the matter—it is, as we have already seen, utter emptiness and instability besides.[4]

Thus supplementing the Report of the Evolution Committee of the Royal Society with Hegel's "Doctrine of Being," it becomes clear at once why biology has so long failed to recognize that rose-comb is single comb plus "roseness." It is because "opinion, with its usual want of thought" has failed to perceive that ordinary comb (an instance of "mere being") is "utter emptiness and instability."

So logic scores again!

W. E. Ritter

La Jolla, California,
August 11, 1909

Scientific Books

Papers from the Tortugas Laboratory

The Carnegie Institution supports three laboratories devoted to biological research, the Desert Laboratory in Arizona, the Station for Evolution on Long Island, N. Y., and the Tortugas Station at the mouth of the Gulf of Mexico, all of which are maintained in the most liberal manner. The Tortugas Laboratory is due to the energy of the present director, Dr. A. G. Mayer, who examined many points in our warmer waters in his endeavors to find the best locality for the study of tropical marine life, and at last decided on the Dry Tortugas, not far from Key West. Each summer he has taken a number of investigators with him and has supplied them with every facility for work. These two volumes[1] of 516 pages, 84 plates and numerous cuts are the results of two seasons' work.

A review of such volumes is difficult. Adequately to criticize the separate papers is not the task of any one person, so varied is their scope. All that can be attempted here is a brief summary of their contents. For this purpose the nineteen papers may be grouped under separate headings.

Four articles, all in the second volume, deal with animal behavior and can not easily be summarized. Dr. R. P. Cowles describes the habits and reactions of the sand crab, *Ocypoda,* and Dr. Charles R. Stockard has a similar paper on the walking-stick, *Aplopus.* John B. Watson studied the habits of two of the terns, while Frank M. Chapman discusses the habits of the booby and the frigate bird.

In Professor Reighard's paper on the colors and habits of coral-reef fishes, which, as is well known, are frequently conspicuously colored, it is pointed out that the theory of warning colors usually advanced does not account for all the facts observed and a theory of immunity coloration is proposed as a substitute, which is defined as follows:

> Coloration, not sexually dimorphic, which renders an organism in its natural environment conspicuous to vertebrates; which has no selective value, since it does not aid the organism in escaping vertebrate enemies by concealment (protective coloration), nor in approaching its accustomed invertebrate prey (aggressive coloration), and when associated with disagreeable qualities is unnecessary as a warning to vertebrate foes of the existence of such qualities (warning coloration); it is conceived to have arisen through internal forces under immunity of the organism from the action of selection on its color characters.

In the first volume Dr. Mayer presents a study of pulsation of medusæ, in which he concludes that the stimulation of pulsation is caused by the formation of sodium oxalate in the marginal sense organs. This reacts on the calcium salts, precipitating calcium oxalate and setting free sulphate and chloride of sodium which act as nerve stimulants. Especially interesting is the way in which a pulsation once started in a ring cut from the medusan tissue may be made to continue in a circular course for days without further stimulation.

Dr. Mayer also returns to his discussion of the Floridan palolo worm, *Eunice fucata,* which at regular dates casts off the hinder sexual part of the body, these amputated portions swarming at the surface in vast numbers. From observations extending over several years, he points out that this occurs commonly within three days of the last quar-

[4] "The Doctrine of Being," *ibid.*

[1] "Papers from the Tortugas Laboratory of the Carnegie Institution of Washington," Volume I., 1908; Volume II., 1908.

ter of the moon which comes in the period between June 29 and July 28.

Four papers are more or less embryological. The late Professor Brooks and Mr. Kellner have a few notes on the embryology of *Oikopleura,* which are of especial interest because of our slight knowledge of the development of the appendicularians. Both eggs and embryos were found attached to the tails of the adults. Brooks and McGlone studied the development of the lung of the snail, *Ampullaria,* and find that gill, lung and osphradium are developed from a ridge in the mantle cavity, forming a series of homologous organs, differentiated for different functions. The lung becomes functional some time before the gill, as young individuals are easily drowned.

Professor E. G. Conklin traces the development of the medusa, *Linerges,* up to the gastrula stage and the free-swimming planula. The sudden appearance of large swarms of the medusæ seems to be connected with reproduction. The medusæ as rapidly disappear, sinking to the bottom and degenerating after depositing the eggs. Dr. Conklin also describes two peculiar actinian larvæ which are assigned to Van Beneden's provisional genera *Zoanthella* (Semper's larva) and *Zoanthina.* The description covers the morphology and histology. All attempts to rear the larvæ to adult conditions were in vain, so that exact relationships are unknown.

Dr. H. E. Jordan has three cytological papers in the first volume. The studies on the spermatogenesis of *Aplopus* seem in the main to be confirmative of the results of Wilson on other forms. Both of the other papers are based upon echinoderms and apparently are part of an attack upon the problem of the continuity of the chromosomes. In *Echinaster* the chromosomes are derived exclusively from the nucleolus, in *Asterias* partly from the nucleolus, and in *Ophiocoma* exclusively from the nuclear reticulum. These results are reconciled by a study of the nuclear constituents which leads to the conclusion that the chromosomes arise from any part that contains chromatin. At least in some forms his studies show little to confirm the idea of chromosome continuity.

The systematic papers are all in the first volume. A paper on the tunicates of the Gulf Stream is divided into sections. In the first Dr. Brooks redescribes both solitary and chain forms of *Salpa floridana.* In the second he presents renewed studies on the muscles of *Cyclosalpa,* reiterating his opinion that the ordinary distinctions in the text-books between the Cyclomyaria and the Hemimyaria are based on erroneous observations. The third section, by Brooks and Kellner, describes a new appendicularian, *Oikopleura tortugenesis.* A parasitic protozoan is described as *Gromia appendicularicæ,* which occurred attached to the tails of the tunicates, but it clearly does not belong to the genus to which it is assigned.

Dr. H. F. Perkins has a paper on the medusæ, describing several new species, with notes on others. It is interesting that not a single male *Cassiopea* was found. Dr. E. S. Linton notes the presence of 29 species of cestode parasites of fishes, several of which, including a genus *Pediobothrium,* are supposed to be new. C. H. Edmondson describes a new variety of Flagellata from the salt water of the moat around Ft. Jefferson.

J. S. KINGSLEY

The Green Algæ of North America. By FRANK SHIPLEY COLLINS. Pp. 480, 18 plates containing 160 figures. Tufts College Studies, Vol. II., No. 3, July, 1909.

This synopsis is certain to find a ready welcome among all botanists who deal with the green algæ either in class work or with more special interests. Among the algæ there has been no group in greater need of comprehensive systematic treatment than that of the Chlorophyceæ. A descriptive work on the fresh-water forms has been especially desired since these are more numerous and more extensively studied as plant types than are the marine species. Moreover, such general accounts of the fresh-water green algæ as have heretofore been published have not treated the taxonomic side with the fulness and accuracy demanded by the difficulties of the subject. Mr. Collins must feel great satisfaction in bringing to such a fruition the results of

many years of study, and Tufts College is much to be congratulated on the way in which it has availed itself of the privilege of publication.

The work describes all the species of green algæ, exclusive of the desmids and stoneworts, known to occur in North America from Greenland to the West Indies and Mexico. The characters of each genus (with the exception of four) are illustrated by figures of at least one species. The figures, taken for the most part from authoritative sources, are well executed and will greatly assist the general student to a clear understanding of generic characters. An extensive bibliography is presented. The index is very full, including not only the species and synonyms, but also structural and descriptive terms with references to the pages in the text on which they are defined, so that the index thus serves the purpose of a glossary.

The descriptions of species are clear and concise and include a reference to the original publication of the binomial, to some good plate or figure, and when possible to some set of exsiccatæ, and conclude with records of American localities to which are added the distributions in other parts of the world. The Phycotheca Boreali-Americana of Collins, Holden and Setchell is naturally most frequently cited among the exsiccatæ as the one most accessible for American students and richest in American species. Mr. Collins as chief editor of this set of algæ has had exceptional opportunities to handle large quantities of material and probably much of his work bestowed on this exsiccata finds further and fuller expression in this book. A considerable number of American botanists will recognize that through their contributions to the Phycotheca and in other ways they have had a small share in making possible this account.

The best test of the general value of such a work as this will be its usefulness in the hands of those who are not algologists. This usefulness will depend very largely on the accuracy and at the same time the simplicity of the analytical keys. Good keys are necessarily based on the more obvious characters which are not always the most important systematically, and perhaps nowhere in works of this character can greater care be shown or is greater judgment required than in the construction of these more or less artificial guides. Genera such as *Spirogyra* with 38 species in this account, *Œdogonium* with 74 species and *Cladophora* with 53 species, illustrate the great difficulties. In some cases Mr. Collins has been able to make use of keys in certain monographs, as for example Hirn's detailed account of the Œdogoniaceæ, but for the most part they are the result of his own studies and ingenuity. His skill in this sort of work has already been shown in the admirable accounts of the Ulvaceæ, Cladophoras, etc., published at various times in *Rhodora*. The keys of this manual possess the characteristics of clearness and simplicity shown in his former work. Besides the keys to species there are also keys to the genera, families and orders, so that the synopsis is well planned in respect to all the aids that enable the reader to handle the text quickly and without confusion.

A brief account of the general system of classification is presented at the end of the introduction, but so closely associated with other matter that the attention of the reader is not brought quickly to its notice as might have been the case had the account been given a separate heading, which its importance fully justifies. Mr. Collins is not willing to follow to the extreme those arrangements which group the green algæ in large subdivisions or classes according to the structure of the reproductive elements and especially the ciliated reproductive cells, and in this respect he takes a conservative attitude. Only one group is split off from the main assemblage of the Chlorophyceæ—the Heterokontæ, a small class the forms of which are of uncertain relationship. It seems even doubtful to the reviewer whether this group (Heterokontæ) is worthy of such distinction, and there is much to be said in favor of applying the name Chlorophyceæ in its broadest signification with the full understanding that it embraces a number of distinct phyla. It is certainly hardly less broad with such divergent groups as the Conjugales, Volvocales, Ulothrichales, Siphonales,

etc., than with the Heterokontæ also included. However interesting and important are the speculations regarding the derivation of a number of lines of green algæ from a flagellate ancestry, we have not as yet such knowledge of the cytology of the reproductive cells as to give a firm foundation for systems of classification based chiefly or wholly on their structure. The groupings of the orders and families follow in the main well-known arrangements and are easily understood.

The introduction contains various matters of interest, some of which might with advantage have been grouped under headings and perhaps given more extended treatment. There are historical comments, remarks on distribution, several pages devoted to a very practical description of methods of collecting and preserving algæ, references to literature helpful to the general student, and at the end the above-mentioned account of the system of classification.

As regards the form of the book, some suggestions occur to the reviewer which are here given with the thought that later editions will be called for and also in the hope that Mr. Collins will write similar synopses of other groups of algæ. Readers would greatly appreciate page headings giving the genus on the right-hand page and the family or order on the left instead of the repeated title and publication. The figures would have been more useful as illustrations if distributed as text figures throughout the book, associated with the genera that they illustrate, rather than collected in a series of plates at the end. These changes in form and arrangement, although increasing somewhat the cost of publication, would be especially appropriate to a taxonomic work and would certainly add to the effectiveness of this remarkably clear and simple treatment.

BRADLEY M. DAVIS

Handbook for Field Geologists. By C. W. HAYES, Chief Geologist, U. S. Geological Survey. New York, John Wiley & Sons. 1909.

It seems to be a trait of human nature not to wish to buy official reports and to ignore the value of material contained in the same. Advantage has been taken of this by certain prudent publishers who reprint the more interesting and widely important government reports, finding a ready sale therefor. A number of Dr. Merrill's valuable books are practically reprints of guides to national museum collections. The book before us is of this class, and the publishers are to be thanked for introducing so valuable a work to a wider circle. This is practically a reprint of the instructions to United States field geologists, and any one who has occasion to do any practical work in geology can not fail to find much in this small book (which he can easily slip into his pocket) which will be of help to him.

This origin explains a certain dogmatic character. There is no discussion of various methods or of dubious points, but one good method is given for solving various geological problems. In no other way could so much be packed into so small a space. The style is clear and simple and there is no one better qualified to prepare such a book than the author—the Chief Geologist of the U. S. Survey.

Most of us will, I think, in reading such a book, feel as we do in reading the Bible, that we have left undone things which we ought to have done and done things which we ought not to have done. In helping one to make the necessary observations, the second part, which includes a set of schedules of the observations which should be made in studying land forms, petrology, geological structure, glacial deposits, ores and various classes of economic materials, will be of great help and suggestiveness to any one who has occasion to make inquiry in these lines. One might, perhaps, ask whether the absence of any schedule with regard to water investigations implies that the hydrographers know nothing about geology or that the geologists have little use for water! The first part includes not only suggestions for the field geologist along every line, but helps to obey these suggestions, from unit rations to mathematical formulæ. It can be most highly recommended not merely to geologists and scientific men, but, as many of the

points are applicable to any camper-out, to any one who has to do with mining or civil engineering, and it should be brought to the attention of a wide circle.

Alfred C. Lane

Tufts College, Mass.

SCIENTIFIC JOURNAL

The Journal of Experimental Zoology, Vol. VI., No. 4 (July, 1909), contains the following contributions: "Factors of Form Regulation in *Harenactis attenuata,*" by C. M. Child. The contraction of tissues following a wound does not appear to be an adaptive reaction to accomplish wound closure, but merely a physiological result of the injury to the tissues. The rapidity of oral restitution and to some extent the size of the parts decrease with increasing distance of the level of restitution from the original oral end, until in short proximal pieces restitution usually ceases with wound closure. "The Effects of Centrifugal Force upon the Eggs of some Chrysomelid Beetles," by R. W. Hegner. Eggs of five species of three genera of chrysomelid beetles were centrifuged at ages ranging from those freshly laid to those with well-developed blastoderms. Three strata were induced regardless of the orientation of the eggs in the centrifugal machine. In some cases eggs with their contents redistributed produced normal embryos or larvæ; in other cases a dwarf embryo resulted at the inner (light) end of the egg, not having grown around the yolk as in eggs developed normally. Female beetles after centrifuging laid eggs as usual; these with two exceptions produced normal larvæ. "Contributions to Experimental Entomology, I., *Junonia cœnia* Hübner; II., Two Cases of Anabiosis in *Actras selene* Hübner," by William Reiff. "Adaptation and Immunity of the Lower Organisms to Ethyl Alcohol," by J. Frank Daniel. The author studied the acclimatization of certain infusoria (*Stentor* and *Spirostomum*) to alcohol. Some strains of these animals showed a considerably increased resistance to alcohol after being kept for a few days in weak solutions of this substance. In other strains, having a high resistance to begin with, scarcely any increase of resistance could be caused by this means. The increase of resistance was limited to the substance used in acclimatizing the animals; when acclimatized to ethyl alcohol, they showed a decreased resistance to other chemicals.

HISTORICAL GRAPHICS

Some time ago, while preparing a paper on the history of physics, I adopted the plan of inserting the life interval of the great masters in metric cross-section paper, to the year. My only excuse for referring to the matter here is this method of reference, which proved itself surprisingly useful, both at that time and since. It consists in plotting straight line life periods chronologically, from left to right and the corresponding names alphabetically from top to bottom. Authors are thus easily found and the chronological comparison is im-