In density it must be such as to allow of a mean density of about 5.5 as concluded from the results of Boys and others. Accepting Gutenberg's radius of the core, this would seem to require (following Jeffreys) a core density of about 12 (crustal density 4.2). This comparatively high density of the core has led to the general view that it is metallic—iron, nickel and such substances being mentioned as possible constituents.

In the matter of rigidity, the core must be considerably less rigid than the shell if the total rigidity is to fit in with that demanded by tidal phenomena and the Eulerian nutation. Jeffreys suggests the zero rigidity of a liquid core.

In its behavior to shear waves it is difficult to say what conditions the core must satisfy. In view of the identification of core shear waves claimed by Macelwane, Krumbach, Imamura and Bastings, it seems that the core must be capable of transmitting a shear wave, but with considerable loss of energy as compared with the compressional wave. The compressional waves are quite prominent after passing through the core, whereas, apart from the isolated cases of identification mentioned above, the shear wave fails to appear.

In view of these required conditions, the picture of the core that most nearly suits our facts is a solid metallic core heavily occluded with some such gas as hydrogen. Experiments with palladium occluded with several hundred times its own volume of hydrogen have revealed effects on its elastic constants that point in this direction. Such a solid metallic sponge for core would seem to give the right values for density, rigidity and small shear wave energy. Experiments to determine the effect of occlusion on elastic properties and particularly on shear wave energy are being carried on. Their results will be published shortly.

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CELL INCLUSIONS AND THE LIFE CYCLE OF AZOTOBACTER CHROOCOCCUM

FOR some time the writer has been engaged in a study of the so-called life cycle of *Azotobacter chroococcum*. While these experiments have not been brought to completion, one point of particular significance may be recorded here. A search of the literature reveals the fact that much confusion exists concerning the nature of the granular bodies which are invariably present in the cells of *Azotobacter* at certain periods of growth.

Jones[1] noted two types of granules which differed from each other in staining capacity. Some of the granules were not stained by aqueous solutions of aniline dyes, while others became intensely stained. He regarded the stainable bodies as reproductive cells or gonidia. Löhnis and Smith[2] made similar observations and conclusions. Mencz[3] regarded the granules as a chromidial system and the equivalent of a true nucleus. Prazmowski[4] believed that each cell contains one nucleus which divides preceding cell division. Schmidt[5] reported the presence of volutin. There is no indication that any of the other workers performed microchemical or solubility tests to determine whether the stainable bodies are living entities of the cell or lifeless cell inclusions which function as reserve food. In the absence of precise knowledge concerning the true nature of the granular bodies, any theory as to their function must be doubted.

Experiments were performed, therefore, to determine the reactions which occur when standard tests for fat, volutin and glycogen are applied. The colorless granules are readily identified as fat bodies, while the stainable granules consist of volutin. It is obvious, therefore, that these bodies could not perform the vital functions assigned to them by previous writers. So far as this species is concerned there seems no support for the conception of a life cycle which involves reproduction by means of gonidia.

Additional work is in progress dealing with reproduction by symplasm, conjunction and endospore formation and the question of cell transmutation. The results of this study will be published elsewhere.

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THE NEW AMERICAN DICTIONARY

NOTICE of publication by the University of Chicago Press of Part 1 of "A Dictionary of American English" has undoubtedly come to the attention of many American scientists, but perhaps few who have not actually seen the work are aware of its importance scientifically.

This dictionary, based on historical principles, is compiled under the editorship of Sir William Craigie, co-editor of the Oxford English Dictionary. In a letter I received from Professor Craigie in 1928, when the work of compilation had barely begun, he stated: "The New Dictionary will not aim at the inclusion of purely scientific terminology, but it ought to include the popular names of animals, birds, etc., so far as these can be historically traced." In this particular aspect the dictionary is succeeding admirably and

[1] Dan H. Jones, *Jour. Bact.*, 5: 325, 1920.

[2] F. Löhnis and N. R. Smith, *Jour. Agr. Res.*, 6: 675, 1916.

[3] E. Mencz, *Arch. f. Protistenk.*, 22: 1, 1911.

[4] A. Prazmowski, *Centralblt. f. Bakt.*, etc., II Abt., 33: 292, 1912.

[5] E. W. Schmidt, *Centralblt. f. Bakt.*, etc., II Abt., 50: 44, 1920.

adequately, to a degree that should make the work a valuable addition to the scientist's library.

The dictionary, as its name implies, has to do primarily with words found to be indigenously American, and every word or sense of a word that originated within the present limits of the United States is conspicuously indicated as such. For instance, although the word *alkali* is found in English before 1600, there are three senses of the word listed as peculiarly American, as well as the expressions alkali desert, alkali dust, alkalied, alkali flat, alkali grass, alkali lake, alkali plain and alkali sink.

The thoroughness with which the vernacular names of American plants and animals are treated is illustrated especially under the word *American* itself, where no less than eighty biologic and ethnologic terms, ranging from *American antelope* to *Amerindian,* are given with their definitions and histories. For method of treatment let us quote one example:

+ American chestnut. The ordinary chestnut (*Castanea dentata*) of the United States. Also attrib. with *tree.*

1785 MARSHALL *Amer. Grove* 46 American Chesnut Tree. . . . The timber is used much for rails, splitting free and outlasting most of our Oaks. **1832** BROWNE *Sylva Amer.* 131 The American chesnut sometimes attains the height of 70 or 80 feet with a circumference of 15 or 16 feet. **1859** HILLHOUSE tr. *Michaux's Sylva* III. 12 Though the American Chestnut nearly resembles that of Europe in its general appearance, its foliage, its fruit, & the properties of its wood, it is treated by botanists as a distinct species. **1901** MOHR *Plant-life Ala.* 468 American Chestnut. . . . Important timber and nut tree.

The number of words purely American in origin is surprising; of these the following examples are selected to represent various branches of science and invention: *abalone, adobe, Alabama, alewife, amberjack, ambrotype, anaesthetic, ancon* (sheep), *angleworm, Appalachian, Arizona, Arkansas, automobile, Bad Lands.* Words originating after the end of the nineteenth century are not admitted to the dictionary.

For any one even only mildly interested in etymology or natural history or geography this dictionary makes good reading, as in fact any good dictionary does. Part 1 (A to Baggage) runs to 116 double-column quarto pages, and there are to be about 20 parts issued separately. By the time it is completed, judged from the beginning, the words of scientific import will mount to a considerable total.[1] It is to be hoped that scientific libraries, museums, and even individuals who can (Part 1 sells for $4) will avail themselves of this monumental reference work, the value of which is bound to increase as Americans become more and more aware of the richness of their own history and culture and put increasing store by the things that had their beginnings in their own country—the United States. In any event, the University of Chicago, the American Council of Learned Societies and the General Education Board of New York should be congratulated for sponsoring such a notable piece of literary research.

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SCIENTIFIC BOOKS

RECENT BOTANICAL BOOKS

The Story of the Plant Kingdom. By MERLE C. COULTER. ix + 270 pp. 119 figs. The University of Chicago Press, Chicago. 1935. $2.50.

MANY students still elect to go through a college course with very little training in science. This applies to certain pre-professional groups—such as those looking forward to law or journalism—who may be pressed for time; but it also holds for many who are not planning to enter such disciplines—the so-called "straight A.B.'s." In spite of the crowded programs and natural reluctance, the college graduate of this generation should live more richly if he has some understanding of the physical and natural sciences, along with the more traditional training in mathematics, the social sciences, the arts and the humanities. A remedy for the educational shortcoming that has thus existed is being tried in the survey courses that are now offered in some universities.

The text-book fruit of this type of course is beginning to mature; and it is to be expected that it will vary widely in different institutions. "The Story of the Plant Kingdom" is a volume that has been prepared for the "Introduction to the Biological Sciences," one of the courses of the "new plan" at the University of Chicago. We are told that the course in biology includes "indispensable readings" in ten books, of which this is one.

Nothing revolutionary has been attempted in this volume. The material presented is for the most part that which is included in the standard texts. Reversing the usual order, this book begins with a consideration of "primitive plants," especially the blue-green algae, and then traces the evolutionary development up through the algae, fungi, liverworts, mosses, ferns, horsetails, club mosses and seed plants. Only well on in the presentation are the structures and functions of the higher plants considered. There is a chapter on the process of evolution and a concluding chapter on some of the commoner families of the angiosperms.

Any book which treats the general subject of botany

[1] The prefatory note to Part 1 states: "In A, the largest group of words denoting actual things consists of the names of plants or trees and animals."