about fourteen horses died of peritonitis, for which no cause was demonstrated. Poisoning was excluded. All cases were acute, and the only definite thing noticed was that the inflammation was mostly in the pelvis and "double colon." Wohmuth, *Veterinarian*, 1901, LXXIV., p. 29-31, records three cases—one being due to a nail in the rumen; another to an abscess in the wall of the rumen; and the third consequent on parturition. The other records merely illustrate its occurrence after operation or parturition.

Looking through these cases, veterinary surgery seems in the same state as that in which the surgery of mankind was some twenty years ago. The idiopathic peritonitis of the latter has turned out to be mainly due to the disease of the appendix, which our predecessors had overlooked. It remains with the future to see if those of the animal will find a similar explanation. In discussing the pathology and physiology of the cæcal region, it was shown that there was every reason to expect inflammation in this place, and also the presence of lymphoid tissue. Beyond the influence of diet and position, there seemed to be no particular reason why this region should be very often affected in the biped and escape in the quadruped. It is to be expected that the disease, when closer attention is paid to it, will be far more frequent in the latter than it appears to be. Veterinary surgeons have not, as yet, recognised anything of the kind. It has also been shown that the collection of lymphoid tissue in the caput coli of animals is the analogue of the appendix of man. And, therefore, it should also have some analogous diseases. It must have a somewhat similar rôle with regard to the action and growth of micro-organisms. And it will, therefore, be liable to like inflammatory changes. These have not been fully recognised, but I have brought forward a case of abscess of the wall of the cæcum, examples of localised intraperitoneal abscess near it and in the pelvis, peritonitis limited to and especially marked in the same region. And it is suggested that these have an origin analogous to what they have in man—*i.e.*, the appendix, in the lymphoid tissue of the cæcum.

Professor Clifford Allbutt once wrote to me: "I warmly welcome any attempt to get away from anthropocentric medicine, to escape from the Ptolemaic phase into the cosmic."

Let this sentence close the remarks that I have made upon the subject.

THE COLOUR-REACTION OF ANTHRAX BLOOD WITH METHYLENE-BLUE: A QUESTION OF PRIORITY OF PUBLICATION.

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IN the preceding volume of this *Journal* (p. 35), I published an article entitled "A peculiar reaction of the blood of animals dead of anthrax," in which I called attention to the great value, for purposes of diagnosis, of treating incompletely fixed films of the suspected blood with aqueous solution of methylene-blue. In describing the reaction which is thus brought out, I said that, so far as I was aware, it had not previously been described. In a letter which I have recently received from Professor Heim, of the University of Erlangen, he has

called my attention to the fact that two years previously he had described the same reaction in an article which appeared in the *Archiv für Hygiene* (Vol. XL., p. 55). I therefore take the earliest opportunity to express my regret that this article had escaped my notice, and that I consequently failed to cite it and to give its author the credit to which he is entitled. It may perhaps be regarded as an extenuation of the oversight that the article was simply entitled "Zur Milzbrandinfektion," and was therefore not likely to attract the attention of anyone searching recent literature on the staining of the anthrax bacillus. Indeed, so far as regards its bearing on the question of diagnosis, it appears to have almost entirely escaped notice even in the country in which it was published, and a perusal of the article shows that this is not surprising, apart altogether from the somewhat vague heading under which it appeared.

In the article in question Professor Heim points out that as long ago as 1892 Weichselbaum had mentioned the violet or rose-colour which the envelope of the anthrax bacillus sometimes assumes in preparations stained with methylene-blue. Professor Heim re-discovered this fact, and, what was more important, he also found that preparations of anthrax blood when stained with methylene-blue often showed a more or less abundant rose-coloured amorphous material between the bacilli.

As stated in the second note which I published on the subject in the preceding number of this *Journal* (p. 360), the fact that films of anthrax blood yield a peculiar reaction with methylene-blue has been known to me for a number of years, and a reference to it, and to its value in the diagnosis of the disease, was made in an article which appeared in the *Journal* in 1899 (Vol. XII. p. 177). I confess, however, that at that time I had not accurately realised what were the conditions necessary to obtain the characteristic reaction, or to bring it out with such distinctness as make it visible to the naked eye.

Professor Heim attaches little or no importance to the precise directions as to the method of treating the film which were given in my note of March last. Indeed, he expresses the expectation that I have already discovered that I was mistaken with regard to this point. Such, however, is far from being the case, for further experience has only served to confirm the view that the condition absolutely essential to the success of this method of staining is that the film must not be completely fixed. All methods of treating the film which effect fixation of the red corpuscles prevent the reaction, apparently because they also fix the envelopes or capsules of the bacilli. As previously stated, no trace of the violet reaction can be obtained if the film has been fixed with sublimate, formalin, or osmic acid solutions. Immersion for a few hours in absolute alcohol similarly abolishes the reaction, as does also prolonged dessication of the film even at temperatures far below 100 C. As this is a matter readily put to the test of experiment, it may confidently be predicted that all difference of opinion with regard to it will soon disappear.

Coming in the next place to the question of the origin and significance of the amorphous material which exhibits the violet tint, I find that Professor Heim says (loc. cit., p. 58): "In the degenerated bacilli the rose-coloured part (Rosateil) is at first swollen, and then it ceases to be sharply defined, passing diffusely over into the surround-

ing space, and appearing as if it had flowed out; frequently it is found only in the fluid, so that the field of the microscope is thickly covered with amorphous fragments (schollenartigen Gebilden), which have often retained the bacillary form." With all this I agree, save that I still cannot assent to the interpretation of the picture which is implied in the word "degenerated." The material is undoubtedly derived from the so-called envelope or capsule which anthrax bacilli formed in the animal body have long been known to possess, but there does not appear to be any good ground for regarding the formation of this capsule as evidence of a degeneration on the part of the bacilli. This capsule is invariably present in the bacilli found in the fresh blood and organs, though it is perhaps thicker in the blood rods than in those formed elsewhere in the body. Moreover, it is present in connection with the bacilli that must have been actively multiplying at the moment of death.

The distorted appearance of the capsules is in my opinion an artefact, produced by the addition of the watery stain to the imperfectly fixed film. The proof of the correctness of that view is easily obtained. All that is necessary is to examine a dry film made with blood from an animal just dead from anthrax, or to fix such a film completely by dry heat, alcohol, or sublimate or osmic acid solution, and then to stain it by the method of Olt or Johnes. It will then be found that the appearances above described as evidence of degeneration are entirely lacking, the bacilli being provided with capsules that are sharply defined outwardly, and free from those irregularities of contour supposed by Professor Heim to indicate liquefaction. On the other hand, if another film of the same blood be prepared, and stained with methylene-blue after incomplete fixation by heat or immersion for a few minutes in alcohol, it will be found that a great many of the bacilli show no capsule at all, while others are partially or completely surrounded by a reddish-purple material, and the field between the bacilli is everywhere occupied by larger or smaller amorphous particles which exhibit the same tint.

The true explanation of the peculiar reaction of fresh anthrax blood with methylene-blue thus appears to be (1) that when the unfixed bacilli are treated with water the outer part of their bodies (the so-called capsule) swells up and in large measure disintegrates, and (2) that the swollen capsules and the particles into which they disintegrate behave in a metachromatic manner with regard to aqueous solution of methylene-blue.

This explanation applies also to those cases in which the stained film shows few or no anthrax bacilli, but nevertheless a large number of purple-stained amorphous granules scattered throughout the field. These granules are the result not of the degeneration of the bacilli, but of their death and disintegration, and the reaction is obtainable for a considerable period after the death of the animal, and is therefore valuable for diagnosis, because the capsules are the most resistant part of the bacilli, and the last to disappear when putrefaction sets in.

In conclusion, it ought to be observed that throughout this note the word methylene-blue has been used merely for the sake of brevity, for, as already explained (see this *Journal*, Vol. XVI., p. 360), there is reason to suppose that the reaction is not obtainable with a solution of the pure dye.