

great floods of the Seine; and thirty-one tables are appended at the end of the volume, giving the rainfall, discharges, and water-levels at different dates in various parts of the Seine basin, and eleven sets of graphic curves indicating the decrease in the discharges of the Seine, some of its tributaries, and certain sources, at different periods. Table xxiii., giving the rainfalls of the warm seasons, and the high floods of the following cold seasons, at the Austerlitz Bridge, Paris, and at Mantes, from 1874 to 1900, shows that none of these warm seasons in which the rainfall was below the mean of 14.88 inches, was followed by floods of the Seine rising higher than 14.44 feet on the gauge at Paris, and 19.72 feet at Mantes; and the eight cold seasons in which the Seine reached or exceeded 16.40 feet at Paris, and 21.06 feet at Mantes, were all preceded by warm seasons in which the rainfall exceeded the mean. Moreover, with the exception of 1890, when the warm season came between two very dry cold seasons, all the warm seasons having a rainfall above the average have been followed by floods of the Seine, attaining at least 10.17 feet at Paris and 16.40 feet at Mantes; whereas none of the fourteen warm seasons with a rainfall below the average was succeeded by floods in the next cold season, reaching the height attained in eight of the cold seasons preceded by warm seasons in which the rainfall exceeded the average.

A NEW AMERICAN WORK ON THE
CALCULUS.

Elements of the Differential and Integral Calculus.

By William Anthony Granville, Ph.D., with the editorial cooperation of Percy F. Smith, Ph.D.
Pp. xiv+463. (Boston and London: Ginn and Co.)
Price 10s. 6d.

THIS is a book the main object of which seems to be to enable the student to acquire a knowledge of the subject with little or no assistance from a teacher; and, after a very careful study of it, we are enabled to say that the work is admirably constructed for the purpose. There is a complete absence of the stilted formality which is usually supposed to be appropriate to a mathematical treatise. In foot-notes, and sometimes in the text, the student is given scores of useful hints and warnings against errors into which he would probably fall. Thus the work possesses a very high value for the student; and it will be found no less helpful to the teacher, for it contains a very large number of examples in every part of the subject, while it abounds in excellent diagrams.

The portion on the differential calculus occupies 285 pages, and terminates with 6 pages containing nothing but figures of all the curves more or less famous which present themselves in the subject, such as the conchoid of Nicomedes, the cycloid, the catenary, the cissoid of Diocles, the probability curve, various spirals, &c.

The work is very strictly logical in its method—here and there a little too much so, perhaps.

Thus in p. 97 the proof that the angle between the radius vector and the tangent to a curve has $rd\theta/dr$ for its tangent is quite unnecessarily accurate, and

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has involved an error in work, which, however, is a mere slip. The theorem of mean value is very well explained and used in the deduction of Taylor's theorem for the determination of the remainder, a little geometrical figure assisting the student to understand the nature of this remainder. (Correct, however, the errors in sign in the first equation of p. 169.)

The discussion of the convergency and divergency of series is very good, and a somewhat uninteresting subject is rendered simple and attractive. An incautious statement, however, is made with regard to an alternating series, p. 241, according to which if we stop at the n th term of such a series the error made is numerically less than the value of the $(n+1)$ th term. Clearly this is not in general true if the alternating series is one in which the numerical values of the terms increase for a while and then diminish. For example, the series for $\sin x$ is an alternating one of this kind. If $x=5$, the numerical values do not begin to diminish until after the third term. The property asserted, and the proof in p. 226, must be applied to cases in which we stop after the greatest numerical term has been passed.

The theory of maxima and minima is well illustrated by examples taken from various branches of physics. Even at the risk of being a little hypercritical, we must, however, point out that the time taken by a ball to roll down a plane the base of which is of length a and the inclination of which is ϕ is not $2\sqrt{a/g} \sin 2\phi$, as it is said to be in p. 128, for the simple reason that the acceleration of the centre of the ball (if the ball is solid and homogeneous) is not $g \sin \phi$, but $5/7 g \sin \phi$. This fact is of importance in dynamics, and the matter should be set right.

The part of the book dealing with curves is very good, and, in particular, we would commend the systematic manner in which (pp. 267, 268) the student is taught to trace a curve from its equation.

In the portion dealing with the integral calculus an exhaustive exposition of all the devices used in integrating functions is given. The reduction formulas to be applied to the binomial integral $\int x^m(a+bx^n)^p dx$ are given in tabular form on p. 345, and the student is told very properly that he should not memorise them. Instead of memorising them, he should apply a single simple rule which was given long ago by Hymers in his "Integral Calculus." This rule enables us to obtain, without an effort of memory, the exact formula appropriate to the reduction of any given binomial integral.

Besides areas and volumes (accompanied by excellent figures), polar moments of inertia of plane areas are dealt with. The author speaks of these as moments of inertia about "a point"—an expression which leaves something to be desired, since it is always an *axis* that is involved. What we always require in this connection in dynamics is the *mean square of distance of a body from an axis*, and we should look to writers on the calculus to emphasise this notion of a mean square of distance, instead of the "square of the radius of gyration," k^2 . The

student might easily learn to regard k as the *distance of mean square*, just as we speak of the *velocity of mean square* in a gas.

The book has a useful chapter on the simpler forms of differential equations, and concludes with a figure and description of the integraph for finding the area of a curve. It might well include a description of Amsler's planimeter, and show how it finds areas, positions of centres of gravity, and moments of inertia of plane figures; and, as to the proof of the theory of Amsler's planimeter, it need occupy no larger space than the area of a shilling, notwithstanding the length and complication of proofs which are usually given.

The author's attention may be directed to the following misprints:—p. 44, note, Leibnitz was Gottfried, not Gottfreid; p. 206 (A), read f'_x for f_x ; p. 216, ex. 15, read v_0^2 for v_0 ; p. 225, line 5, read 223 for 225; p. 275, line 6, read P' for P; p. 374, line 1, read y for dy .

GEORGE M. MINCHIN.

SERUM DIAGNOSIS.

Manual of Serum Diagnosis. By O. Rostoksi. Authorised translation by Charles Bolduan. Pp. vi+96. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd., 1904.) Price 1 dollar.

THIS small work forms a companion volume to that by Wasserman on "Hæmolysins and Cytotoxins," which has already been noticed in these columns. Each volume forms a monograph on some part of those newer developments of bacteriology which concern immunity and kindred subjects. The aim of the series is to provide simple yet comprehensive accounts of our present knowledge suitable for those who do not make a special study of the laboratory aspects of disease rather than exhaustive treatises adapted for special students. That the information is authoritative and trustworthy is vouched for by the list of authors, which includes some of the most distinguished names in contemporary bacteriology. Each volume is the work of one who has himself made important contributions to the study of the subject.

The present volume deals with the practical use of agglutinins, bacteriolysins, and precipitins in diagnosis. More than two-fifths of the whole is devoted to an account of the Widal reaction in enteric fever. This section is extremely good, and for it alone the book is well worth reading. The author points out very clearly that the "test" is not to be regarded as more than the "first of the cardinal symptoms of typhoid." Some discredit has been cast on the value of the reaction, because clinicians have not always found that infallibility which is so often expected of the laboratory, but which can never be present in dealing with so variable a complex as living matter. Removed from the pedestal of a "test" to the common ground of a "symptom," the phenomenon seems to have a better chance of receiving the appreciation which it deserves. There is an admirable account of the mixed and "group" agglutinations in typhoid and paratyphoid infections, and due notice is taken of the use of typhoid cultures which have been killed by the addition of formalin. These react

practically as well as living cultures; and, though the increased time required to obtain a result and the slight loss of delicacy render the use of living cultures still desirable in the laboratory, the safety and convenience of the dead cultures place the "test" within the personal practice of every not-too-busy practitioner. It is, however, strange to read (p. 13) that the use of an oil-immersion objective is necessary.

The author then considers briefly the agglutination phenomena found in tuberculosis, dysentery, and other diseases. Serum diagnosis of tubercle is considered to be of very doubtful value. Appropriate stress is laid on the fact that in many diseases (especially plague and cholera) agglutination, in comparison with other symptoms, is of very little use for the direct diagnosis of the disease, though of the greatest value in the identification of the isolated organism. This part of the book is, however, less satisfactory than the earlier sections. Indeed, the serum diagnosis of Malta fever is not mentioned, though the practical value of the phenomenon in the diagnosis of this variable and often very obscure disease has been demonstrated beyond question.

The book concludes with an account of the identification of blood stains by the precipitin test. Readers will find here a wise injunction to make sure that any given stain is blood before deciding whether it is of human or animal origin; the precipitin will not distinguish between the different tissues of the same species of animal in the same way as it will separate the same tissue from different species.

In the translation several useful additions have been made; the last chapter, which attempts an impossibly precise and entirely arbitrary definition of the Widal reaction, might, however, well have been omitted.

A. E. B.

HISTORY OF PHARMACY.

Geschichte der Pharmazie. By Hermann Schelenz. Pp. ix+934. (Berlin: Julius Springer, 1904.) Price 20 marks.

THE successful practice of pharmacy implies some acquaintance with plant chemistry and with that branch of economic botany known as *materia medica*. For this reason the history of pharmacy, although it appeals particularly to the pharmacist and the physician, presents also many points of interest to the chemist and the botanist. Herr Schelenz does not consider that the classes of readers here enumerated form a sufficiently wide circle for his purpose, and he states in the preface to this volume that he hopes also to interest the legislator, the antiquarian, and the philologist.

The book begins with a description of the conditions under which pharmacy was practised among the Jews. A summary of the political history of the nation is first given, and this is followed by sections dealing with Biblical and Talmudic references to the practice of pharmacy and the social condition, &c., of the practitioners of the art. The most interesting portion of this section is that describing the drugs employed by Jewish apothecaries. It is curious that so many of these are still in use at the present day;