICAL NEWS

The Medical Health Officer of Vancouver reported that of the 109 restaurants visited only 10 per cent. could be classed as sanitary.

A by-law is to be submitted to the Vancouver City Council in January for money to provide a new small pox hospital provision being made for cholera and plague patients.

It is proposed to erect a special building to cost about \$25,000 in B. C. for advanced cases of tuberculosis.

An Anti-Tuberculosis Society was formed two years ago in Vancouver to assist not only the sanatorium but also local cases of tuberculosis. It is an auxiliary to the British Columbia Anti-tuberculosis Society. The Vancouver Branch assists the Board of Directors of the B. C. Society in secur-

ing funds and forwards its objects in every way. .

The Salvation Army is to build two new hospitals—one in Calgary, another in Edmonton. The first payment has been made on the land for the Edmonton hospital. The scope of the work undertaken will be similar to that done in Grace Hospital, Winnipeg.

The Saskatoon City Hospital is expected to be ready for occupation about Xmas.

The public hospital board of Edmonton intend erecting a modern hospital next year. The amount required will be at least \$150,000—accommodation for 100 patients.

Work is soon to be started at the government farm for the asylum at Coquitlam, B. C. In time it is hoped to make this institution self-supporting.

The Grey Nuns are to make arrangements for the erection of a hospital at Regina costing about \$200,000.

The City Council of Chilliwack, B. C., decided to build a hospital for the city.

The Edmonton Day Nursery is to be opened. A house rented at \$25 a month has been taken. Children will be taken care of from 7 a. m. to 6.30. A charge of 10 cents per day will be made.

In the appeal of Dr. Garesche from the decision of the Dental Council in striking his name off the list of dental surgeons allowed to practice in B. C., the right of the Council to do as they had done was upheld by Justice Clement.

Superintendent Perley of the Indian Department reports the Indian population last March as 110,205, a decrease of 140 from the record of 1907. Excess of 40 deaths over births. The heavy mortality is due to tuberculosis.

At a meeting of the Saskatchewan University Council at Regina it was decided to begin work next fall in Arts, Science and Agriculture and that instruction be given for 3 years providing 3 students enter for the 3rd year.

At a meeting of the Saskatchewan Medical Society the

following officers were elected for 1908-1909:—President, Dr. W. J. Mackay; Vice-President, Dr. J. E. Bromley; Sec.-Treas., Dr. Peterson.

Calgary will soon instal a civic laboratory. The advantages of having a medical man as alderman is seen by the attitude of Dr. Egbert in regard to salary of the officer in charge.

PERSONALS

Dr. Wishart, who has been lately appointed chief of the Ear, Nose and Throat Department of the Toronto General Hospital, has on that account resigned his position as chief of that department in the hospital for sick children which has devolved upon his junior in the service, Dr. Geoffrey Boyd. Dr. Wishart has been elected a member of the Royal Society of Medicine, London, England.

Dr. H. S. Sharpe, Gainsboro, Sask., is taking a course at the New York Post-graduate Medical School and Hospital. On his way to New York he will attend the Mayo Clinic, Rochester, Minn., for a short time. Mrs. Sharpe accompanies him.

Dr. Conolly of Cranbrook, B. C., has been appointed Coroner for the Province of B. C.

Dr. Fred A. Keillor of Stirling has been appointed Coroner of

Dr. H. S. Smith, late of India, has started practice in Saskatoon.

Dr. H. E. Munroe and Dr. G. R. Peterson have been elected members of the Saskatoon Hospital Board—the former for 3 years, the latter for two.

Dr. J. H. C. Willoughby was one of the candidates for Mayor for Saskatoon city this year.

Dr. C. D. Parfitt who was for six years physician-in-charge of the Free Hospital for Consumption at Gravenhurst, Ont., and has been for the last seven months resident con-

sultant to that institution and the Cottage Sanatorium, has resigned his position. Dr. Parfitt will remain at Gravenhurst and continue practice in pulmonary and laryngeal tuberculosis.

Dr. Hanington of Queen's Hospital, Ross Bay, is taking a vacation at Vancouver.

Dr. Brett of Banff has been on a visit to Edmonton.

Dr. Harvey Smith of Winnipeg has returned from his visit to the States.

Dr. Quesnel of Daysland visited Edmonton recently.

Dr. Ball of Regina is taking a three week's vacation during which he will visit Rochester, Chicago and Eastern points.

Dr. A. S. Monro of Vancouver paid a short visit to Winnipeg.

Dr. Lincoln of Calgary is visiting Montreal.

Dr. Pirie of Vancouver is visiting Hamilton, Ont.

Dr. Couillard of Montreal is visiting Edmonton and will probably practice there.

Dr. Sherrin of Souris, Man., leaves this month for New York, where he will take a post-graduate course in Eye, Ear, Nose.

NOTICES

The address of the local Secretaries for the Meeting of the British Association for the advancement of Science, Aug. 25th to Sept. 1st, is—British Association for the Advancement of Science, University of Manitoba, Winnipeg.

Dr. Halpenny, Secretary of the Manitoba Medical Association, desires to hear by February 15th from any Manitoba men who will volunteer papers for the June meeting.

We thank Dr. Butler of Wilmette, Ill., for "A Doctor's Symphony," and regret lack of space prevents our printing it this month.

MARRIED

CAMERON—HALL, November 3rd, at Saskatoon—Dr. D. C. Cameron to Miss Hall, both of Saskatoon.

SHARPE—HOUSTON—At Gainsboro, Sask., December 16th 1908—Agnes Smith Houston (daughter of the late Baillie Houston, Dumfries, Scotland) to Dr. H. S. Sharpe, Gainsboro.

OBITUARY

On Xmas Day at Vancouver, Dr. McGuigan died. Dr. McGuigan was one of the old timers and held many public offices, among others that of Mayor.

Dr. Leeson of Brandon, Man., was killed almost instantly on November 25th. While hauling lumber he slipped and fell under the wheels. Dr. Leeson was a pioneer, but had retired from medical practice owing to ill-health. He was well-known and popular. His wife was formerly Miss Hunter, once superintendent of Brandon Hospital.

BOOK REVIEWS

Diseases of the Heart, by James MacKenzie, M.D., M.R.C.P., Oxford Publications, London, H. Froud & Hodder and Stoughton, 1908 (Cr. 4 to pp. 406; 264 Figures, 2 25s—d.

This work gives much valuable food for thought and hypothesis that render easier of comprehension the action of the various chambers of the heart under pathological conditions.

At the outset, the author gives the definition of many of the terms in connection with affections of the heart and blood vessels, so that all readers may have a uniform idea of their application.

An interesting portion of the work deals with the development of the heart from the primitive cardiac tube in which Prof. Keith's authority is acknowledged and much information in regard to the cardiac anatomy and physiology is given, more especially in regard to the Atrio Ventricular Bundle (Bundle of His).

The author also gives prominence to the description of the instruments and their application in recording the Heart's Action, whether, when applied to that organ itself, or to the arteries and veins in their various locations.

The pulse tracings, of which there are a large number used in illustration, form the principal basis for the Writer's interpretations of the behaviour of the various portions of the heart as manifested in disease. The Atrio Ventricular Bundle is used to explain the many forms of irregularity of the heart's action.

The authorities may not agree with the explanations given but since they are based upon observations, extending in many cases over long periods of time and numerous pulse tracings, they must be regarded as a very serious endeavour to explain many puzzling cardiac phenomena.

The conditions indicating the use of digitalis are very clearly defined, also the advantages and disadvantages of the Spa treatment, with some particular reference to that carried out at Bad Nauheim, which are, it may be said, not altogether laudatory in character.

Those interested in the diseases of this important organ, should give this book careful study.

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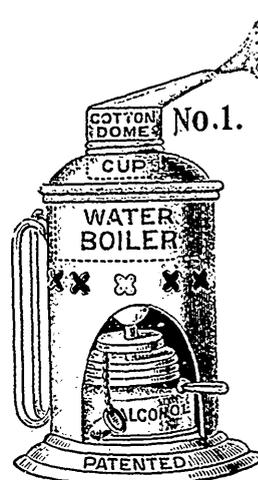
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NOTICE

ODD-NUMBERED SECTIONS

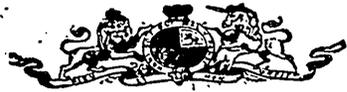
As already publicly announced, odd numbered sections remaining vacant and undisposed of will become available for homestead entry on the coming into force of the Dominion Lands Act on Sept. 1, next.

As the records of only the even numbered sections have hitherto been kept in the books of the various land agencies in the western provinces and the time having been very limited since the passing of the act within which to transfer the records of all odd numbered sections from the head office at Ottawa to the local offices, it is possible that the transfer of records in some cases may not have been absolutely completed by the 1st September. In any case where the record of any quarter section has not been transferred, application will be accepted but will have to be forwarded to head office to be dealt with.

As it has been found impossible as yet to furnish sub-agencies with copies of the records of the odd numbered sections and in view of the large probable demand for entries, all applicants for entry upon odd numbered sections are strongly advised to make their applications in person at the office of the Dominion Lands Agent and not through a Sub Land Agent. Applications for even numbered sections may be dealt with through the Sub-Land Agent as before if desired.

J. W. GREENWAY,

Commissioner of Dominion Lands,
Winnipeg, August 22, 1908.



Synopsis of Canadian North-West Homestead Regulations

Any even numbered section of Dominion lands in Manitoba, Saskatchewan and Alberta, excepting 8 and 26, not reserved, may be homesteaded by any person who is the sole head of a family, or any male over 18 years of age, to the extent of one-quarter section of 160 acres more or less.

Application for entry must be made in person by the applicant at a Dominion Lands Agency or Sub-Agency for the district in which the land is situated. Entry by proxy, may, however, be made at an Agency on certain conditions by the father, mother, son, daughter, brother or sister of an intending homesteader.

DUTIES:

(1) At least six months' residence upon and cultivation of the land in each year for three years.

(2) A homesteader may, if he so desires, perform the required residence duties by living on farming land owned solely by him, not less than eighty (80) acres in extent, in the vicinity of his homestead. Joint ownership in land will not meet this requirement.

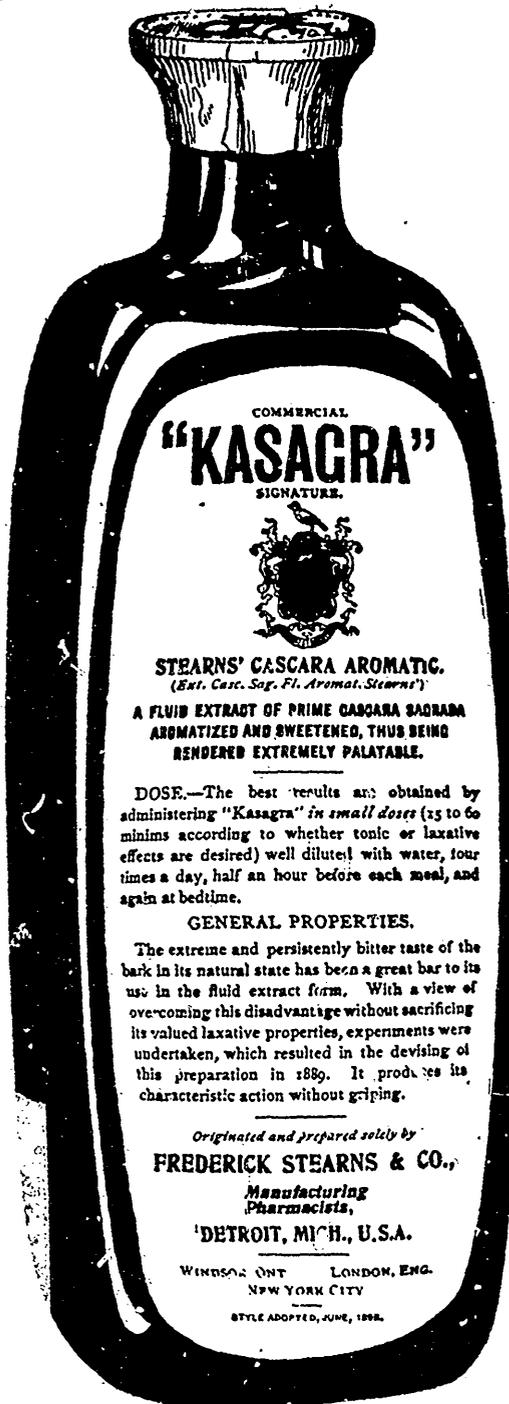
(3) A homesteader intending to perform his residence duties in accordance with the above while living with parents or on farming land owned by himself must notify the Agent for the district of such intention.

Six months' notice in writing must be given to the Commissioner of Dominion Lands at Ottawa, of intention to apply for patent.

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Antigonococcic Serum will play an important part in the therapeutics of the future. Its field, it should be understood, is not in acute urethritis, but in the

sequelæ of gonorrhœa—joint involvement (arthritis and tendosynovitis), gleet, epididymitis, orchitis, etc. We suggest that you give it a trial.

Bulbs of 2 Cc., three in a package.

LITERATURE FREE ON REQUEST.

Some
New Agents that
Broaden the
Field of
Biological
Therapeutics

Bacterial Vaccines

The development of the opsonic theory marks a long step in the advancement of medical science—such, at least, is the opinion of men who have made an intelligent study of the new therapy. Believing with Sir A. E. Wright of London (the originator) that the bacterial vaccines have an important future, we are now marketing a number of these products, as follows:

STAPHYLOCOCCUS VACCINES.

Albus (*Staphylococcus Pyogenes Albus*).
Aureus (*Staphylococcus Pyogenes Aureus*).
Citrus (*Staphylococcus Pyogenes Citreus*).
Combined (*Staphylococcus Pyogenes Albus*, *Staphylococcus Pyogenes Aureus*, and *Staphylococcus Pyogenes Citreus*).

These vaccines are applicable in the treatment of furunculosis, suppurating acne and other forms of staphylococcal infection. They are prepared from various strains of staphylococci. They are sterilized by heat and are ready for use. Bulbs of 1 Cc., 4 bulbs in a package.

GNONOCOCCUS VACCINE.

Applicable in the treatment of the chronic conditions following acute gonorrhœa. Prepared from pure cultures of the gonococcus. Sterilized by heat and ready for use. Bulbs of 1 Cc., 4 bulbs in a package.

STREPTOCOCCUS VACCINE. (*Streptococcus Pyogenes*.)

Applicable in the treatment of the localized forms of streptococcal infection. Prepared from various strains of streptococci. Sterilized by heat and ready for use. Bulbs of 1 Cc., 4 bulbs in a package.

TUBERCULIN PRODUCTS.

(Used in the treatment of tuberculosis.)

Tuberculin T. R. (Tubercle Residue)—Bulbs of 1 Cc.
Tuberculin B. E. (Bazillon Emulsion)—Bulbs of 1 Cc.
Tuberculin B. F. (Bouillon Filtrate)—Bulbs of 1 Cc.

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