

ington, where gardeners have brought the fruit during more than twenty years; but few of them have kept it pure. One may there trace the reversion through various grades from the typical to almost worthless kinds.

In view of all the facts that have here been stated, there seems to be no room for doubt as to the spontaneous, saltatory and phylogenetic character of the mutation which produced the Washington variety of tomato. Whether it will show the usual degree of varietal stability in future seed propagation, and whether any similar mutation will occur in other varieties of tomato under conditions similar to those of my garden, remain to be demonstrated.

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SMITHSONIAN INSTITUTION,
October 3, 1901.

SCIENTIFIC BOOKS.

A Treatise on Zoology. Edited by E. RAY LANKESTER. Part III. The Echinoderma, by F. A. BATHER, assisted by J. W. GREGORY and E. S. GOODRICH. London, A. and C. Black. 1900. Pp. vii + 344.

The student of zoology, if he wishes an elementary text-book, finds as great difficulty in making his selection as he does in buying a new bicycle or typewriter. Apparently the more advanced student will not be thus hampered by any embarrassment of riches, for it is doubtful whether any other work aims as high and attains as much as the volume under review.

The average worker who has added somewhat to his primary zoological training finds it a dreary and often fruitless performance to extract the new facts of science or the present state of knowledge on any particular topic from the almost endless collection of 'elementary' text-books, no matter how valuable they may be in fulfilling their true function. It is almost equally tiresome to sift out the same information from the great mass of technical papers on particular things. The present volume supplies in a large degree this deficiency for the Echinoderma, and is a most welcome addition

to general zoological literature. The entire series is planned to include ten parts, of which this is the third. Each of the larger groups of animals is to be described by a separate author after a definite model, in order to secure uniformity in both scope and method.

The general systematic survey of the phylum Echinoderma, with its seven classes, is quite full and comprehensive and includes the main facts of ontogeny, phylogeny, anatomy and classification. The orders and families are all clearly defined and most of the prominent genera are reviewed or mentioned. One of the striking features of this volume is the fulness with which the fossil forms are treated, thus according them their true value in any general treatise on echinoderm morphogeny. Instead of the starfishes and sea-urchins constituting the entire program, or 'whole show,' as they do in the minds of the average student and in half the text-books, here they form but the last two of the seven classes recognized, and the length of their discussion is in proper proportion. It is sincerely to be hoped that similar true values will be given among other classes, whether extinct or not.

The phylum Echinoderma comprises two divisions or grades, the Pelmatozoa and the Eleutherozoa. In the first are the classes Cystidea, Blastoidea, Crinoidea and Edrioasteroidea. In the second grade are the Holothuroidea, Stelleroidea and Echinoidea. This arrangement shows the unequal value of the classes and does not express their phylogenetic relations. The latter probably would be more truly represented, according to Bather, by placing a primitive class, Amphoridea, at the base and deducing from it several lines of descent, namely, Edrioasteroidea, Anomalocystida, Aporita, Rhombifera and Diploporita. From the Edrioasteroid line, it is supposed, there sprang first Holothurians, then Stelleroidea, then Echinoidea. The Blastoids are included in the Diploporite line, and from them as a fresh development with a new lease of life arose the important class Crinoidea, whose discussion occupies, as is wholly proper, nearly one-third of the present volume.

The class Stelleroidea comprises the Asteroidea and Ophiuroidea, generally considered as quite distinct. Some recent genera, how-

ever, and many of the fossil forms, show that no clear line of separation can be drawn, though the names are still retained for simple convenience.

The usual primary subdivisions of the Echinoidea into two subclasses, the Palæechnoidea and Euechinoidea, have been abandoned and the older divisions, Regularia and Irregularia, adopted. The primitive ancestral Echinoid is unknown, though it is evident that the first forms were small sac-like bodies, with the mouth and anus at opposite poles and the muscular body supported by a series of angular plates, of which five pairs were perforated by pores. The thickening of the plates and the consequent loss of flexibility is believed to explain the reduction in the number of vertical rows taking place in the passage from paleozoic to neozoic genera.

C. E. BEECHER.

Studien über die Narcose, Zugleich ein Beitrag zur allgemeinen Pharmakologie. By E. OVERTON. Jena, Gustav Fisher. 1901. Pp. 195.

The chief object of these studies is the presentation of a new theory of narcosis which was put forward simultaneously but independently by Overton and H. Meyer. The essential point of the theory is that narcotics are such substances which are more or less soluble in the lipoids of the nerve cells, chiefly cholesterin and lecithin. However, as all substances reach the nerve cells only after being taken up by the blood and the lymph, they have in the first place to be soluble in the chief medium of these fluids—*i. e.*, water. The question, therefore, whether and in what degree a substance is a narcotic—*i. e.*, whether and in what degree it is able to enter into the nerve cell—depends upon whether and how much this substance is more soluble in fats than in water; in other words, the narcotic capacity of a substance depends upon the coefficient of its solubility in organic solvents divided by its solubility in water.

The book consists of two parts. The first part deals in an interesting and instructive way with the general aspect of the subject of narcosis. At the start the author shows that the distinction made by Claude Bernard, Dastre and other French writers, between anæsthetics

and narcotics cannot be maintained. Neither does the practical separation of the inhalation anæsthetics from the other narcotics have a scientific basis. There is, however, according to the author, a distinct difference between indifferent narcotics and narcotics of a basic character. The latter vary in their effects upon animals as well as plants from species to species; while the indifferent narcotics affect all vertebrates and some invertebrates in the same degree, provided the concentration of the narcotic within the blood of the animal is taken as a basis for the unit, and not the quantity of the narcotic used up in the production of the narcosis of the animal. The writer discusses the various steps which a narcotic has to pass through from its administration to the animal to its arrival in the body cells, and the different modes of penetration of the several layers of the cell, according to the compound employed as a narcotic. He then describes in detail the methods employed by Paul Bert, as well as those employed by himself, to obtain a constant concentration within the plasma of the blood of the volatile as well as of the non-volatile narcotics.

The author reviews the different theories of anæsthesia: hyperæmia, anæmia, Claude Bernard's semi-coagulation of the protoplasm, Dubois's theory of partial dehydration of the protoplasm. He quotes further Richet's rule that a compound is the stronger an anæsthetic the less soluble it is in water; and after reviewing our present knowledge of the presence of cholesterin and lecithin in the nerve tissues, he mentions that already as early as 1847 Bibra and Harless have suggested that there might be a connection between anæsthesia and the capacity of the anæsthetics to dissolve fats; and that L. Hermann has further suggested that cholesterin and lecithin of the ganglion cells might present the point of attack of the anæsthetics.

Turning to his own above-mentioned theory Overton states that he studied the solubility of the narcotics in olive oil, on account of the difficulty of obtaining sufficient quantities of lecithin, and describes in detail the physical and physiological methods employed by him for determining the division-coefficient (Thèi-