where there was the slightest abrasion of the epidermis, produced by a fine needle, gave characteristic spots filled with bacteria in from forty-eight to seventy-two hours. Characteristic spots have also been secured by simply brushing the bacteria on the uninjured leaves. Under natural conditions the bacteria appear to gain entrance to the leaves and stems from the slight injuries produced by the red spider and by other causes. Slugs have been observed eating diseased spots, and infection from slug bites was observed. It is also evident that the organism has other ways of gaining entrance to the tissues, possibly through the stomata. We have found the disease so far on the varieties Mrs. McKinley, Mrs. Nelson, Lawson, and Crane, and it will doubtless be found on numerous other varieties. In some cases observed nearly every leaf and many of the stems were so badly spotted that it would be practically impossible to save the plants. When the disease has not progressed so far, however, it can be checked by thoroughly cleaning the plants of all diseased leaves and stems and burning what is removed. Then syringe the plants with a solution of commercial formaldehyde, one part to five hundred parts of water. This should be done in the forenoon so that the plants may dry before night. Syringe occasionally with water under pressure to keep down the red spider. Give the plants as much light and air as possible and keep the foliage as dry as practicable. Give the plants a second thorough cleaning after the new growth is well started and follow with a second light syringing with formaldehyde solution. It is probable that these recommendations may be modified after further investigation, but the procedure outlined is the best we can suggest at the present time.

A careful study of the disease and the organism causing it will be completed as soon as possible. Messrs. Lloyd Tenny and J. B. Rorer, assistants in pathology, are actively aiding in the investigation.

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THE FRONTIER OF PHYSIOGRAPHY.

The term physiography, as generally applied in geological studies, has become associated with and is inclusive of glacial geology; and from the character of the formations studied is sometimes referred to as superficial or surficial geology. The alternative use of the latter terms calls attention, also, to the fact that the field of its inquiries has not been generally regarded as extending deep into the earth's crust. As time has gone on the work of physiography has, in fact, been more and more sharply differentiated from that upon the consolidated portion of the lithosphere; and geologists of a special class have arisen known as physiographers, glacialists or surficial geologists—which, while not by any means equivalent terms, are yet regarded as all properly referring to men trained in a special way.

The features of the land areas are by this school of geologists interpreted to be largely fashioned under the action of water or ice, or both; in the case of the first of the agencies mentioned, according as the action has been affected by epeirogenic movements. The origin of earth sculpture has been, therefore, largely referred to the changes brought about by successive geographic cycles, during which elevation and tilting of the crust follow upon a period of subsidence. In a subordinate degree the relative hardness of the underlying rocks is brought into account by the modern school. As a result of this type of specialization or special generalization stress has been laid upon the *general* contours which are characteristic of a district or province, and with remarkable readiness and accuracy the stage of a geographic cycle through which a province is passing, and many of the earlier events of the cycle as well, are determined.

The unconsolidated deposits in glaciated regions have been further studied with minuteness as regards their form and extent as well as their composition, and an elaborate classification of them has been adopted. To the consolidated or 'hard' rocks this study has not, however, been extended; and, beyond the fixing of what may be termed erosional ear marks to determine the agent and the stage

of a geographic cycle, little has been attempted. The significance of the great geographic lines of a region, the breaks in the continuity of mountain ranges, the direction of cliff lines, the position of cataracts in relation to one another (in a unique instance called a 'fall line'), the relation in direction of strong topographic lines to water courses, and, above all, to geologic boundaries—in fact, the more impressive manifestations of nature through surface configuration, seem not to have been included in the field of study of physiography. This neglected field is no doubt quite as much within the province of the student of the consolidated crust of the lithosphere—the worker upon the 'hard geology'—who, from his knowledge of mountain structure, is the one best fitted to cope with the problems involved in the interpretation of these complex phenomena. It need, therefore, be no reflection upon the modern physiographer that he has left almost untouched this department of physiography strictly so-called; and the rather sharp differentiation of structural from physiographic geology is doubtless responsible for the fact that exploitation of this frontier of physiography is now only beginning.

The neglected field of study sketched in the above paragraph may be described as the inquiry into the configuration of the earth's surface, and particularly that of its rock basement, as this is related to rock composition and structure. In contrast with physiography, as that term is now applied, it discusses the relation of earth physiognomy to orogeny, rather than to epeirogeny. It gives comparatively little attention to the characters of erosional contours, but endeavors to decipher beneath those obscuring curves, as upon a weather-worn and moss-grown monument, the partly effaced characters which have been chiseled in an earlier period. The attention is focused, therefore, upon the *direction*—the *orientation*—of the earlier lines. The questions asked are not whether for a given province an infantile or a mature stage of erosion or one of rejuvenation, is indicated; but rather what are the cardinal directions of lineaments, and how are they related to geologic boundaries and to other structure planes within the lithosphere. It is, in a word, the *architecture of the earth's surface*—the *tectonic geography*—that is considered, as has been happily expressed by a recent French writer (Barré, 'L'architecture du sol de la France,' Paris, 1903). The increasing frequency with which the term orography has been used by continental writers for studies bordering upon this field (vide especially Kotô, 'An Orographic Sketch of Korea,' Tokyo, 1903) suggests the appropriateness of a general term to designate this division of physiography or geomorphology. The term orology (the science of mountain chains), which was used with special fitness by Gilbert in connection with his classical studies of the basin ranges of the western United States, would appear, however, better adapted for the purpose than orography, for it may be presumed that physiology, rather than physiography would have come into use save for the limitations already placed upon that term. Both these terms fail, however, to emphasize sufficiently the importance of physiographic development, and as indicating the respective provinces of the two widely different lines of investigation the terms *epeirogenic physiography* and *orogenic physiography* may be better employed.

Studies upon which the writer has been engaged for a number of years within the province of southwestern New England have been directed toward the discovery of methods by which the relationships of physiographic lineaments to tectonic structures may be disclosed. The results, when reviewed in their relations to the more marked physiographic features of the Atlantic coast region, are comprised in a forthcoming monograph of the United States Geological Survey, and indicate that for a large area the earth's physiognomy is the outward expression of its internal structure. These conclusions have followed from extension of the pregnant generalizations of Professor Edouard Suess, of Vienna—generalizations which have already borne such rich fruit upon the other side of the Atlantic. It is the writer's belief that the exploitation of this frontier region of orogenic physiog-

raphy will afford ample returns to science, and that the key-note of the inquiry should be the more precise observation of lineamental orientation.

William Herbert Hobbs.
University of Wisconsin,
September 25, 1903.

BOTANICAL NOTES.

A NEW EDITION OF DETMER'S PRAKTIKUM.

For many years botanists have been acquainted with the very useful little book on plant physiology prepared by Doctor Detmer, of the University of Jena, and intended to be a laboratory handbook under the title of 'Das Kleine Pflanzenphysiologische Praktikum.' This little book has passed through a number of editions, and has been used widely in plant physiological laboratories. The present edition, which bears date of February, 1903, is an enlargement and improvement of the previous editions. It is essentially the same as the earlier editions and is illustrated in the same admirable manner. American botanists can not but envy the German botanists when it is remembered that this book of nearly three hundred pages is sold for a little more than six Marks. It should be even more largely used than its predecessors.

THE ALGÆ OF NORTHWESTERN AMERICA.

An interesting paper entitled 'The Algæ of Northwestern America' came to hand recently, as one of the University of California publications. It is by Professor W. A. Setchell and N. L. Gardner. It is an attempt at a rather exhaustive account of the algæ of the northwestern coast of North America. It is illustrated with eleven good plates, and altogether is a very excellent paper. The bibliography appears to be quite complete.

The two numbers of Engler's 'Pflanzenreich,' which have recently made their appearance, are devoted to the Orchidaceæ (in part) and the Eriocaulaceæ. The first takes up merely one section of the great family, but this is of interest to us since it includes the lady slippers (of the genus *Cypripedium* and related genera). The treatment is very full, and can not help throwing a great amount of light upon this portion of the orchid family. In passing it may be remarked that Pfitzer, the author, insists upon the spelling *Cypripedilum,* instead of that which is ordinarily followed. The illustrations are excellent. The other number is by Ruhland, and here the treatment is very much like that given by Pfitzer. These successive numbers of Engler's publication indicate that this is to be one of the great publications in botanical literature.

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STUDIES OF THE FOOD VALUE OF FRUIT AT THE UNIVERSITY OF CALIFORNIA.

According to a bulletin of the U. S. Department of Agriculture Professor M. E. Jaffa has carried on at the University of California, in cooperation with the U. S. Department of Agriculture, a number of investigations which have to do with the food value of fruits and nuts, the special object of this and the earlier work which it continues being to study the value of such foods when they constitute an integral part of the diet.

Nine dietary studies and 31 digestion experiments were made, part of them with persons who had lived for a number of years on a strictly fruit and nut diet, and others with university students who had been accustomed to the ordinary fare. In the majority of the dietary studies and all but one of the digestion experiments fruit and nuts constituted all or almost all of the diet. Thus, in one series of tests the daily ration consisted of apples and bananas, alone or in combination, eaten with walnuts, almonds, Brazil nuts, or pecans. In other experiments different combinations of grapes, pears, figs, walnuts, and other fruits and nuts were eaten with small quantities of milk, cereal breakfast foods, etc., the latter articles being taken simply to give a relish to the experimental dietary combinations, some of which were rather unusual.

In connection with this work the nutritive value of individual fruits and nuts was studied and many data were collected and summarized regarding the composition and