

late its own system, if it has any, and give us a chance to see whether either is at all satisfactory as a basis of long-range forecasting? The Weather Bureau is not so wedded to the daily weather map, with its clear presentation of the actual state of affairs and the general drift of the weather for the next few days, but what it would quickly adopt the horoscopes of the astrologer or the cycles of the empiricists if there were the least chance of doing anything with these methods more satisfactory than is being done at the present time. It can not be too strongly stated that up to the present time no man has yet appeared who has shown himself able to deduce all the consequences in weather and climate that flow from the action of the sun's heat upon the earth, the ocean, and the clouds, and until that has been accomplished the study of the infinitesimal influences of the sun spots, the moon, the planets, and the stars, is wholly uncalled for and irrational.

UNIVERSITY RESEARCH AT WASHINGTON, D. C.

The proceedings of the last Convention of Agricultural Colleges and Experiment Stations held in November, 1900, have lately been published as Bulletin No. 99 of the Office of Experiment Stations. There are a number of addresses and discussions that will undoubtedly interest those Government officials who are hoping for the broadest development of university education in order that the various departments may secure the highest type of men to carry on the scientific work of the Government. The committee on graduate study at Washington pointed out the great stimulus that has been given to this subject by the appointment of "scientific aids in the Department of Agriculture," whose term of service is at present limited to two years, and whose maximum compensation is \$40 per month or sufficient to cover a portion of the living expenses, while the young men who must be graduates of land grant colleges have an opportunity to show what they can do in the way of original research in lines of work that are important to the Department.

The discussion as to the propriety of establishing a national university or a Washington memorial at the capital has also taken a prominent place at the July convention of the National Educational Association in Detroit, and it has also been brought prominently forward by the Chicago address of the Director of the United States Geological Survey, Dr. C. H. Walcott. Apparently all the practical agitators of this subject are in accord with the ideas published in the *MONTHLY WEATHER REVIEW*,¹ to the effect that the Government has already long since established its land grant colleges representing in general the under graduate or collegiate department of the proposed national university. It has now only to co-ordinate the systems of instruction in these colleges by the appointment of a board which may very properly be called the regents of the university. It can then authorize these regents to establish the conditions under which graduates from these, and probably other institutions, may continue their studies in Washington and attain the higher or university degree. In this latter portion of the work the investigators and the laboratories, the museums and the libraries, the literary and legal authorities in the employ of the Government can be utilized, but, of course, many additional facilities must be provided.

The fact that there is often a demand for a man who can do original work rather than for one who knows all about

¹ *MONTHLY WEATHER REVIEW*: February, 1898, pp. 63-64; Civil service examinations. December, 1898, p. 548; Civil service examinations for observers in the Weather Bureau. December, 1898, p. 564; Civil service examinations for assistants in the Department of Agriculture. May, 1899, p. 213; Scientific aids in the Department of Agriculture.

what others have done, suggests that there should be an intimate relation and friendly cooperation between such a national university and the Civil Service Commission.

The address by President Stubbs of Nevada, and especially that of J. K. Patterson, contained in the above-mentioned Bulletin No. 99, emphasize the necessity of a systematic co-ordination of the courses of study.

INSTRUCTIONS TO THE VOLUNTARY METEOROLOGICAL OBSERVERS OF THE UNITED STATES HYDROGRAPHIC OFFICE.

Under the above title a pamphlet by Mr. James Page, Meteorologist to the Hydrographic Office, has just been published from which we make the following extracts which show the work being done at the Hydrographic Office in charting the weather from day to day in response to the demands of modern meteorology, as well as the tabulation of the data for use in preparing monthly and annual means.

We notice that on page 26 mariners are instructed not to apply the reduction to standard gravity when they use mercurial barometers, but that they may apply an inverse correction to the aneroid. This seems to be exactly contrary to the recommendations of all the international meteorological conferences. Our own experience is that at sea the aneroid is quite as reliable as the mercurial, and of course it needs no correction for gravity.

In the days of Maury, and for some years subsequent to the period of his greatest activity, the common aim of the various institutions engaged in the study of ocean meteorology was to obtain for each unit area of the sea's surface (generally a field bounded by the even 5° parallels and meridians, 5°, 10°, 15°, etc.) a reasonable number of observations of wind, weather, etc., extending over any period of years. The observations were then assembled by months, the average for each month taken, and the result stated as the normal condition for the month, i. e., the condition which the mariner might expect to find most frequently prevailing throughout the given field or square during the given month. Sailing routes were then laid down for the successive months in accordance with these normal conditions, and shipmasters were instructed to adhere to these routes as rigidly as the winds would permit, even when convinced by their own experience of weather changes, as well as by the indications of their meteorological instruments, that better results might be attained by adapting the course of the voyage to the conditions actually encountered.

With the advent of weather forecasting as a science, using as a basis the daily synoptic weather charts, a new importance was attached to the sailor's meteorological observations. It was seen that in taking them he was not only adding to the stock of general knowledge of the climatology of the sea, the value of which to him was future and problematical, but also that he was putting himself in possession of certain special knowledge the value of which might prove absolute and immediate. His last preceding observation revealed a certain existent condition of the meteorological elements, his present observation a more or less different condition. What did the changes which had taken place during the time intervening between the observations foretell? Did the existence of adverse winds in his immediate neighborhood imply better or worse conditions elsewhere? If better, would he not, in this instance be justified in abandoning the route which had been laid down for him as the best under average circumstances, and seeking that which his present observations led him to believe would prove more favorable?

A satisfactory answer to these various questions demands, in addition to a knowledge of the general periodic changes which occur in the several meteorologic elements from season to season, and from month to month, a knowledge of what may be termed the nonperiodic or accidental changes which occur from day to day; of the relation which exists between the simultaneous changes in the several elements and of the effect which a decided variation of pressure, temperature, or wind in any one neighborhood has upon the conditions existing in other parts of the ocean.

To obtain this latter knowledge it is requisite that we have at hand for the purpose of study a series of charts or pictures, as it were, of the weather covering the entire ocean at a given instant of time, taken at regular intervals so brief that we may be confident that no marked change can occur without appearing in its different stages upon several of the pictures in succession. An examination of this series will then serve to reveal what changes have taken place in the interval separating any two of them; to trace the development and progress of any