forms of the Decapods are given for the different regions.

The last chapter gives a short review of our present knowledge of the geographical distribution of the other groups of animals.

A map shows the distribution of the regions and subregions of the marine life zones, the litoral, abyssal and pelagial. G. BAUR.

Introduction to the Study of Fungi. By M. C. COOKE, LL. D., author of 'Hand-book of British Fungi,' Fungi, Their Nature, Uses, etc. 8vo., pp. 360. London, Adam and Charles Black. 1895.

This, the latest and, as stated in the preface, 'probably last contribution to British Mycology' from Dr. Cooke, is a work 'for the use of collectors.' It is divided into three parts; namely, organography, with eight chapters; classification, with fifteen chapters—by far the largest portion of the book—and two chapters upon distribution.

Under organography there is a chapter each upon: The mycelium, carpophore, receptacle, fructification, fertilization, dichocarpism saprophytes and parasites and constituents. The author, as a lifelong student of his subject, recognizes many of the difficulties that lie in the pathway of the collector and endeavors to help him to overcome them. His method is to begin with the more common and easily seen forms and pass to the less conspicuous. Thus with mycelium the start is made with the spawn, or artificial 'bricks' of the cultivated mushroom, and he afterward considers the filaments of mildews and then the more complex forms as illustrated by the ergot grains and other indurated forms. The work is fairly well illustrated, there being in the neighborhood of one hundred small wood cuts taken in large part from the author's 'Hand-book.' From one who has written so largely upon the topics considered in the book before us there is perhaps no occasion for new engravings, but there is, nevertheless, a lack of freshness that the mycologist notes upon first taking up this work.

The carpophore, defined in brief as 'the fruit-bearer,' logically and in reality follows from the mycelium, and in the chapter upon it, it is shown in various stages of complexity from the comparatively simple bearing of spores upon the free tips of threads to the globose compact structure, where the spores are produced in sacs within the closely knit tissue. The author does not hesitate to use the names of genera without stint in citing instances, and these names, being set in italics, give the pages a heavy cast of countenance that might not please the beginner upon the first acquaintance. In fact it is to be inferred that Dr. Cooke expects more of his latest work than a mere introduction. Some of his earlier books may well serve as a preparation for this. A case, and not an extreme one, is the following upon page 262: "In *Chætophoma* the penthecia resemble those of *Phoma;* but are innate in a dermatioid subiculum resembling *Fumago* or *Asterina.*" Here we have the free use of genera, but it is innate, dermatioid and subiculum that the beginner might stumble over. He will naturally turn to the glossary to find none of these words mentioned and be disappointed. Upon the other hand, he may notice in the brief glossary the following: 'Cryptogamia—applied to the lower orders of plants in which there are no conspicuous flowers as there are in Phanerogamia.' To say the least, the mind of the reviewer is left in the dark concerning inconspicuous flowers.

The chapter upon fructification precedes that on fertilization, which does not seem entirely logical; but it is to be remembered that the author holds that sexual reproduction is not well established, or, in his own words, "the instances in which sexual reproduction has been determined are exceptionally few." This subject of fertilization is treated somewhat at length with several engravings, and it is a surprise to have it finally dismissed with the remark that "experience and investigation of forty years have shown that lichens and fungi still remain practical exceptions to the rule of sexuality."

The above view naturally leads one to look at the bibliography under each subject, and it is found far from complete. For the rusts (Uredineæ) the only American authority cited is Dr. Farlow. Under the circumstances it is a pleasure to find that Ellis and Everhart receive mention under the bibliography of the Pyronomycites, Morgan under puff-ball fungi, and

there the matter ends, save under the head of bibliography for geographical distribution, where the list of nine, not all American, begins with Schweinitz and includes Berkeley, Curtis, Ellis and Peck. It is noted that Dr. Burrell is credited with first discovering a plant disease of bacterial origin; namely, 'the shrivelling o pears' in 1880 due to *Micrococcus amylovorus*.

The total number of described species of fungi is given as 40,000, an estimate founded upon the Sylloge of Dr. Saccardo.

Under the chapter upon geographical distribution it is stated that the fungi are not yet well enough known to more than conjecture as to their distribution on the earth. China is still an unknown land and India but little better, and Africa is a 'dark continent' so far as fungi are concerned. The fleshy fungi are mostly in the temperate regions. Nearly the whole of the Amaniteæ groups of exceedingly poisonous toadstools are rarely met with in the tropics.

Under classification some of the salient points are introduced, as naked and covered spores, perfect and imperfect forms and the character of the spore covering. While not accepting the classification offered by Brefeld in full, Dr. Cooke recognizes its influence and summarizes it in tabulated form. In the same chapter a page and a half is given to the drawing of lines of contrast between lichens and fungi, and the first page of the introductory chapter states, "It is now known that aquatic fungi are not an impossibility, that algæ may grow in damp atmosphere and that some portions of the substance of lichens may be derived from their matrix." From these statements the student would gain no encouragement to incline toward the modern theory of the fungo-algal conception of lichens.

The book is printed upon unusually heavy paper with uncut edges and weighs about three pounds. Half the size and bulk would make it many times more companionable.

While the faults have been most largely pointed out, the book cannot but be useful and aid the collector to reach the conclusion expressed in the last sentence of the work: "The whole history of one species worked out with perseverance and intelligence will present the key to a knowledge of many kindred species and always prove to be a valuable contribution to science when the names of species are changed or forgotten." When this fact is realized in the collector he becomes a working factor in the strict sense for the advancement of his science. BYRON D. HALSTED.

A Preliminary Report on the Geology of South Dakota. By J. E. TODD. South Dakota Geological Survey. Bulletin No. I. Sioux Falls, South Dakota. 1895. Pp. viii, 172. Plates V., figures 2, and preliminary geologic map of South Dakota.

In the above report Prof. Todd, who is the State Geologist, has summarized what is known of the geology of South Dakota. The author's studies of the geology of this State began in 1881, since which time his connection with the United States and State Surveys has enabled him to examine in the field most of the geological formations found in South Dakota. The work is written in popular form in order that it may serve as a geological guide to the citizens of the State; but in its pages is also found matter of value to the teacher and geologist.

The report contains a chapter devoted to each of the following topics: Introduction, topographic features, sketch of the geology of the State, eruptive rocks, geological history of South Dakota, and economic geology, while the description of the geological formations of the State occupies four chapters, making ten in all. Prof. Todd finds that the following systems are represented: Huronian, Cambrian, Lower Silurian, Carboniferous, Triassic, Jurassic, Cretaceous, Tertiary and Quaternary, while 25 feet of shales in the vicinity of Deadwood is referred doubtfully to the Devonian. On consulting the geologic map it will be seen that about two-thirds of the State is covered by formations belonging to the Cretaceous system, of which the Colorado group is first in area and the Laramie second. After the Cretaceous system the Miocene of the Tertiary is second in areal extent, and the Huronian third.

Among minerals of economic value, gold is the most important, the Black Hills in 1893 producing $4,000,000. The author says that the oxide of tin (cassiterite) 'occurs very generally.