

members of the medical profession. In this capacity they had strenuously to maintain the highest standard of professional ethics and dignity. Their position as ward-room officers would bring them in daily contact with the best and ablest colleagues in the ship. In this relation they had to maintain a cheerful, but not too hilarious, comradeship with perfect good temper, a measure of dignity (always void of priggishness), and the grace of self-effacement. In short, each would have to be *bonus comes*, which in plain English meant a good fellow. The medical profession was everywhere and always one of self-sacrifice and self-denial. It was therefore a power for refining character. Strictly professional knowledge and experience need not rust, or fall much behind, as was commonly imagined, but it would assuredly do so if the young officer was indolent or casual, or shirked his duties. "Always do the best work you can in the best way you can," continued Sir Dyce Duckworth, who urged his hearers to work diligently at one or two modern languages, and concluded his inspiring address by referring to "one who was once a naval surgeon but rose afterwards to the highest place in the sister service, who was asked at the end of his long and distinguished career, in my presence, if he still believed in *anything*. 'Yes,' he said, '*I do; I still believe in a gentleman.*' I agree with that grand old man," said Sir Dyce Duckworth; "his portrait adorns a neighbouring room here, Surgeon-General Sir Joseph Fayrer, Bart., K.C.S.I." If they would maintain that ideal throughout their service they would all reach higher prizes in their profession than any that he had presented that day.

Correspondence.

"Audi alteram partem."

THE STATISTICAL SIDE OF THE OPSONIC QUESTION.

To the Editor of THE LANCET.

SIR,—The statistical portion of the memoir by Dr. Reyn and Dr. Kjer-Petersen which appears in your issue of March 28th raises a question of such importance that I should like to refer briefly to some considerations suggested by it.

Although the statistical side of the opsonic question has been discussed at a meeting of a London society, Dr. Reyn and Dr. Kjer-Petersen are, so far as I know, the first workers to draw public attention to the fact that the significance of opsonic determinations can only be estimated with the help of statistical analysis. They are to be congratulated on their clear enunciation of this important truth, but it is permissible to doubt whether their method of analysis is capable of solving the very complex problems underlying the experimental data. From the use made by Dr. Reyn and Dr. Kjer-Petersen of the "mean error" and the standard deviation as a criterion of the distribution of deviations I infer that what they mean by the "law of error" is the well-known Gauss-Laplace distribution. Now it is by no means clear that calculations based upon this law are valid for phagocytic counts. Although, for reasons which need not be discussed here, a belief has long been entertained that this Gauss-Laplace law was the final word in the theory of random distributions, statisticians are now pretty well agreed—thanks to the work of Fechner, Bruns, and above all, Karl Pearson—that many distributions cannot adequately be described by means of the "normal curve" and that it is necessary to employ the more general form of which the "normal curve" is a particular case. The application of this process to statistical practice has been rendered possible by the researches of Karl Pearson.

At the London Hospital my colleague Dr. Douglas White and myself have been for some time engaged on this problem and we have found that the distributions of phagocytic counts (for numbers varying from 600 to 1100 cells) are not even approximately "normal," the distribution of the numbers on either side of the mean being highly "skew," the mean and mode not coinciding. It therefore follows that the method of the mean error or any kindred process based on the assumption of a "normal" distribution is not applicable since positive and negative deviations of the same

magnitude do not occur with equal frequency. There is, indeed, reason to believe that with an increase in the mean number of bacilli per cell the asymmetry is diminished, but we have no satisfactory evidence that the process used by Dr. Reyn and Dr. Kjer-Petersen is applicable to our data. I think, therefore, that in the absence of more evidence the reasoning of Dr. Reyn and Dr. Kjer-Petersen will not enable one to assign definite limits to the normal range of variation.

There are other points of great interest in this paper to which I should have liked to allude, but this must be postponed. I only venture to trouble you in the matter because a complete statistical analysis of the material at our disposal cannot be ready for a considerable time and I desire to emphasise the urgent necessity of caution in drawing conclusions with respect to this subject. In the mass of papers, both eulogistic and vituperative, which deal with the opsonic method little is to be found having much statistical value. Dr. Reyn and Dr. Kjer-Petersen appear to be the first clinicians who have seriously attempted to grapple with the difficulties.

I am, Sir, yours faithfully,

M. GREENWOOD, jun.,
Director of the London Hospital Statistical Department and Senior Demonstrator of Physiology in the Medical College.

London Hospital, E., April 6th, 1908.

To the Editor of THE LANCET.

SIR,—The article of Dr. Reyn and Dr. Kjer-Petersen on the Opsonins of Tubercle which has just appeared in THE LANCET must be of the greatest interest to workers in this particular field. It is generally recognised that the opsonin technique in the case of the tubercle bacillus presents greater difficulties and affords more sources of error than that which is employed with many other bacteria. This may be partly due to the impossibility of preparing a satisfactory bacterial emulsion without, to some extent, damaging the bacilli in the agate mortar, and partly to the injury that is often done to the contour of the leucocytes by the staining method necessary. Dr. Reyn compares the average count in the case of six normal sera treated separately with a count of the same sera "pooled," and the results are certainly startling. But these observations would have been more instructive had he also published several opsonic estimations of the same serum arrived at by different workers and the same counter, and by the same worker and different counters.

The tubercle bacillus is nearly always about 0.2 micron thick but its length varies from 1.5 μ to 4.5 μ at least. In other words, in the same film we may have some bacilli that are three times as great as others, and to tackle them, presumably, the leucocytes would require to put forth three times the phagocytic effort that would be called for in the case of the smaller specimens. May I venture to suggest that more satisfactory results would be obtained by comparing the sum of the lengths of the bacilli taken up by the leucocytes in each preparation rather than the apparent number of the ingested bacteria? After all what appear to be separate bacilli may often be only portions of one organism, disintegrated in the preparation of the emulsion.

I am, Sir, yours faithfully,

Oban, April 6th, 1908.

W. D. ANDERSON.

CORONERS' INQUESTS UPON DEATHS IN SURGICAL ANÆSTHESIA.

To the Editor of THE LANCET.

SIR,—In THE LANCET of March 21st, p. 851, Dr. F. J. Waldo, the coroner of the City of London and Borough of Southwark, complains that the Registrar-General's statistics of the deaths which occur under anæsthetics are not of much use from a statistical point of view because they do not state the particular anæsthetic under which they occurred. He then proceeds to review his own experience with regard to the number which have occurred chiefly in two large charitable institutions within his district during the past six and a half years. The statements which he makes are also valueless because not only does he fail to specify the different anæsthetics under which they occurred, but has not indicated the total number of anæsthetic administrations which were conducted during the period in those institutions, a number which could be stated by their medical authorities with a very close approximation to accuracy. He then goes