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-

ing an enzyme and therefore such a thing as a pure enzyme is now unknown. For this reason the chemical analyses of dried "enzyme preparations" signify little, because it is impossible to know what portion of the preparation is enzyme and what is impurity. Pending the discovery of some method for crystallizing enzymes this branch of their study is practically at a standstill. On the other hand, the study of the mode of action of enzymes and the influence of temperature, acids, etc., upon their catalyzing power is advancing rapidly and it is with this subject that Professor Euler's treatise deals. To quote from the preface, he "has attempted to review the more important facts of enzymology from a general standpoint and to fit them, as far as is possible, into their proper places in the fabric of general and physical chemistry." This book is the first in which an attempt has been made to describe this branch of science from the standpoint of theoretical chemistry and special credit is due Professor Euler for his excellent treatment of the subject. The following chapter titles may serve to give an idea of the contents of the book: Special chemistry of the enzymes, their physical properties, their activators and poisons, the chemical dynamics of enzyme reactions, the influence of temperature and radiation on enzymic reactions, the chemical statics of enzyme reactions, enzymic syntheses and the specificity of enzyme action. The work of translation by Mr. Pope has been very carefully done. The publishers are also to be commended for the quality of the printing and binding.

C. S. HUDSON

SPECIAL ARTICLES

MITOCHONDRIA IN ASCARIS SEX-CELLS

DURING the course of preparation of a thesis for the Doctor's degree at the University of Pennsylvania, entitled "The Spermatogenesis of *Ascaris megalocephala* with special reference to the two Cytoplasmic Inclusions, the *Refractive Body* and the *'Mitochondria'*; their *Origin, Nature* and *Rôle* in Fertilization," the following observations were made:

The refractive body arises, as Marcus (1906), Mayer (1908) and Romieu (1911) point out, by the fusion of the refringent vesicles while still in the vas—probably just before copulation occurs. The refringent vesicles arise from minute granules scattered here and there throughout the cytoplasm in the early growth period of the spermatocyte. These granules stain blue after the material is fixed in Benda's modification of Flemming's strong solution and stained in Benda's "Krystal Violet." This reaction is characteristic of true mitochondria. Granules staining exactly like these are found constantly in the nucleus of the spermatogonium, *and these actually pass through the nuclear membrane* into the cytoplasm of the spermatocyte. This blue staining material, or true mitochondria, is apparently derived directly from the chromatin because in several cases chromosomes in the spermatogonial nuclei were cut, showing the red-brown interior (the typical reaction to Benda's stain for chromatin) covered by a blue layer. Thus the refractive body is ultimately derived from the chromatin of the spermatogonium, and it is formed by true mitochondria; these are not only nuclear in origin, they are derivatives of the karyosome. They should, therefore, be called *karyochondria* to distinguish them clearly from the *plastochondria* (Meves) which are derived from the plasmosome of the spermatogonial nucleus.

The refractive body has but one function—namely, to feed the spermatozoon on its long and exhausting journey (by pseudopodial creeping) to the "entrance region" at the proximal end of the uterus. This is proven by the fact that many eggs are entered there by spermatozoa which have lost every trace of the refractive body; and further, by the fact that the decrease in size of this body takes place equally from all sides, showing that it is the surrounding layer of cytoplasm, and not the uterine epithelial cells, as all other authors maintain, which is the agent of its absorption. Not only is its axial symmetry maintained during the stages of degeneration while crowded between the epithelial cells, but also when lying amongst eggs far out in the