

right temperature and pressure are present, then, as hydrogen is but one ninth of water, the amount of hydrogen used to form the water of the earth would be $1/45,000$ of the mass of the earth. If we add the amount of carbon dioxide which went to form limestone and carbonaceous substances¹⁹ we will add one fourth the amount of the water, *i. e.*, $1/20,000$ of the mass of the earth. The sum of these, $1/14,000$ of the mass of the earth, will be the amount of gas which has been driven out from the original material by pressure and heat, and which is now represented by our present water and atmosphere and the carbon dioxide which has been from time to time withdrawn from the latter. If the planetesimals had on an average a density of three, this being the density of the average rock of the earth's surface, and contained on an average two times (Chamberlin above says 'several times') their own volume of gas of the average density of water vapor, then the amount of gaseous substances mentioned above ($1/14,000$ of the mass of the earth) would be about one

of which a reprint has lately been received, Mr. A. Lawrence Rotch reported upon the results obtained by means of kites at Blue Hill Observatory regarding the temperature of the free air in cyclones and anticyclones. Thirty-four ascents showed a vertical decrease of temperature in cyclones and anticyclones at a much lower rate than the adiabatic rate of cooling in ascending air, and also showed almost the same rate of decrease in low and high pressure areas up to 3,000 meters. In view of this latter fact, as Teisserenc de Bort pointed out, the temperature of these two columns of air, up to height of say 4,000 meters, depends to a large extent on the season and upon geographical conditions, as well as upon the relative position of the pressure system. The thirty-four cases were distributed equally among cyclones and anticyclones, and among different seasons. Yet the mean sea-level temperature at a mean pressure of 29.646 ins. was 48.4° , and at 30.157 ins. the temperature was 48° . The following table summarizes the results.

METERS ABOVE SEA LEVEL.								Mean.
	0	500	1,000	1,500	2,000	2,500	3,000	0 — 3,000
Mean Pressure 29.646", Temp. 48.4°		44.2°	39.2°	34.3°	31.5°	28.0°	22.6°	35.4°
Mean Pressure 30.157", Temp. 48°		43.7°	38.7°	35.2°	31.3°	27.1°	21.7°	35.1°

seventh of the mass of the gas contained by the planetesimals from which the earth was formed. This may be shown as follows: An average gram of material contained in a planetesimal would contain two thirds of a cubic centimeter of gas (density taken as $18/32$ of that of oxygen), weighing .00051 gram at 15° . If it gave off only the amount mentioned above, $1/14,000$ of its mass, it would give .00007 gram, which is about one seventh of .00051 gram, the amount it is capable of giving off.

RALPH H. MCKEE.

LAKE FOREST UNIVERSITY,
January 6, 1906.

CURRENT NOTES ON METEOROLOGY.

TEMPERATURES IN CYCLONES AND ANTICYCLONES.

In the Archives of the Imperial Academy of Sciences of St. Petersburg for June, 1905;

¹⁹ Dana, *loc. cit.*

A better method, first used by Mr. Clayton in connection with kite ascents in 1899 and 1900, is to determine the temperatures at the same heights for several days in succession while changes of pressure and temperature are taking place at the earth's surface. By this method it was found that the maximum temperature at all heights up to about 4,000 meters nearly coincided with the minimum pressure at sea level, but was somewhat ahead of it, and that the minimum temperature at all heights coincided with a sea-level pressure above normal, but preceded the latter at a considerable distance.

A LABORATORY MANUAL.

A VERY convenient form of laboratory notebook is found in Professor Frank W. Darling's 'A Laboratory Manual in Physical Geography' (Atkinson, Mentzer & Grover, Chicago and Boston, 1905). All teachers who

have had the labor of handling large numbers of papers and maps in laboratory exercises in physiography and in meteorology will appreciate this publication. In flexible covers, we have, on separate sheets held together by paper fasteners, fifty-five exercises, in very direct and precise form, designed to call the attention of the student to the essential points in each subject discussed. The exercises can be put in any order that is desired, and any teacher can add, subtract or multiply as he sees fit, or as his opportunity permits. At the end of the note-book there are a number of extra pages of blank paper, and also sheets of section paper, and outline maps of various kinds. Several copies of each of these maps are included, for use in different exercises.

About one half of the exercises are meteorological in their character, and are on the whole satisfactory and well worded. It is easy to say that they might be improved, because they probably do not exactly fit the demands of any large number of teachers. But with all the limitations which must be expected in any scheme of laboratory work designed by *some* persons for *other* persons, we may, nevertheless, commend Professor Darling's 'Manual' as a very useful, compact and effective laboratory guide, which can not fail to improve and systematize laboratory teaching in physiography and meteorology. We suggest that the blank tables for entering the meteorological records are too rigid, and do not call for that variation from week to week which is an essential in keeping up interest in the subject. And we fail to see how the outline weather maps can be copyrighted, for they seem to us nothing more than a reproduction of the regular Weather Bureau station map.

NOTES.

OBSERVATIONS of temperature during the recent solar eclipse made on board the P. and O. steamship *Arcadia*, off the coast of Spain, showed a fall from 82.4° to 72.5°.

Dr. J. M. Pernter, whose book, 'Meteorologische Optik,' covers a field in meteorology which had not previously been occupied, has recently published two additional studies

along the same line. These are entitled: "Erklärung, des fälschlich 'weisser Regenbogen' benannten Bouguer'schen Halos," and 'Zur Theorie des von einer kreisförmigen Lichtquelle erzeugten Regenbogens.' Both appear in the *Sitzungsberichte* of the Vienna Academy of Sciences, June and July, 1905.

Apropos of the recent note in SCIENCE concerning the results obtained by Mr. Clayton during the past summer in sounding the free air over the tropical Atlantic, it may be worth while to call attention to two papers by Hergesell on this same subject in the *Beiträge zur Physik der freien Atmosphäre*, Vol. I., No. 4, 1905. In these papers are discussed the results obtained by Hergesell while on the yacht of the Prince of Monaco in the summers of 1904 and 1905.

The U. S. Weather Bureau eclipse party at Daroca, Spain, observed a fall of 8° in temperature during the eclipse. There was no notable change in the wind.

THE November number of *Education* contains an article by Dr. Frank Waldo, on 'The Study of Meteorology,' which deals chiefly with meteorological and climatological instruction given at Harvard.

'HÖHENKLIMA und Bergwanderungen in ihrer Wirkung auf den Menschen' is the title of an elaborate work just issued in Germany. The authors are teachers at the University of Berlin (Loewy and Müller), and at the Landwirtschaftliche Hochschule in Berlin (Zuntz and Caspari). The book numbers nearly 500 pages, and presents the results of experimental studies on high mountains and in the laboratory. It contains many illustrations.

THE self-recording rain-gauge designed by S. P. Fergusson, of Blue Hill Observatory, is now constructed and for sale by the International Instrument Company, of Cambridge, Mass.

A SMALL-SIZE, relatively inexpensive, so-called piezmic barometer, designed by A. S. Davis, is for sale by F. Darton & Co., St. John Street, London, E. C., for £1 to £1 15 s. This barometer has a tube seven inches long,

whose mouth can be closed by a screw when the instrument is being carried.

R. DEC. WARD.

A COLORADO SCHOOL OF FORESTRY.

THROUGH the generosity of Gen. William J. Palmer and Dr. Wm. A. Bell, of Colorado Springs, Colorado College is to have a School of Forestry. These two gentlemen, who take great interest in forestry, have given to the college the beautiful tract of land known as Manitou Park, with its 15,000 acres of forest, haylands and lakes. A conservative estimate places the value of this gift at \$150,000.

The park is twenty-five miles northwest of Colorado Springs on a plateau, 7,550 feet above sea level. The climate and soil are typical of the mountains. Many years ago the whole tract was deforested, but at present there is a fine new growth of conifers. In every respect it offers excellent opportunity for field work and the practical study of silviculture and forest botany. The theoretical and lecture courses in this new department will be given at Colorado College. The new science building completed in 1903, with its modern and well-equipped laboratories makes possible the study and research which this new movement entails.

No better location could be found for such a school than Colorado College. Situated at the foot of Pikes Peak, where the Rocky Mountains touch the arid plains, it affords fine opportunities for the study of irrigation, as well as of forestry problems. The whole irrigation problem must, in the last analysis, be determined by the forest coverings of the mountains, for the mountains are the natural sources of water supply for the plains. Where they are denuded of forest, they can not hold water; rain and the snow water rush off in torrents that can not be utilized. The forest covering equalizes the water supply of the plains by restraining the water, allowing it to flow down slowly and gradually so that it can be properly distributed. The Pikes Peak forest reserve is also near; here the central government has established three nurseries to provide trees for the reforestation of denuded slopes. On Pikes Peak and other near-by

mountains are found a great variety of climates, from the arctic-alpine down to the more temperate.

The establishment of this School of Forestry means much for the Rocky Mountain region. It is said that the first settlers in the state of Colorado found 36,000 square miles of forest area covered with various kinds of valuable pines and spruces. Since that time 30,000 square miles of the virgin forests of the state have been destroyed. Evidence introduced in the Kansas-Colorado water suit showed that the cutting away of the forests on the mountain sides has greatly decreased the amount of water available for irrigation. The influence of the school will do much toward checking this waste and establishing better economic conditions.

Professor Gifford Pinchot, forester, U. S. Department of Agriculture, has agreed to nominate a man to act as head of this new department of Colorado College, which will be opened next September.

THE GEOLOGICAL SURVEY OF ILLINOIS.

THE State Geological Commission, at its meeting at Springfield last week, completed the corps and arranged for the season's work. The following appointments were made to the regular force, and in addition the director was authorized to make such temporary appointments as might be necessary, subject to confirmation at a succeeding meeting of the commission.

Professor C. W. Rolfe, of the State University, consulting geologist in clay work.

Professor R. D. Salisbury, of the University of Chicago, consulting geologist, in charge of educational work.

Dr. U. S. Grant, of Northwestern University, consulting geologist in lead and zinc work.

Professor S. W. Parr, of the State University, consulting chemist in coal work.

Dr. Edward Bartow, director of the State Water Survey, consulting chemist in water work.

Mr. F. B. Van Horn, recently of the Missouri Geological Survey, assistant geologist.

Mr. F. F. Grout, recently of the West Virginia Geological Survey, assistant chemist.

Mr. H. B. Fox, of the State University, assistant geologist.