SCIENCE

FRIDAY, JUNE 29, 1900.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

*RHYTHMS AND GEOLOGIC TIME.**

CUSTOM dictates that in complying with the rule of the Association I shall address you on some subject of a scientific character. But before doing so I may be permitted to pay my personal tribute to the honored and cherished leader of whose loss we are so keenly sensible on this occasion. His kindly personality, the charm which his earnestness and sincerity gave to his conversation, the range of his accomplishment, are inviting themes; but it is perhaps more fitting that I touch this evening on his character as a representative president of this body. The Association holds a peculiar position among our scientific organizations of national or continental extent. Instead of narrowing its meetings by limitations of subject matter or membership, it cultivates the entire field of research and invites the interest and co-operation of all. It is thus not only the integrating body for professional investigators, but the bond of union between these and the great group of cultured men and women—the group from whose ranks the professional guild is recruited, through whom the scientific spirit is chiefly propagated, and through whose interest scientific research receives its financial support. Its aims and form of organization recognize, what pure science

* Read to the American Association for the Advancement of Science at New York, June 26, 1900, as the address of the retiring President.

tables, can only be regarded as approximations to the truth. In arranging the computation of such a series of values it becomes a very practical matter so to select the intervals as to avoid unnecessary labor on the one hand and the possible introduction of inadmissible errors in the interpolated values on the other. We have here the practical rule evolved showing that this may ordinarily be accomplished by choosing our intervals such that differences beyond the fifth order may be disregarded. Of course, in the very uncommon case of a rational integral function we may reach absolute accuracy by carrying our computation to the point where the differences vanish.

The subject of mechanical quadrature is doubtless more familiar to the mathematical astronomer than to any other class of readers. Owing to the convenience and facility with which it may often be applied to the evaluation of definite integrals it seems to deserve a more prominent place in works treating of applied mathematics than is commonly the case. Here we find the processes of both single and double integration very fully developed, based in turn on Newton, Stirling and Bessel's formulæ.

Every one naturally assigns a somewhat exalted position to his own special line of investigation. It is, therefore, perhaps not surprising to find, on page 79, what to some may appear to be a somewhat 'dark saying,' viz: "Interpolation has undoubtedly done more for mathematical science than any other discovery excepting that of logarithms." Not to mention the Arabic system of notation, why may we not with equal propriety make a like assertion in regard to multiplication?

Among the problems solved the following are suggestive:

To solve any numerical equation whatever involving but one unknown quantity.

Given a series of numerical functions embracing a maximum and minimum value. To find the value of the argument which corresponds to the maximum and minimum function.

An appendix deals with symbolical methods. Fifteen pages are given to tables, principally the coefficients in Newton, Stirling and Bessel's formulæ, while two pages devoted to the bibliography of the subject complete the work.

Naturally a treatise like this will interest only a limited class of readers, such as workers and students in astronomy and mathematical physics. To all these it can be cordially recommended.

C. L. DOOLITTLE.

FLOWER OBSERVATORY.

BOOKS RECEIVED.

Education in the United States. A Series of Monographs prepared for the United States exhibit at the Paris Exposition, 1900. Edited by NICHOLAS MURRAY BUTLER. Albany, N. Y., J. B. Lyon Company. 1900. In two volumes. Pp. xviii+977.

Department of Geology and Natural Resources of Indiana. 1899. W. S. BLATCHLEY. Indianapolis, Wm. B. Burford. 1900. Pp. 1078.

North America. RALPH S. TARR and FRANK M. MCMURRY. New York and London, The Macmillan Co. 1900. Pp. xix+469. 75 cts.

Familiar Fish, their Habits and Capture. EUGENE MCCARTHY, with an introduction by DAVID STARR JORDAN. New York City, D. Appleton & Co. 1900. Pp. xi+216. $1.50.

A Book of Whales. F. E. BEEDARD. New York, G. P. Putnam's Sons; London, John Murray. 1900. Pp. xv + 320.

Physiology for the Laboratory. BERTHA MILLARD BROWN. Boston, U. S. A., Ginn & Company. 1900. Pp. v + 167.

A Brief History of Mathematics. KARL FINK. Translated by W. W. BEMAN and D. E. SMITH. Chicago, Open Court Publishing Co. 1900. Pp. xi + 333. $1.50.

Exploitation technique des forêts. M. H. VANUTBERGH. Paris, Gauther-Villars. 1900. Pp. 176.

La garance et l'indigo. GEORGE F. JAUBERT. Paris, Gauthier-Villars. 1900. Pp. 166.

Lehrbuch der Photochromie. WILHELM ZENKER. New edition edited by B. SCHWALBE. Braunschweig, F. Vieweg und Sohn. 1900. Pp. xiii + 157.

Das soziale und sittliche Leben erklärt durch die seelische Entwicklung. J. MARK BALDWIN. Translated from the second English edition by DR. R. RUEDEMANN, with preface by DR. PAUL BARTH. Leipzig, J. A. Barth, 1900. Pp. xv + 466.

SCIENTIFIC JOURNALS AND ARTICLES.

THE *Journal of the Boston Society of Medical Sciences* for May is more exclusively technical than usual. Harold C. Ernst and W. H.

Robey, Jr., present some 'Studies in the Mechanism of Agglutination,' W. R. Brenckerhoff describes 'The Pathology of Azoturia,' and A. W. Balch notes 'A Possible Cause of Azoturia,' Allen Cleghorn discusses 'The Physiological Effects and the Nature of Extracts of Sympathetic Ganglia,' R. W. Lowett has a note on 'Movements of the Normal Spine in their Relation to Scoliosis,' and Harold C. Ernst treats of 'Actinomycosis of the Udder of the Cow.'

DISCUSSION AND CORRESPONDENCE.

THE MISUSE OF TECHNICAL TERMS.

When a layman discourses upon a professional subject, as when a cobbler expounds electricity, he may be excused for lack of familiarity with technicalities, and for a consequent misuse of technical terms, though one may question the propriety of his posing as an authority on the subject. The case is different with a professional man who has acquired the right to speak by reason of high position or meritorious work, or both. A misuse of terms in speaking to others of his own profession would probably not affect them seriously, as they would perceive the error and discern the truth that is behind it, or the mistake, if there be any, in the conclusions. But when he addresses an audience of laymen, it is incumbent upon him to be careful of his language, especially in scientific matters, since these are loaded down with technical terms of great exactness in meaning, the wrong use of which may result to the uninitiated in error as well as confusion. To be sure, the use of abtruse or uncommon terms where common words would convey the true meaning is tiresome pedantry in professor and layman alike, but whether the words are common or uncommon, let them be used correctly.

In these days of specialties and specialists a highly trained authority in one profession is a layman among the members of another, and to some degree is at their mercy as to technical terms; still more so are those who, without special training, but with intelligence enough to appreciate the ability of scholars, and with a corresponding interest in such features of the various professions as touch upon their life and experience, must depend upon what they can get from the utterances of professional men in quasi-scientific or semi-professional form, to satisfy their thirst for knowledge. They constitute the greater portion of the readers of scientific journals which are not strictly technical, and they want expressions in regard to science that are more authoritative than those appearing in the daily newspaper, where, for example, we read from time to time that a man has taken an electric *current* of an incredible number of volts. The diffusing and popularizing of science has introduced its nomenclature to a wide circle of such interested but imperfectly trained readers, and has made accuracy in the use of terms more important now than ever before. There is no need to go to excess in technicalities. Now and then we encounter papers or even extended treatises in which the author delights in coining words, after the manner of a Heine or a Richter, apparently expecting thereby to enrich our vocabulary, but while occasionally a term thus introduced stays, most commonly it falls out of use very speedily. That is something that takes care of itself. Our only contention is that a technical term should be used correctly, if at all, and that this is the more imperative if the term is not a rare one.

It is true that in some branches of science, possibly in all branches, there are theories or hypotheses, not yet well enough established, phenomena not well enough understood to make it possible to give to the terms the exact significance they may come to possess later. This was illustrated in the discussions that abounded four years ago, regarding the X-rays, and the proper words to designate the radiant agent and the pictures produced by it. In response to a request for a suitable name for the latter, no fewer than twenty were suggested to *The Electrical World*, with special reasons for each one. Of these twenty none has been generally adopted, and today the pictures may be called by any one of several names without violating propriety or precision. It is quite different, however, in regard to certain names in subjects that have passed a transition stage, and probably in none has the nomenclature been more fully developed or better established than in mechanics. In this science new words are proposed from time