quite probable that there were highland or mountain species that have not been described.

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CURRENT NOTES ON METEOROLOGY.

SNOW CRYSTALS.

MENTION has already been made in these notes of the micro-photographic study of snow crystals which has been carried on for twenty years by Mr. W. A. Bentley, of Vermont. In the 'Annual Summary' of the *Monthly Weather Review* for 1902 (dated March 16, 1903), Mr. Bentley has a further contribution to this subject, in which he gives the results of his studies of snow crystals during the winter of 1901–02. The classification proposed by Hellmann ('Schneekrystalle,' Berlin, 1903, p. 38) is adopted as the best. It has been found that in general the great majority of perfect crystals are produced in the western, southwestern or northwestern portions of widespread snowstorms. The whole number of photographs of individual crystals taken by Mr. Bentley is now somewhat over 1,000, and no two are alike. This is doubtless the most complete collection in the world. The article contains 22 plates giving half-tone reproductions of 255 separate snow crystals—altogether a most beautiful collection.

STRUCTURE OF CYCLONES.

THE January number of the *Monthly Weather Review* contains a paper by Professor F. H. Bigelow on 'The Structure of Cyclones and Anticyclones on the 3,500-foot and 10,000-foot Planes for the United States.' In this paper charts are given showing, for the cyclones of January 2 and 7, 1903, the distribution of pressure and temperature at sea level, at 3,500 feet and at 10,000 feet. In reducing the station observations of pressure and temperature to the two high-level planes, Professor Bigelow used the tables prepared by him and published in his report on Barometry, a brief note on which appeared in SCIENCE for April 10, page 595. As Professor Bigelow says, these charts 'have special interest from the fact that this is the first exhibit of the isobaric systems in the upper air surrounding individual cyclonic and anticyclonic centers.'

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BOTANICAL NOTES.

A NEW CLASSIFICATION OF PLANTS.

IN his new syllabus of the plant-families ('Syllabus der Pflanzenfamilien,' 1903), Engler makes a considerable modification of the system of plants which he has followed heretofore. In the edition of the 'Syllabus' which appeared in 1898, four branches ('Abteilungen') of the vegetable kingdom were recognized, as follows: (1) Myxothallophyta, (2) Euthallophyta, (3) Embryophyta Zoidiogama, (4) Embryophyta Siphonogama. The changes in the new edition consist in breaking up the Euthallophyta into ten branches, thus increasing the whole number from four to thirteen. This very materially changes the grouping of the algæ and fungi which make up the bulk of the Euthallophyta. The branch Myxothallophyta remains unchanged, except in minor details as to group names, and the same is true of Embryophyta Zoidiogama and Embryophyta Siphonogama.

The new grouping is as follows:

Branch ('Abteilung') 1. PHYTOSARCODINA (Myxothallophyta), with three classes, Acrasiales, Plasmodiophorales and Myxogastres.

Branch 2. SCHIZOPHYTA, with two classes, Schizomycetes and Schizophyceae.

Branch 3. FLAGELLATAE.

Branch 4. DINOFLAGELLATAE.

Branch 5. ZYGOPHYCEAE, with two classes, Bacillariales and Conjugatae.

Branch 6. CHLOROPHYCEAE, with three classes, Protococcales, Confervales and Siphoneae.

Branch 7. CHARALES.

Branch 8. PHAEOPHYCEAE.

Branch 9. DICTYOTALES.

Branch 10. RHODOPHYCEAE, with two classes, Bangiales and Florideae.

Branch 11. EUMYCETES, with five classes, Phycomycetes, Hemiascomycetes, Euascomycetes, Laboulbeniomycetes and Basidiomycetes.

Branch 12. EMBRYOPHYTA ASIPHONOGAMA, with two subbranches ('Unterabteilungen') as follows:

Subbranch Bryophyta, with two classes, Hepaticae and Musci.

Subbranch Pteridophyta, with four classes, Filicales, Sphenophyllales, Equisetales and Lycopodiales.

Branch 13. EMBROPHYTA SIPHONOGAMA, with two subbranches, as follows:

Subbranch Gymnospermae, with six classes, Cycadales, Bennettitales, Cordiatales, Ginkgoales, Coniferae and Gnetales.

Subbranch Angiospermae, with two classes, Monocotyledoneae and Dicotyledoneae.

The significance of this rearrangement consists in the recognition of the greater relative importance of the lower groups of plants. There was a time, not many years ago, when eminent botanists regarded the flowering plants (Phanerogams) as coordinate with the lower plants bunched into one group (Cryptogams). Next, four groups—Thallophyta, Bryophyta, Pteridophyta and Spermatophyta —were recognized, the flowering plants (Spermatophyta) representing but one of the four great types of plants. Now we find in Engler's latest grouping that Spermatophyta are coordinate, not with one, or three, but with *twelve* other groups. This means that we no longer regard the morphological differences among lower plants as of merely secondary importance, but accord to them a value equal to that which they have in the flowering plants.

While one may bring serious objections to many details in this new system, there can be no doubt as to its usefulness in calling attention to the morphological differences among lower plants. In the consideration of the characters upon which the classification of plants depends botanists have generally given too much weight to those of flowering plants, and too little to those of the lower plants. This has made our systems top-heavy. In recent years tardy justice has been given to the fernworts (Pteridophyta) and mossworts (Bryophyta), but as for the fungi, lichens and algae, they have been thrown into a common heap of the 'thallus plants' (Thallophyta), in spite of the fact that they represent several well-marked great types. This mistake, at least, has not been made in Engler's new system. Here the lower types receive full recognition, and the higher are thereby reduced to something like their proper relative rank.

MORE MARINE BOTANY.

A FEW weeks ago mention was made of the opportunities for seaside laboratory work in botany at Woods Holl, Sandusky and on Vancouver's Island. To this list should be added the Biological Laboratory at Cold Spring Harbor, on the north shore of Long Island, which will be opened for its fourteenth session this year from the middle of June to the middle of September or later for investigators. There will be lectures from July 1 to August 15. In botany, courses are offered in cryptogamic botany, ecology and bacteriology. For a small number of investigators there are private laboratory rooms which may be obtained free of charge on certain conditions. Professor C. B. Davenport, of the University of Chicago, is the director.

AIDS TO THE STUDY OF THE FUNGI.

PROFESSOR KELLERMAN, of the Ohio State University, Columbus, is doing two things which will do much toward helping to increase the study of the fungi. The first is intended for the scientific worker, and consists of alphabetical lists of articles, authors, subjects, new species, hosts, new names and synonyms pertaining to North American fungi. Two such lists have appeared, the first representing the mycological literature of the year 1901, covering fifty-seven pages, and including nearly 1,000 citations, and the second representing the literature for 1902, and including about 1,400 citations. These lists are printed on one side of the page only, and so may be cut for card cataloguing purposes. The amount of work which these lists represent is quite appalling, and one can only wonder at the courage of the professor in undertaking it. That it will be of the greatest value to students of the fungi is at once obvious.

The other undertaking of the professor is the publication of a four-page leaflet under the title *Ohio Mycological Bulletin* for the benefit of beginners and amateurs in the study

of the fungi. It is to be issued 'from time to time,' and is sent for the nominal charge of ten cents for the year. All who send this sum are enrolled as members of the 'Ohio Mycological Club,' and from the lists already published this club is certainly a very live and active one, since it enrolled nearly 150 names in less than a fortnight. While intended for the beginner, these bulletins, of which two numbers have been issued, are of interest to the worker as well. Professor Kellerman is to be congratulated upon having so successfully launched this useful little publication.

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CORNELL WORK FOR AGRICULTURE.

THE president of Cornell University in a recent address before the College of Agriculture of that university gave a very admirable summary of the work of the college and its relations with the state.

The college was founded under the Land Grand Act of 1862 and is, under that act, a state college; but the state of New York has done nothing for it until within a few years, and the annual expenditures of the university on free scholarships for the state have exceeded the sum total of all the contributions of the state to the work. This address refers mainly to the work of the college and of the university in scientific fields and in promotion more or less directly of the agricultural interests of the state.

The university provides about eight hundred scholarships at a cost of about $250,000 per annum. Of these, six hundred are distributed to the one hundred and fifty assembly districts of the state. They are 'state scholarships.' The others are open to all and secured by competitive examinations. The annual cost of the College of Agriculture is $141,061.27, as for the last fiscal year 1901–1902.

The state of New York does not appropriate a dollar of this nearly $400,000. It makes appropriations for the state colleges of forestry and of veterinary science, located at Cornell University but not its property, $35,000. It turns over to the university the less than $60,000 per annum coming in from the Land Grant Fund, which fund was the gift of the United States. It has built two buildings, which, however, remain the property of the state.

The College of Agriculture of Cornell University gives free tuition and has done so from the first. The students in regular course number about two hundred. There are enrolled in the Farmers' Reading Course 30,000 students; in the Farmers' Wives' Reading Course, 8,000; in the 1700 Junior Naturalists' Clubs, 30,000; in the Home-Study Courses about 15,000 teachers. Five hundred farmers have conducted experimental work on their own farms, under the supervision of the college. A correspondence school of large extent is carried on, which gives instruction to all agriculturists throughout the state. The experiment station has published 196 bulletins, of 20,000 in each edition, and 14 annual reports.

Members of the staff of the college are sent out whenever an outbreak of disease among either animals or plants is reported and, if familiar, it is extinguished; if unfamiliar, it is studied and a way found of preventing and curing it. In such an instance, that of the pear-sylla, a million dollars was saved to a single county, a few years ago.

This is work prescribed by the statutes and the charter of Cornell University. It is carried on mainly through the liberality, not of the state, but of Messrs. Cornell, Sage and other private contributors to the available funds of the university. Illinois, Iowa, Wisconsin and other states, similarly interested in agriculture, are providing handsomely for scientific work of this kind in their land-grant and state colleges. New York gains much, gives little.

Professor Robertson, Agricultural and Dairy Commissioner of the Dominion of Canada, after a three days' visit to Cornell, writes as follows:

"I do not know of another great university that is doing the same sort of work. Insti-