

pression is correspondingly slight; it also proceeds very slowly and is not prominent to the observer.

In the dry chinook the slope of the descent and ascent is great, and the warming is rapid and prominent; the rise or fall of the barometer is not a prominent feature of the dry chinook, which wind is essentially due to an overturning of the upper and lower layers of air when they are in unstable equilibrium; the dry chinook occurs with equal ease either with southwest winds and falling barometer, or northwest winds and rising barometer, depending on the location of the mountains relative to the station.

The low pressure in the great low areas is not due to the temperature, moisture, or density of the air, but is the mechanical result of the wind, like the whirlpools, vortices, or eddies in rapid rivers, or those made artificially in a basin of water. The large barometric gradient shown by the isobars on our daily maps is not that slight gradient which causes the wind, but is itself essentially produced by the action of the wind.—C. A.

THE HURRICANE OF 1867 IN THE BAHAMAS.

Mr. Maxwell Hall calls attention to the fact that the great Bahama hurricane of October 1, 1867, which was partially studied by Buchan (see p. 265 of his "Handybook"), is worthy of a more elaborate study. The material for such a study probably still exists in the archives of the hydrographic offices of France, Germany, England, and America, to say nothing of the observations at land stations, which are preserved in the archives of the meteorological offices of those same nations. Some reliable accounts will also undoubtedly be found in the newspapers and journals for that year. The compilation of these data and the preparation of the charts of isobars and winds would form a very appropriate subject for a thesis for a graduate degree. Such subjects are of great meteorological interest, as well as commercial importance.

During the month of June, 1867, the writer happened to have charge of the library and archives of the Hydrographic Office, U. S. Navy, which had just been removed from the Naval Observatory and was temporarily established in what is known as the "Octagon Building", corner of New York avenue and Eighteenth street. He well remembers the immense collection of log books from vessels of every nationality that had been accumulated by Commodore Maury for use in his enthusiastic researches on the meteorology of the ocean, and his compilation of general sailing charts, to which the modern pilot chart is a worthy successor. The whole series of charts published by him is rare and difficult to obtain. Perhaps very few realize that it included six different series, known by letters, as follows:

- Series A. Track charts.
- Series B. Trade wind charts.
- Series C. Pilot charts.
- Series D. Thermal charts.
- Series E. Storm and rain charts.
- Series F. Whale charts.

The whole series comprises at least eighty charts, published between the years 1849 and 1860, under the general title, "Wind and Current Charts".

The more recent charts of winds, pressure, temperature, currents, etc., on the various oceans, as published by the British, French, and German offices; the daily maps of the Atlantic, published by the French and British, and especially the Danish office; and the daily maps of the Northern Hemisphere, published by the U. S. Weather Bureau, show the great advance in our knowledge since 1860.

It would be interesting to publish the numerical statistics of the great mass of manuscripts and logs of vessels now preserved by the various governmental offices for use in the study

of the atmosphere over the ocean. The old records of sailing vessels give us the most precious data, and almost all that we have, relative to those parts of the ocean where the modern steamship never goes. Maury began his work just in time to save the old records before they were destroyed as waste paper, and before sailing vessels were replaced by steamers.

In Bulletin No. 113, published by the U. S. Hydrographic Office, in April, 1897, Mr. James Page says that in addition to an indefinite number of rough logs presented by the masters of vessels that office has 380 abstract logs, each containing three months' records, and 85,000 forms 105a and 105b, containing the simultaneous Greenwich mean noon observations. The total number of complete observations was then estimated at 4,000,000, but by the present date (1907) this number must have been more than doubled.

NOTES FOR TEACHERS.

The December, 1906, number of School Science and Mathematics refers to several matters that may be interesting to teachers of meteorology. On pages 762-768 we have descriptions of several simple pieces of apparatus for determining the percentage of oxygen in the air. These are designed for use in large classes with the least possible expenditure of the teacher's time. Several pieces of apparatus may be kept in constant service for several weeks without requiring any of the teacher's time. Experimental work of this kind is the only way by which to convey instruction vividly and impressively. The scholar never forgets the percentages (by volume), 21 and 79, when he has made a few measurements of this kind with such apparatus.

A special application of apparatus for measuring the oxygen and the aqueous vapor in the ordinary atmosphere consists in applying it, first of all, to the pure air breathed into the lungs, and then to the impure air exhaled from the lungs. Of course in the latter case increased quantities of carbonic acid gas and aqueous vapor are discovered. We are often taught that this carbonic acid gas is produced by the oxidation of carbonaceous material in the blood when brought into contact with the warm air of the lungs; if this be true then the ratio of the oxygen to the nitrogen in the exhaled air should be less than the $\frac{21}{79}$ of the inhaled air. Possibly the student will be surprised to find that it is not so, and that he has been wrongly taught.

On page 772 is an interesting article by R. A. Millikan on "Cooling through change of state", in which a simple experiment shows the changes of temperature that are produced by crystallization from or solution in liquids. He lays especial stress upon the importance of graphs in some cases, but also confesses that, like many others, he has had "difficulty in finding a sufficient number of sensible and natural applications of the graphical method. The graph should be used as the interpreter of the physics, and not the physics as interpreter of the graph".

On page 778 a method of determining the horsepower of a small steam engine, or the work done in a unit of time, could probably be applied to the wind or to an anemometer for determining the work done by the wind.

On page 795 School Science reprints from Scientific American a general description of the use of hydrolith for generating hydrogen. This hydrolith is supposed to be a hydrate of calcium, and if the data given are correct its use would be of great advantage in aerial research. Unfortunately the article omits to state the fact that this chemical is not for sale in the market. Only a few pounds of it have ever been made. An analogous compound is offered for sale in the United States, under a different name, but its future usefulness is still problematical. The great stimulus recently given to ballooning will, however, undoubtedly bring about many chemical and mechanical improvements.—EDITOR.

EDUCATIONAL NOTES.

Prof. Josiah Keep, of Mills College, California, under date of March 11, 1907; writes the Editor as follows:

I wish to express my obligations to the MONTHLY WEATHER REVIEW for many interesting and helpful suggestions, which I use with my class in physical geography. Many of the issues I have indexed and placed in a convenient place for reference.

Prof. John L. Tilton, of Simpson College, Indianola, Iowa, under date of April 10, 1907, writes the official in charge, Des Moines, Iowa, that he has this year 45 students in his meteorological class—the largest number he has ever had in the subject. Ward's text is used, supplemented by references to other texts.

At the Chattanooga, Tenn., High School an extensive set of meteorological apparatus has been provided, including almost all the instruments used at a regular station of the Weather Bureau. In October, 1906, a quadruple register was installed and started by Mr. L. M. Pindell, Local Forecaster. Each pupil in the class in meteorology was instructed in the handling and care of the register, and also in the taking of the regular observation, which is taken every day the school is in session. Mr. Pindell has made frequent visits to the class to aid the regular instructor, and on October 30 gave a special lecture to the class on "The weather map".

At the Erie, Pa., High School laboratory work covering the making of synoptic weather charts, rainfall charts, and pressure and temperature curves has been given to the classes in physical geography. These classes and those in physics have visited the Weather Bureau office to become better acquainted with methods of meteorological observation and with the instruments used.

WEATHER BUREAU MEN AS EDUCATORS.

Mr. W. H. Alexander, Observer, began in February a course in elementary meteorology with a class of eight young men, at the University of Vermont, Burlington, Vt. This course is elective, is open to juniors and seniors in the Department of Agriculture, and is to last during the second half of the college year, with one hour per week in the class room.

Beginning next fall it is hoped to give an advanced course in meteorology, open to students who have past in the first course; this will probably cover the first half-year, and call for two hours per week.

It is announced that a course in elementary meteorology will be given by Mr. J. L. Bartlett, Observer, at the summer session of the University of Wisconsin, Madison, Wis., lasting from June 24 to August 3, 1907. This is to be a lecture course, accompanied by practise in the use of meteorological instruments and the taking of weather observations. The lectures are to be given two afternoons each week, and two or more hours of laboratory work per week are expected. The course may be counted as one hour credit for students who are candidates for a degree, but is open to any one who complies with the simple requirements.

Mr. Joseph L. Cline, Observer, Corpus Christi, Tex., under date of May 17, 1907, reports that he has just completed a series of 35 lectures on meteorological and kindred subjects to the seniors and subseniors of the local high school. The pupils were required to read the portions of Waldo's Elementary Meteorology treating of the topics discust in the lectures.

Arrangements have been made for Mr. Cline to deliver a similar series of lectures at the Corpus Christi Summer Normal School, during June and July, 1907.

Mr. George N. Salisbury, Section Director, will probably

give a course in meteorology at the summer school session of the University of Washington, at Seattle. The session will extend from June 24 to August 2, 1907, and the proposed course in meteorology is to be given on three afternoons each week.

Mr. W. A. Shaw, Local Forecaster, reports that during the winter term of twelve weeks he gave the regular course of instruction in meteorology at Norwich University, Northfield, Vt. Two hours a week are required in the class room. The course is based on Waldo's Elementary Meteorology as a textbook, but much use is made of other standard works, and of maps, charts, publications of the Weather Bureau, and lantern slides. All members of the senior class are required to take this course.

Mr. A. H. Thiessen, Section Director, early in April completed his series of lectures at the Agricultural and Mechanical College, Raleigh, N. C. There were from six to ten students in the class. One general lecture, with lantern slides, was given, to which the junior class also was invited, about seventy-five attending.

Mr. W. M. Wilson, Section Director, Ithaca, N. Y., writes that he has been appointed instructor in meteorology in the College of Arts and Sciences of Cornell University. Heretofore the instruction given by officials of the Weather Bureau has been under the College of Agriculture, tho students of other colleges have attended. Of the 42 students registered in the course given this year by Mr. Wilson four are from the College of Arts and Sciences. In the past that college has, however, offered a course in meteorology in connection with physical geography, but in future the course offered by the College of Agriculture will be open to the students of the College of Arts and Sciences upon favorable terms.

At the Binghamton Industrial Exposition, in the Public Library Building, Binghamton, N. Y., March 14 to 27, 1907, a Weather Bureau exhibit was prepared by Mr. John R. Weeks, Local Forecaster. About 400 square feet of wall space was taken up by a series of sheets and maps illustrating how the daily weather map is made; other exhibits showed the uses of the map, the publications of the Bureau, and in general the various ways in which the Bureau serves the public. Upon a table close by were shown a duplicate set of instruments and several of the larger books and pamphlets among the publications of the Bureau. The exposition was visited regularly by pupils of the public schools of the city, under the guidance of their teachers, by students of the business colleges, and by many business men. At the end of the exposition part of the wall exhibit was left in the library building as a permanent exhibit.

The system inaugurated by Mr. Weeks, in accordance with which his typewritten lecture, with the accompanying slides, is sent successively to different seminaries, seems to be working satisfactorily. We note that it was delivered April 9, 1907, at Cazenovia, N. Y., and forwarded on April 10, to Fonda.

Mr. R. F. Young, Section Director, during March, 1907, gave a course of ten lessons to a class in physical geography of the Helena, Mont., High School. The subjects included the weather map and the climatology of Montana. The class visited the Weather Bureau office to inspect the instruments, to draw weather maps from current reports, and to study the movements of areas of high and low pressure.

The following lectures and addresses by Weather Bureau men have been reported:

Mr. Ford A. Carpenter, April 16, 1907, before the San Diego,