THE MODERN DOCTRINE OF BACTERIOLOGY, OR THE GERM THEORY OF DISEASE.

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[The following is an abstract of a paper read before the British Gynæcological Society on March 9th. The discussion which followed the paper was published in the British Medical Journal of March 25th, page 730.]

After a few preliminary remarks, Dr. Bantock said: I am quite aware that my views will probably be regarded by a majority of those present as very heterodox; but that does not deter me from giving expression to them, notwithstanding the belief that they are only too far in advance of those held by my contemporaries for immediate acceptance. Before proceeding further it will be well to define what I understand to be the modern doctrine of bacteriology. It is this, namely, that in the majority of—or, as some extremists would seem to hold, all—acute diseases the condition is due to the influence of a specific so-called pathogenic micro-organism. This is the doctrine that I proceed to combat by propounding the very opposite doctrine—that the presence of these various micro-organisms is the result, and not the cause, of disease; in other words, that the bacilli are found in association with the disease because of the disease, or that the disease furnishes the conditions necessary for the presence of the special micro-organism.

You may have overlooked or forgotten a very important fact told us by Dr. Newman. He told us that in the examination of the vaginal discharge of a healthy woman, obtained for him by one of his colleagues, he found a great variety of organisms, and amongst them the staphylococcus pyogenes and streptococcus pyogenes. In the abstract published in the *Journal* of this Society, he tells us that "more than thirty different species of micro-organism have been isolated from the female genital tract, or from discharges." This is confirmed by numerous observers. Of the most recent publications that I have seen, I refer to that of Dobbin, appearing in the *American Journal of Obstetrics* for August last, and of Dr. Whittridge Williams, who tells us that in the vaginal discharge of pregnant women "pyogenic bacteria were found in the vulvar secretion in nineteen cases (76 per cent.)," and within the vulva in 48 per cent. Among those enumerated by Dobbin we find, in addition to the two just mentioned, the bacillus coli communis, the bacillus of tetanus, Klebs-Loeffler bacillus of diphtheria, and the bacillus typhosus. Dr. Newman adds that "the most frequently present is the staphylococcus pyogenes aureus, which is the commonest of the group of suppurative bacteria." Here we have the doctrine plainly indicated—namely, that the staphylococcus pyogenes and the streptococcus pyogenes are, as the name implies, the cause of suppuration. A strange part of this doctrine is this—namely, that the vagina is said to be the habitat of a bacillus—Döderlein's—which "is inimical to the presence or prolonged existence of so-called pathogenic bacilli"—like the good fairy in the pantomime defeating the machinations of the wicked fairy.

I presume you are all acquainted with the fact that Dr. George Stoker had been treating chronic ulcerative conditions, with the most gratifying results, by means of oxygen gas. Now it happened that in the early days of his work he had under his care a woman who had been bedridden for many years with a large ulcer involving the whole of the instep of each foot. These ulcers were almost precisely alike in form and extent, and it was suggested to him that one should be treated with corrosive sublimate and the other with oxygen gas, for the purpose of comparison. In a very short time it was easy to perceive a difference between these two ulcers; for while in the former the surface was certainly cleaner than at the beginning of the experiment, yet it presented an ashy-grey appearance, and exhibited very little sign of healing, the latter presented a healthy granulating surface with a good margin already healed over. A gentleman from the Clinical Research Association now appeared upon the scene, and took some of the discharge from each with the view of obtaining a culture. This was the astounding result, namely, that the first was—to use the current language—sterile, while the latter (oxygen case) gave a copious crop of bacteria, and what, think you, was the organism which stood out most prominently? It was this very staphylococcus pyogenes, which, with the streptococcus pyogenes, we are told, is the prime cause of suppuration. From that time Dr. Stoker took up the study of bacteriology as applied to this part of the subject, and at the annual meeting of the British Medical Association in this city in 1895 he gave an account of his work. As reported in the Journal, one of the important points to which he called attention was thus expressed: "(3) The bacteriological aspect of one case was surprising, and rather upset one's preconceived ideas." Dr. Stoker found that whenever the healing process appeared to falter, either under a diminished or an insufficient supply of oxygen, this was an indication for an increase, or for inoculation from a more healthy sore; and his observations led him to the conclusion that in proportion as the staphylococci were numerous and well developed, so the healing process progressed. What, then, is the natural, common-sense conclusion from this? It is this, that the staphylococcus pyogenes, which, as its name implies, has hitherto been regarded as the prime cause of suppuration, and therefore of the destructive process, must henceforth be regarded as, to say the least, doing no harm, and, it may be, as playing a beneficent *rôle* in the economy of Nature, and, in non-technical language, may be looked upon as playing the part of a scavenger.

[Having pointed out that in the three diseases of which we probably know more than of any others—namely, variola, vaccinia, and syphilis, no one has ever discovered a bacillus to whose influence the disease could be attributed, Dr. Bantock turned to the case of diphtheria.] You all know the modern doctrine—namely, that it is due to the influence of a specific bacillus—Loeffler's. But, I ask, How does it happen that cases of true diphtheria are met with in which this bacillus cannot be found? And how does it happen that this bacillus can be found in the throat of a subject weeks, even months, after all trace of the disease has disappeared? This doctrine has suffered much discredit of late from the fact that this bacillus of Loeffler is frequently present in some exanthemata, and also in healthy persons. A still "more striking example is afforded in cases of tonsillotomy, wherein upon the incised surface a greyish membrane is formed in which the bacilli abound, without constitutional disturbance or any sign of diphtheria." I anticipate the argument that, if you allow some of the discharge from the throat of a subject of this disease to gain access to that of a presumably healthy individual, you may, but not necessarily, produce the disease in him. And you may point to a number of cases in which medical men, in the fulfilment of what they conceived to be their duty, have sacrificed their lives in the heroic attempt to succour their patients—as, for instance, in the course of the operation of tracheotomy. But the answer to this is the very valid one that you do not convey the bacillus only. You also convey the fluid with which they are bathed, in which I contend they live, and which, in my opinion, constitutes the real essence of the disease. Many observers of eminence and authority in this field concur in denying the connection of the Loeffler bacillus with diphtheria as cause and effect. I am bound to accept as matter of fact the statements made as to the association, even in a majority of cases, of the Loeffler bacillus with diphtheria—for they are not questioned—but to reverse the proposition and say that their presence is the result of the disease appears to me to be the more sound reasoning.

It will probably be regarded as the rankest heresy when I express any doubt as to, much more a decided opinion against, the influence of the gonococcus as the prime agent in the production of gonorrhœa. Numerous observations are on record of cases of gonorrhœa without gonococci, and *vice versâ*. Dr. Newman tells us that "it is now well known that the gonococci diminish in number as the disease becomes chronic." That is to say, that as the disease becomes less acute the amount of the poison—the food on which they live—diminishes in quantity, and the gonococci are less numerous.

I am also aware that I am a heretic as to the importance of gonorrhœa in the production of pelvic inflammations, but I claim Dr. Newman as at least a tacit supporter; for has he not these words without adverse comment? "It is said that gonococci are present in one of every four cases of pyo-

salpinx." Surely that is a very small proportion on which to establish the proposition that gonorrhœa is answerable for the majority of cases of pyosalpinx. On the contrary, it supports my contention that it is only a factor in the minority of cases. As an example of the difficulties into which a rigid application of the doctrine leads one, I may refer to Dr. Robinson's paper on Vulvitis in Children, read at the Obstetrical Society of London, in which he stated that bacteriological observations revealed the presence of an organism indistinguishable from the gonococcus in cases of vulvitis in children, in as many as seventy-six present.

[After further illustrating his contention from facts connected with the origin and spread of typhoid fever, Dr. Bantock proceeded:]

You are doubtless aware that it is generally admitted by bacteriologists that the skin of the hands, and indeed all parts of the body, though not all equally, teem with a bacillus to which the name "staphylococcus albus" has been given; that this bacillus is supposed to be possessed of pathogenic properties, and that elaborate processes have been invented for the purpose of destroying it. I refer especially to that described by Howard Kelly as perhaps the most elaborate. You are probably also aware that no process hitherto invented has yet succeeded in getting rid of these micro-organisms, so deeply are they situated. Hence the skin itself, including the hands of the operator and that part of the patient involved in the operation, is said to be in a septic condition requiring more or less elaborate treatment. I might refer to innumerable observations by different workers in this field; but one will be sufficient for my purpose, and I take a paper published by Mr. Lockwood (British Medical Journal, September 17th, 1898), entitled, Further Report upon Aseptic and Septic Surgical Cases. In that report Mr. Lockwood tells us that with regard to his hands, "the skin was aseptic thirty-five times and septic six. ..... Once it was some variety of staphylococcus albus." Just before he "had operated upon a case of ruptured perineum in which there was a vaginal discharge." One would like to know what became of that case, in which we may assume there must have been an abundance of micro-organisms—such as the staphylococcus and streptococcus (pyogenes), which so abound at the vulvar opening whenever there is any discharge. With regard to the patient's skin, he says: "The skin of the scrotum is exceedingly difficult to disinfect, and, with the exception of the scalp, has a higher proportion of sepsis than any other." "Nevertheless, the scrotal wounds have done exceedingly well." "Since 1894 I have done twenty-five, and none of them suppurated. *Thus the sepsis of the scrotal skin has evidently a very small influence upon the repair of scrotal wounds.*" What an extraordinary comment!

Now let us see what is the meaning of this word "sepsis." It is as follows, as given in Funk's *Standard Dictionary of the English Language:* "(1) Poisonous putrefaction causing noxious effects on the vital properties. (2) Infection from a putrescent virus containing microscopic organisms, as sepsis from putrid matter or bacteria in a festering wound." The equivalent, then, of this in plain English is "poisonous" or "poisoned." I give Mr. Lockwood his choice of these definitions. Does he contend that the skin of a healthy subject in any part of the body is in a condition which answers to either of these definitions? But this is the natural condition of the skin. How absurd, then, does it not all seem! How much more rational and logical the view that these organisms are there for a specific and beneficent purpose. How is it that he has not perceived the force of his own conclusion in the words I have already emphasised and now repeat? *Thus the sepsis*—equivalent, as we have just seen, to the poisonous or poisoned condition—"*of the scrotal skin has evidently a very small influence upon the repair of scrotal wounds.*"

Kopinski, having concluded a series of bacteriological investigations on animals, has arrived at certain definite conclusions, as follows:

The performance of operations, whether aseptically or antiseptically, assures no absolute sterility of wounds, and it is difficult to say which of the two methods, in this respect, is the better. Antiseptic means in operations on healthy tissues must be given up, as they do not approach an attainable degree of sterility so nearly as asepticism does. In healing by first intention, both saprophytes and pathogenic micro-organisms are retained in the wound. In a wound healed by first intention, both staphylococcus aureus and albus were met with. Skin cocci frequently found their way into wounds, and, as a matter of fact, the skin showed itself to be a chief hindrance to sterility, as its microbes were deep seated, and on this account were only removed with difficulty.

Hence it follows that sepsis, according to Mr. Lockwood's phraseology, or the presence of the staphylococcus pyogenes aureus itself has evidently a very small or no influence upon the repair of wounds, and surgery has not ceased to be a possible art.

Probably it will not be news to you that I adopt none of the elaborate precautions of Dr. Howard Kelly, or the less complicated method described by Mr. Lockwood, beyond the simple washing of my hands previous to operation, and of my instruments after. While I am content with making my hands as clean as an ordinary washing with soap and water will make them, thus removing Lister's "grosser forms of septic mischief," I fear Mr. Lockwood will think they must be horribly septic. Yet with this simple precaution I stitch up a recent rupture of the perineum, it may be some hours after its occurrence, merely taking the additional precaution of wiping off any lochial discharge from the raw surface with a sponge and then placing another in the vagina to keep back the discharge, and I have never had a failure. I make a fresh wound in a ruptured perineum, stitch it up and obtain union by first intention. If I happen to pull a stitch too tight, the tissues become strangulated, their vitality is lowered, and I may get some suppuration in the track of the suture, but so uniform have been my final results that I have never had a case break down. In a case in which the whole perineum and vulva were in a state of extreme irritation from the relaxed or irritable state of the bowels—due to the exposure of the mucous membrane of the rectum—and without any precaution beyond wiping the surface with a warm wet sponge, I secured union by first intention, the diarrhœa ceasing from the moment of the completion of the operation. I dissect out vulvo-vaginal glands, obliterating the cavity in stages. I remove growths from the vulva, stitching up the wounds, and have never failed to obtain union by first intention. I sew up a bilacerated cervix, and have yet to record a failure. I have excised a considerable number of breasts, and the one in which I have failed to obtain union by first intention was the first and only one I did under the carbolic spray. So uniformly favourable have been my results since that case that I have come to regard it as one of the most simple operations in surgery. Moreover, in one case in which it was impossible to bring the flaps together I left the wound freely exposed to the air, with the result that the healing process went on as well as, if not better than, under the most approved dressing, and, aided by two or three skin grafts, the wound healed over completely. This in a public hospital. I have removed sebaceous cysts from the scalp—which, according to Mr. Lockwood, most abounds in septic micro-organisms—without any trouble resulting. I have, either by accident or of set purpose, opened the small intestine, the rectum, urinary bladder, and vagina in abdominal operations, in which the bacillus coli must, for a short time at least, have had free access to the peritoneal surface, without any harm. And if I obtain these good results by the adoption of simple cleanliness, in the common, every-day acceptation of the term—and such arrangements as any well-ordered private house can afford—where is the necessity for all those elaborate precautions which we hear of in the case of private and even public "installations" as they are called; for instance, "the floor of encaustic tiles, well-laid parquet thoroughly saturated with wax and highly polished, cement or highly-glazed linoleum," all angles of walls rounded off, the walls and even the shelves and doors covered with a hard, smooth cement, coated with some kind of enamel, such as Flicoteaux's "lacquered paint"; the sterilising of instruments and dressings, the spraying of the room for an hour or two before the time of operation, and so forth—precautions and preparations so eloquently satirised by Mr. Treves in *The Ritual of an Abdominal Operation?*

But does the observance of this elaborate "ritual" yield any better results than the observance of simple cleanliness? I aver that it does not. The operations I have named may be regarded as test operations; for are we not told that the orifices of the mucous passages especially swarm with bacteria—the bacillus coli, for instance—and that vaginal dis-

charges contain the staphylococcus and streptococcus pyogenes in abundance? And how are you going to carry out these elaborate precautions in a private house—the home of the patient—where cases do so well? I often wonder how the men who hold these views ever dare to operate on a cleft palate or hare lip, seeing that the mouth contains a greater variety of bacteria than any other part of the body, from the most innocuous to the most virulent, so-called.

There was a time when the bacillus coli was regarded as a most virulent microbe; and when, if the intestine by an unlucky chance got wounded in the course of an abdominal operation and the patient died, the death was attributed to the baneful action of this organism. But the late Professor Kanthack showed that this organism is a natural inhabitant of the digestive tract, and that its absence or reduction in number must be regarded as a departure from perfect health.

Thus it has come about, from the observations of Dr. Stoker, that the staphylococcus pyogenes can no longer be regarded as the prime cause of suppuration, but rather as a beneficent organism; from the investigations of the late Professor Kanthack, that the bacillus coli must be relegated to the same category; and from the observations of a host of investigators, that the staphylococcus pyogenes—and even the streptococcus—is found in conditions consistent with at least apparent health. Need I refer again to the case of the mouth, which in the recesses between the teeth, or in the cavity of a hollow tooth, furnishes, under favourable conditions for their development, abundant evidence of the presence of all these so-called pathogenic organisms?

But it has been affirmed that Nature has provided a wonderful mode of escape from the ravages of these noxious organisms, and has provided us with an arrangement for their destruction. I refer to the doctrine of phagocytosis of Metchnikoff, to which Sir Joseph Lister (as he then was) pinned his faith less than three years ago. I never could accept this comforting doctrine. I take credit to myself for my unbelief, for the theory is now almost universally discredited.

[Dr. Bantock then quoted Professor Buchner, who having at first been a staunch supporter of Metchnikoff's theory, characterised it as "a fable." This was also the view of the late Professor Kanthack.

Dr. Bantock next referred to recent investigations on plague and tuberculosis, as supporting his argument. He then went on:—]

It is perhaps necessary to remind the younger generation, who may not have studied the question from the beginning, that the antiseptic system was founded on the hypothesis that germs floating in the atmosphere fell into wounds, there developed into their respective bacteria, and produced all the evil effects that sometimes followed surgical operations. I cannot but think that the address of the inventor of the system, delivered before the International Medical Congress at Berlin, has not been read so extensively as it deserved to be, and therefore it is that I feel obliged to direct your attention to it, at the same time commending it to you for perusal. He says:

> By means of the phagocyte theory of Metchnikoff—which I have already shown you is now universally discredited—we can account for what would otherwise have seemed to me incomprehensible—the use, without evil consequences, of silk ligatures, which have not been subjected to any antiseptic preparation.....Dr. Bantock, whose remarkable series of successful ovariotomies may seem to justify his practice, does not, I believe, prepare his ligatures antiseptically. The success achieved by Bantock and Tait, without, it is said, the use of antiseptic means, proves a stumbling-block to some minds." (No doubt, so long as they hold to the germ theory.) "I can see that while the measures" (comprehended under the term cleanliness) "to which I have referred are, so far as they go, highly valuable, it must be in itself a very desirable thing to avoid the direct application to the peritoneum of strong and irritating antiseptic solutions." (This latter is in itself a strong justification of my abandonment of carbolic acid. He continues): "As regards the spray, I feel ashamed that I should have ever recommended it for the purpose of destroying the microbes in the air. If we watch the formation of the spray and observe how its narrow initial cone expands as it advances with fresh portions of air continually drawn into its vortex, we see that many of the microbes in it, having only just come under its influence, cannot possibly have been deprived of their vitality. Yet there was a time when I assumed that such was the case, and trusting the spray implicitly, as an atmosphere free from living organisms, omitted various precautions which I had before supposed to be essential." He then describes how, in a case of operation for empyema, "the air passed freely in and out of the pleural cavity" in a cloud of spray, and he arrives at the conclusion that "it is physically impossible that the microbes in such air can have been in any way whatever affected by their momentary presence in the air." "If then," he continues, "no harm resulted from the admission day after day of abundant atmospheric organisms to mingle unaltered with the serum in the pleural cavity, it seems to follow logically that the floating particles of the air may be disregarded in our surgical work, and if so we may dispense with antiseptic washing and irrigation, provided always that we can trust ourselves and our assistants to avoid the introduction into the wound of septic defilement from other than atmospheric sources." What these sources are we learn from his address at Liverpool, on September 16th, 1896, six years later: "Hence I was led to conclude that it was the grosser forms of septic mischief, rather than microbes in the attenuated condition in which they existed in the atmosphere, that we had to dread in surgical practice."

Here let me pause for a moment to give expression to my admiration of the character of the man who can confess his error with such candour and honesty, and exhibit such a state of open-mindedness, seeing that such a confession of error must detract from the credence we should otherwise give to his later views. Would that his disciples were likeminded! Nowhere do I find that Lister holds to the doctrine of Mr. Lockwood.

To proceed: What, then, are the "grosser forms of septic mischief?" "If," in the words of the late Dr. Campbell Black, "they are what is vulgarly called 'dirt,' then we are all agreed that to remove dirt (not, however, by killing it), and to keep wounds clean is perfectly scientific and proper treatment." What is this but the doctrine of "cleanliness" which I have advocated for so many years? Thus you will see that it only requires that Lord Lister should take one step more to fall into line with me. For while he has given up the theory of atmospheric germs, he admits that we may dispense with antiseptic washing and irrigation, and has virtually come to accept the principle of cleanliness—one of the two principles in the enunciation of which I played no unimportant part, and which are now generally accepted in the case of ovariotomy.

But, said Lister, in his Liverpool address: "The secretions of bacteria" possess "poisonous qualities of astonishing intensity." Where is the evidence of secretion? Do they possess a secreting organ? Is there an example in Nature of an organism, however low or high, living in, not to say upon, its own secretion?

I claim, then, to have shown that the poisons of variola, vaccinia, and syphilis are not and cannot be the product of a bacillus; that Loeffler's bacillus is not a constant, and therefore cannot be the essential, element for the production of an attack of diphtheria; that the essential element in the case of gonorrhœa is not the gonococcus; that the essential element in the case of typhoid fever is not the bacillus typhosus; that this bacillus cannot live but a few hours in ordinary sewage; that not a single specimen of this bacillus has ever been discovered in sewer air, and hence that typhoid fever cannot be attributed to it, because of its contained germs; that, in the cases of the epidemics at Maidstone and King's Lynn, there exists no proof of the contamination of the water by typhoidal matter, as indicated by the presence of the bacillus typhosus; that there is no evidence worthy of the name that tuberculosis is due to the ravages of the tubercle bacillus; that the comma bacillus cannot be regarded as the essential element in the production of an attack of cholera, and that the same can be said of the plague and its special bacillus; that the so-called pathogenic micro-organisms are constantly found under conditions consistent with perfect health, and that in more than one notable instance they not only appear to, but actually do, exert a beneficent influence.

All these things—which are facts, not opinions, capable of demonstration and proof—go to show that the modern doctrine of bacteriology is a gigantic mistake; that we are already at the parting of the ways, and that it is safe to predict that, ere long, it will come to be recognised that these various bacilli play a beneficent *rôle* in the economy of Nature.

Edinburgh University Angling Club.—An angling club in connection with the University of Edinburgh has just been formed with the following office-bearers: *President:* Dr. Hepburn. *Vice-President:* Mr. W. S. Nicholson. *Honorary Secretary:* Mr. M. F. Anderson. *Honorary Treasurer:* Mr. J. T. P. Heatley. *Committee:* Messrs. D. A. Callender, A. B. Flett, H. G. Lewer, J. B. Mason, J. G. M'Bride, and G. C. J. Robertson.