calculate these logarithms, and the value of the base does not interest him: patently, the values of these logarithms are what he wants in integration, while if he wants logarithms to base 10 he has only to divide his areal logarithms all by the same constant, namely, the areal logarithm of 10 itself.

The crucial stage then is to devise a process of calculation. Sir Charles Boys gives Archimedes' quadrature of the parabola, and replaces the hyperbolic arc by an arc of a parabola. He shows that even the simple choice of the parabola which touches the hyperbola at the two end-points of the arc gives an approximate logarithm accurate to 1 in $10^7$ if the argument is between 1·0 and 1·1. This parabola lies inside the hyperbola, and the approximation is necessarily in excess. An obvious modification is to introduce a parabola which crosses the hyperbola and allows some compensation of errors, and Sir Charles makes an ingenious choice which, without adding substantially to the arithmetic, reduces the error from 1 in $10^7$ to 1 in $10^{11}$.

The weakness of the presentation is that both to determine the best parabola and to estimate the error Sir Charles uses the classical logarithmic series. If, after all, we are dependent on this series, the work becomes on the arithmetical side a mere curiosity. The classical series, as the author shows—though not in the language a mathematician would use—follows at once from the identification of the logarithm with the area, and since obviously the series *could* be used for calculation, the question whether the existing tables were actually calculated as efficiently as they might have been is of no practical importance. The practical man does not want to recalculate logarithms of any kind, but he does want to understand the natural logarithm, and this tract will show him very clearly how natural it is. On p. 22, $H^3$ and $A^3$ should be $H_3$ and $A_3$.

E. H. N.

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## Scientific Study of Dust

*Dust.* By Dr. S. Cyril Blacktin. Pp. xi+296+2 plates. (London: Chapman and Hall, Ltd., 1934.) 18*s.* net.

DR. BLACKTIN has written a book which is a mixture of philosophy and fact. In modern days this is unusual in a scientific textbook, and initially makes rather interesting reading. The scientific reader in search of a lucid exposition of dusts and smokes, however, will find it rather difficult to differentiate between the facts and Dr. Blacktin's own philosophy. The author has considered every conceivable aspect of smokes and dusts, even explaining how they help in the scientific detection of crime. (Under the heading of dusts he includes such widely diverse systems as sandstorms, volcanic eruptions and ice particles.)

One is left with the impression after reading the book, however, that Dr. Blacktin would have done well to have specialised more on the scientific and technological applications of the subject, rather than to have dwelt on a large number of extraordinarily interesting and out of the way facts, which are somewhat irrelevant to the scientific investigation of atmospheric pollution or its allied problems.

The author has also introduced a new nomenclature, and a new set of definitions which, as the old ones of Gibbs (depending upon size) have been in general use for some years, is to be regretted, especially as the new ones are founded more on assumption of certain properties of particles than on fact. Most workers will disagree strongly with some of the definitions and statements. Thus—taking only one example, for the book provides much material for polemical discussion—Dr. Blacktin's definition of the difference between a smoke and a dust is that the latter is a disperse system in which the individual particles are breaking up and becoming smaller, due to a self-abrasive or disruptive approach action, whilst in the former the particulate matter is increasing in size, due to coagulation. There is no doubt of course about coagulation, but almost certainly this process continues until the particles are so heavy that they fall out under gravity. All the experimental and theoretical evidence is against a change in which disintegration commences and the particles become more numerous. Nor is there any evidence of an equilibrium state which would exist if Dr. Blacktin's views were correct. The coagulation of a smoke system, of course, becomes very slow as the particles get larger and less numerous, but this is due to the lack of Brownian diffusion and hence the small chance of collision, which also suggests the remoteness of the possibility of self-abrasive action in dusts of larger particle size.

Dr. Blacktin's book, however, will be valuable as a guide to industrial and technological workers. There is no phase of the subject on which he has not touched, in industry, in physiology or in Nature. He has also included an invaluable collection of almost six hundred references, and the work will be useful as a book of reference on the subject to the reader who has little or no previous knowledge of dusts. One criticism the reviewer must make is that he has found the English very obscure in places; this is a very real blemish in a book of this description.