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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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.

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