

Italian: Regole Internazionali della Nomenclatura Zoologica. Translated by Professor F. S. Monticelli, and published by Luigi Niccolai, Florence, Italy, 1914. Price 5 lira.

Several unsuccessful attempts have been made to obtain a reprint in English, but the outlook for sale has been so indefinite, or other points have arisen, so that publishers have not been inclined to undertake the work as a business venture. Finally, in order to make it possible for zoologists to obtain a copy of the rules to date, arrangements have been made for a mimeographed edition of all the rules, with cross references to the opinions, and with an appendix containing summaries of the opinions No. 1 to No. 56.

This mimeographed edition is issued by T. O. Smallwood, 3216 N Street, Washington, D. C., price per copy 50 cents, plus 10 cents postage.

C. W. STILES,
Secretary to Commission

GERMINATING POLLEN

TO THE EDITOR OF SCIENCE: In the past, a number of requests have come in asking for the method employed by this station in determining the germinability of pollen of deciduous tree- and bush-fruits. Others who are interested in this matter will find the following method useful.

Mature pollen, either directly from the anther, or that which previously has been collected and stored, is used. Van Tieghem cells or 10×20 mm. moist chamber rings are fastened to ordinary microscope object slides by means of soft paraffin, employing as little as possible of the latter, and yet secure a waterproof joint. Put one or two drops of water into the cell and at two or three points about the upper edge place tiny drops of vaseline. This is better than the smearing of the entire circumference, since it serves as well to hold the cover in place and does not exclude air. Next place a small drop of the germinating medium in the center of a cover glass having a diameter somewhat greater than that of the cell. We employ 22 mm. squares. If the medium tends to spread over the glass, spread

very thinly with vaseline and wipe with a dry cloth until the vaseline apparently has been removed. Sow the pollen grains evenly and sparingly over the surface of the drop by means of a needle or camel's-hair brush. If the latter is used hold it above the drop and tap lightly to scatter the pollen. Pollen may be used directly from the expanded anther by touching the latter to the germinating medium. Quickly invert the cover, place over the cell, and press it down gently, having the drop of germinating medium approximately in the center. A temperature of 22° to 25° Centigrade is best.

The germinating medium is the most important item. It may be necessary to vary its composition for the several varieties of fruits or even for the same variety, depending upon prevailing environmental conditions under which the pollen developed or has been stored.

Sometimes a 3 per cent. to 10 per cent. aqueous solution of cane sugar is entirely satisfactory. If there is considerable bursting of the pollen grains soon after sowing, increase the percentage of sugar; decrease the amount if plasmolysis takes place. Solutions should be made up fresh each day. Frequently it has been impossible to secure the optimum germination from simple sugar solutions. Most of the difficulties were avoided and excellent results obtained, when from $\frac{1}{2}$ per cent. to 2 per cent. gelatin was added to the medium. The gelatine is first made up as a 4 per cent. or 8 per cent. solution. Soak the gelatin in cold water, then dissolve with the least possible heating. This solution, without sugar, will remain fit for use for several days. From this stock solution of gelatin, dilutions are readily obtained. In making up the germinating medium the diluted gelatin solution is reckoned as water and the cane sugar added directly to it. While not absolutely exact, perhaps, the method is sufficiently accurate. Thus, for a 4 per cent. solution of sugar in $\frac{1}{2}$ per cent. gelatin, add one gram cane sugar to 24 c.c. of a $\frac{1}{2}$ per cent. gelatin solution. Combinations of 3 per cent. to 12 per cent. cane sugar in $\frac{1}{2}$ per cent. to 2 per cent. gelatin have proved very satisfactory. No definite combi-

nation can be recommended for any particular variety.

While it is generally possible to secure a higher percentage germination in the gelatin-sugar solutions than in the simple sugar solution, growth of the pollen tube is often less rapid, especially when the larger amounts of gelatin are used. This is frequently an advantage if large numbers of samples are being tested, since long, interlacing tubes make counting difficult.

E. J. KRAUS

OREGON AGRICULTURAL EXPERIMENT STATION

SCIENTIFIC BOOKS

Economic Geography. By JOHN McFARLANE, lecturer in geography in the University of Manchester. The Macmillan Company. 8vo. Pp. 560. \$2.25.

The work is based on the principle of natural regions. It is recognized, however, that political conditions control economic development so largely that the boundaries of countries, whether natural or arbitrary, must figure in the reckoning. Also true geographic units may be closely linked into a group dominated by one or more geographic factors.

Preceding the geography of continents and countries are three chapters on physical conditions of economic activity, climate and vegetation. These chapters occupy but 26 pages and it may be questioned whether so brief and general a statement is useful as an introduction to the main treatment. The author recognizes that the economic geographer relies on the geologist, meteorologist, botanist, etc., for the data which he correlates, and it would, in the reviewer's judgment, be as well to leave the case thus; for, to take an example, a non-geologist could not derive much help from the author's two-page account of rocks and geological periods, or from one page on the principles of geomorphology, or the like brief discussions of winds, ocean currents and the distribution of plants. Should we not frankly concede that this branch of geography is an advanced phase to be based on previous training in physical and biological geography?

The proportioning of space in the regional treatment is fairly balanced considering that

the text is no doubt expected to be used mainly by British students. This fact would justify 38 pages for the United Kingdom and 34 for the United States. Indeed most American texts are more one-sided than this. On the same basis we can not criticize the assignment of more space to India and Ceylon than to Germany, or giving two thirds as much space to Canada as to the United States. Our author used the term *economic* as designating the phase of anthropogeography here treated. It is not easy to see that the subject-matter differs in general scope from the volume by Mr. Chisholm, who although deeply versed in economic conditions, calls his handbook commercial geography. So, it would seem, we are still using these terms interchangeably. It is to be hoped that we may be able in time to arrive at more specific terminology.

As for the body of the work, we find sound, clearly expressed and informing accounts of the physical conditions, products and trade of the various countries, the work of a thorough and conscientious geographer. The illustrations are confined to maps, eighteen in number, mainly devoted to rainfall and the delineation of natural regions. Possibly the author's plan was deliberate, not to emphasize transportation either by map or text, and thus to justify somewhat the term *economic*. The chapter on the United States has been prepared with evident care. The map of natural regions conveys some misapprehensions which indeed a generalized map could not avoid. Some misleading boundaries, however, are qualified by statements in the text. Still it is not quite appropriate, as seen by an American geographer, to include the lake plains of New York and the coastal plain of New Jersey in a "Middle Appalachian Region."

The volume takes a good place among the few comprehensive manuals in English dealing with this aspect of geography.

A. P. BRIGHAM

IO AND ITS ENVIRONMENT

THE manuscript of Dr. Chas. C. Adams's paper on "The Variations and Ecological Distribution of the Snails of the Genus *Io*" was