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.

other arrangement is most convenient at the time. When a hundred or more references are on hand they are given to a typist who makes the copies on the form described and arranges the wording according to a uniform plan. Often the bibliography maker writes a short abstract of the article, or comments on its most useful information, and these statements of from 75 to 125 words are copied on the cards.

The system of filing used by the writer is an attempt to place the cards so they will be most readily found when looking through the index for particular articles or when making a study of a specific subject. The first or original card of each set is placed in a general file arranged alphabetically by authors; the second card (a carbon copy) is placed in its proper alphabetical order according to the type of rock or mineral or texture described; the third card (second carbon copy) is placed in a miscellaneous group, arranged alphabetically, under such headings as "chemical analyses," "environments of deposition" (with subdivisions as lakes, rivers, marine, littoral, swamp, etc.), "laboratory methods," "mineral analyses" and many others. Oftentimes the third card is placed under a separate subheading of the division which contains the second card. For instance, the cards covering the article by Takahashi, on the "Significance of Micro-crystals of Carbonates in Bituminous Shales," would be distributed (1) in "T" of authors' file, (2) in "shales" of the rock division of the file and (3) in "carbonates" in the same division. Another article, by Kindle, "A Comparative Study of Different Types of Thermal Stratification in Lakes and their Influence on the Formation of Marl," would be found by looking in the author index or under "marl" of the rock division or under "lakes" of the environment of deposition class of the miscellaneous division. Often the word used for filing purposes, or the method of classification does not appear in the title of the article but will be given in the abstract of the article at the bottom of the card. When such is the case, it has been found convenient to underline the word or clew to classification with red pencil. Cards for the article by Ross on "Altered Paleozoic Volcanic Materials and their Recognition" would be found in the author index, one under volcanic rocks and the third one in the mineral analyses class, this being an important feature of the article.

The writer recognizes that the brief description does not show clearly how every type of reference would be filed, or that the method is entirely foolproof, but he knows from experience that he can usually find a bibliographical reference in a short time, if it is in the file, without the delay of going through an authors' index.

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TEST PAPERS FOR DETECTING MAGNESIUM

A CONVENIENT method for carrying out the new organic test for magnesium is by means of a spot reaction on filter paper impregnated with the reagent. The test papers may be prepared as follows. White filter paper is immersed in a 0.01 per cent. solution of para-nitrobenzene-azo-resorcinol[1] (ortho, para-dihydroxy-azo-para-nitrobenzene) in alcohol and hung up to dry. When dry cut into pieces of about four square inches and preserve in amber bottles. To perform the test, one drop of the slightly acid solution to be tested is placed in the center of the test paper and allowed to dry. Immerse paper in a dilute sodium hydroxide solution (about 1 per cent.). In the presence of magnesium a blue spot will show in a reddish field. If the test drop contained a large amount of acid the spot will first be yellow. The reaction as performed is sensitive to about 0.005 milligrams of magnesium (one drop of a solution containing 0.1 milligram of magnesium per cc). The limitations on this procedure are the same as those noted before,[2] nickel and cobalt giving similar colored spots and large amounts of ammonium salts and organic matter reducing the sensitivity.

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SPECIAL ARTICLES

LIVING MICRO-ORGANISMS IN THE AIR OF THE ARID SOUTHWEST

NUMEROUS living micro-organisms are present at times in the air in southern Arizona. Recently the writer exposed from aeroplanes sterile agar plates and spore traps during flights primarily intended to afford information concerning the movement of the spores of wheat rusts. Two agars were used: Nutrient, pH 7.2, and potato, pH 6.8. Exposures were uniformly two minutes in length. Some of the results are given in the following table.

No spores of wheat rust were found, but further trials may discover them. Among the fungi were species of Aspergillus and Penicillium, Macrosporium, Alternaria, Cladosporium and one yeast. White and

[1] Purchasable from Eastman Kodak Company, Rochester, New York, or may be prepared by detailed method given by Stone, *Chem.-Analyst*, 19: 6, May, 1930.

[2] Riugh, *J. A. C. S.*, 51: 1456, 1929; Engel, *ibid.*, 52: 1812, 1930.