been, inevitably, both result and cause of the wonderful progress that has gone on. Surely there is neither possibility nor desire to return to the conditions of a half-century ago. But a certain quality or attitude of mind essential, according to the reviewer's notion, to the best achievements has been lost since the former days. Reference may be made to what some astronomer, Professor Hale I believe, has extolled as the amateur spirit in science: a spontaneous, perennial curiosity; a wide-awakeness of perception; an openness of mind; and a nimbleness of imagination, as touching all sorts of objects and processes and incidents in one's surroundings. The belief prevails widely among biologists of the present day that this sort of thing necessarily begets superficiality—that it is inimical to that profundity demanded by the deep, ultimate problems which constitute the soul of science. The belief is, however, not justified by either the history of scientific discovery, or our modern knowledge of the constitution and workings of the human mind. The "complex" of recent psychology is a "system of connected ideas with a strong emotional tone"; and specialization may go so far in both differentiation and intensification as to tend to reduce the system of ideas to one idea, and to destroy the "emotional tone."

Such works as the one now before us, taken in their entirety, ought to serve the two-fold end of helping on knowledge in a restricted field of zoology, and of restoring to biological research something of the amateur spirit.

WM. E. RITTER

List of North American Land Mammals in the United States National Museum, 1911. By GERRIT S. MILLER, JR., Curator, Division of Mammals, United States National Museum. Bulletin 79, United States National Museum. Washington, Government Printing Office. 1912. 8vo. Pp. xiv + 455.

This volume is a most welcome contribution to mammalogical literature, giving, as it does, in systematic sequence, the names of the species and subspecies of all North American land mammals currently recognized down to the end of the year 1911, and a large part of those described during 1912. "North America," for the purpose of the list, comprises "the entire continent from Panama northward, together with Greenland and the Greater and Lesser Antilles." It consequently includes the Island of Trinidad, which is, faunally and geographically, really South American. According to the author's tabular summary, the number of "forms" included in the list is 2,138, of which 1,955 are represented in the United States National Museum, leaving only 183 as unrepresented. The types of about one half of the total number of forms are in the National Museum.

The plan of the list is about as follows: The classification, or "sequence of groups is, in its main features, that adopted by Osborn in his 'Age of Mammals,' 1910, though the arrangement of the families and genera has been revised to make it as consistently as possible in harmony with that of the higher groups." References are given to the place of first publication of all generic, specific and subspecific names, and types are designated for the genera. In the case of species and subspecies, reference is usually made to the first use of the binomial or trinomial here adopted, and to True's list of 1885. "The type locality of each form is stated with all possible exactitude; and in revised genera the ranges are given as printed by the author," references to such revisions being given in footnotes.

The list includes: (1) species and subspecies that "had not been questioned in some recent work of definite monographic character" prior to the end of the year 1911; (2) forms belonging to groups which have not been treated in a monographic paper; and in cases where differences of opinion regarding their status have developed, "references are given to the conflicting views," at least in most cases. The utility of this work to investigators is further enhanced by an asterisk prefixed to the names of forms contained in the National Museum, and also a dagger in case the museum also has the type. The author has of

course expressed his preferences in deciding disputed questions of nomenclature, of which a few might well be referred to the International Zoological Congress for arbitration.

As already stated, the number of species and subspecies of North American land mammals is in round numbers about 2,150, without including a considerable number described late in the year 1912. The first enumeration comparable in geographic area with Mr. Miller's was published by True[1] in 1885, numbering 365 species and subspecies. This number, according to Miller and Rehn,[2] had increased by the end of the year 1904 to 1,450. Elliot, in 1905, in his "Check List of the Mammals of the Continent of North America, the West Indies and the Neighboring Seas,"[3] included 1,940 forms of land mammals, he listing a considerable number that have since, through the work of monographers, passed into synonymy. Doubtless when other groups are subjected to this ordeal many listed in the present check list will also lapse, so that the number now fairly entitled to recognition may be estimated at about 2,000. Probably many valid additions are yet to be made from parts of Central America now very imperfectly known.

The task of preparing the present list could hardly have fallen to more competent hands, and mammalogists owe a debt of gratitude to its author for the great aid it will be to them in their work. It is to be regretted, however, that so unusual and confusing a system of classification has been adopted, the scheme being based on specialization, the sequence of the higher groups being determined by the amount of their departure in structure from the most "primitive" or "generalized" mammalian type, and not on affinity or genetic relationship. The arrangement therefore will be very confusing and unprofitable to nine tenths of the users of Mr. Miller's book, who have been led to suppose that the purpose of a system of classification designed for general use was to indicate, so far as possible in a linear sequence, the affinities of the animals classified. The classification here adopted may serve the purpose for which it was intended—an expression of the relative degree of specialization among the ordinal groups of mammals; but it is rather startling to the uninitiated to find the two ends of the series represented, respectively, by the Monotremes and the Cetacea, and the Primates flanked on one side by the Edentates and on the other by the Artiodactyls: In other words, to find an otherwise admirable check list of the mammals of a continent arranged in conformity to a scheme of classification which ignores genetic relationships and therefore is out of touch with current faunistic and systematic work on recent mammals. J. A. A.

[1] True, F. W., "A Provisional List of the Mammals of North and Central America and the West Indian Islands," *Proc. U. S. Nat. Mus.*, Vol. 7, 1884, pp. 587–611 (appendix, 1885).

[2] "Systematic Results of the Study of North American Land Mammals to the Close of the Year 1900," *Proc. Boston Soc. Nat. Hist.*, Vol. 30, pp. 1–352, December, 1901.

[3] Field Columbian Museum, Zool. Ser., VI., 1905.

General Chemistry of the Enzymes. By Hans Euler, Professor of Chemistry in the University of Stockholm. Translated from the German by Thomas H. Pope. New York, John Wiley and Sons. Pp. 323.

The chemical changes which are taking place continually in plants and animals fall, for the most part, under that branch of science which is called organic chemistry. It is characteristic of organic reactions that they proceed slowly, though their progress can often be hastened by the addition of small amounts of particular substances, the so-called catalysts. This property of hastening the speed of organic reactions by supplying an appropriate catalyst is wonderfully developed in living organisms, because the element of time is all-important to them. The catalysts which occur in organisms are given the general name of enzymes. In many cases they can be readily separated from the cells of the organism and they are accordingly considered to be organic chemicals, probably of complex composition, but without organized or cell structure. Up to the present time no one has succeeded in crystallizing or vaporiz-