many times in connection with canal matters, spending months at a time there, often living in tents in the jungle in order to know at first hand the problems along the proposed routes.

I am collecting material for a sketch of my father, but as I sail for Europe this week I have put all papers in storage and can at present only state the facts as known to myself, the only bit of corroboration at hand being a sentence from a report to Hon. William H. Taft, Secretary of War, dated March 16, 1905, as follows: "The Commission . . . moreover feels itself under obligation not only to provide screens for all buildings owned or controlled by it, but would like to see all buildings where screens would be of any service suitably screened."

I should be glad if you could find space for this letter in order to correct any possible misconception of Dr. Stevens' meaning.

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SCIENTIFIC BOOKS

Die Phylogenie der Pflanzen. DR. WALTER ZIMMERMAN, University of Tübingen. Jena, Verlag von Gustav Fischer, 1930.

THIS is one of the comprehensive works which are a feature of German scientific activity at the present time. It deals with the subject of the evolution of plants, particularly the higher plants, in a thorough fashion from the standpoints not only of morphology, anatomy and development, but also what is rarer, from the standpoint of fossil plants. It is dedicated to Graf Zu Solms-Laubach.

The volume consists of about 450 pages, only some 50 of which are devoted to the Thallophytes. This apparent discrimination against the lower forms arises out of the historical basis of the volume under consideration. Since the record of the lower forms is extremely imperfect, they naturally do not supply abundant material for this volume. About 400 pages are given over to the consideration of the Cormophyta. About 50 pages are devoted to general problems such as the structure and combination of organs, the differentiation of organs, the development and differentiation of the stele and wood, and to reproduction. Under the Cormophyta are included the Bryophyta, which are very briefly considered. Following is the division Psilophyta, to which the author appends the Asterophyta and Psilotales. The third division comprises the Lycopsida, including the forms which are now clearly recognized as coming under this comprehensive heading. The fourth division comprises the Articulata, which are equivalent to Dr. Scott's Sphenopsida. Under this group are arranged the Hyeniales, Pseudoborniales, Sphenophyllales, Cheirostrobales and Equisetales, which are divided into three families, the Asterocalamitaceae, Calamitaceae and Equisetaceae. Next comes the division Pteropsida, including the Filicinae—Primofilices, Eusporangiatae, Osmundales, Leptosporangiatae and Hydropterides. Follow the Gymnospermae, including Pteridospermeae, Cycadophyta, Ginkgophyta, Cordaitales, Coniferae and Gnetales. This chapter is most interesting because it correlates to a large degree the anatomical, morphological and paleobotanical work done in recent years. The treatment of the Conifers indicates the confusion of opinion which still prevails in that field. The botanical world will await with keen interest the complete publication of the investigations and views of Florin and Walton in this important field, since the Conifers, on account of their long duration in geological time and present good state of development, constitute the most important of all biological documents from the evolutionary standpoint. The unchallenged antiquity of the araucarian Conifers no longer prevails and the next few years are likely to see very fundamental changes in this important field. The third division of Pteropsida comprises the Angiosperms and reflects our doubts and difficulties regarding this extremely important group, concerning the origin of which we have scarcely passed beyond Darwin's statement of horrible mystery. Naturally the difficulties which beset the phylogenetic interpretation of the Angiosperms are very great in view of our almost complete ignorance of their early development.

Another division of the volume deals with the history of floras in which the Algae, the Pteridophyta, Gymnosperms and Angiosperms mark quite satisfactorily the main geological periods. A third main division of the volume deals with general historical laws. Under this heading are discussed the development of characters, ascending and descending evolution, the law of irreversibility, polyphyletic, parallel and convergent evolution, correlative evolution, the biogenetic law, reversions and teratological developments in relation to phylogeny.

The second main division of the volume deals with the so-called causal analysis of phylogeny. Under this heading the author deals with phylogeny as a physiological process with continuous and discontinuous variation and the development of characters suited to the environment. Further he discusses the Lamarckian and Darwinian attitudes towards evolu-

tion, calling attention to the essentially Lamarckian attitude of the genetical group at the present time. He further deals with the difficult subject of the inheritance of acquired characters, a field which has recently assumed renewed prominence in connection with experimental use of radiations. There follows a discussion of the essential principles of Darwinism under the headings of the selective action of the struggle for existence, the accumulation of mutations (variations), the origin of mutations (variations). Next comes a discussion of the limitations of Darwinism and of the problem of the protean character of organic matter. These various discussions end with a summary of the most important results of phylogenetic analysis.

Although the volume is of moderate size, it contains a very large amount of information and is most attractively and comprehensively illustrated. It will be of great value to all students of botanical science who can read the German language with any degree of ease.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR MAKING A BIBLIOGRAPHY

SCIENTIFIC workers generally agree that a bibliography is an essential for good research.[1] Bibliochresis is the first and a fundamental step in the natural approach to a new problem. In many cases there are regularly maintained bibliographies which are available for use, and even though they may be one or two years in arrears, the workers find it possible to supply the lacking material with a few hours' search of the leading publications and annual reports. For example, the bibliographies of North American geology, edited by Nickles and published by the U. S. Geological Survey, have covered the literature in this field for the period since 1785. As specialties within a field develop it has been found necessary in some cases to compile a bibliography for that branch of the science and to keep it up to date by the periodic publication of new lists. Many science departments or individuals of various universities and colleges find it desirable to compile bibliographies which are so arranged that they supplement the published reference lists if such exist. This has been the case in the division of sedimentation of the department of geology at the State University of Iowa. The graduate students as well as the members of the staff interested in this field of geology contribute regularly to this file. During the last two years the writer has been active in compiling a bibliography pertaining especially to the petrography of sediments. The plan used is submitted here in the hope that others may find it helpful, or will make for improvement.

The references which include the complete data regularly given in bibliographies are typed on a fan-fold form in triplicate, with eight sets of cards in series. An 88-pound white ledger Scotch linen paper has been found most desirable. The paper used is thin enough to make good carbon copies, takes little space in the file drawers and is tough and stiff enough to withstand harder use than the average grade 3 x 5 file card. Sheets 24 x 15 inches are perforated accurately so as to make twenty-four 3 x 5 inch cards in three vertical rows of eight each. The 5-inch dimension of the card times three cards utilizes the 15-inch dimension of the original sheet, and the 3-inch dimension of the eight cards fills the 24-inch dimension. When ready for use the large sheets are folded along the two 24-inch perforations making a triplicate form 5 inches wide and 24 inches long. Carbon copying sheets 5 x 24 inches are used. This makes it possible to type eight references in triplicate with the one operation of folding, placing carbon paper and inserting in typewriter. When the typing is completed the cards are torn apart, or cut along the perforations with a large knife paper trimmer, keeping the three copies of the reference together. When ready to file, the three cards are torn along the perforations and distributed in any manner desired. The advantage of three copies of the same reference, and the speed a good typist can make in copying a large number of references when he has only to insert a new set of forms for every eight bibliography references, more than pay the small cost of the forms.

The same type of triplicate fan-fold form is used in a 5 x 8 inch size, seven in vertical series, for a file of definitions of sedimentary rocks. In fact, the general idea was worked out first when the subcommittee on the classification of sedimentary rocks, of the committee on sedimentation, National Research Council, wished to make three identical sets of rock definitions.

In actual practice in this department, the graduate students interested in sedimentary petrography and the writer in his own research accumulate the bibliographical data on whatever type of paper, card or

[1] See W. A. Hamor and L. W. Bass, "Bibliochresis," SCIENCE, n. s., 71: 375–8, April 11, 1930.