ment, national, state and municipal conditions are discussed at length; there is a consideration of economic conditions and labor questions, the items thus far occupying about half the bulky volume.

In matters of science the treatment is of rather restricted divisions, generally by those in the employ of the government or with colleges. In agriculture, Allen, Hooker, Evans, Knight and Glasson, all of them related to some bureau, discuss, respectively, the census of 1911, diseases of live stock, diseases of plants, legislation and horticulture, while Morse, of the Bussey Institute, considers live stock, and Felt, of Albany, the seventeen-year locust. Ethel Marion Smith, of the Bureau of Fisheries, takes up briefly the story of the fisheries. In similar manner Locke and Wilson, of the Massachusetts Institute of Technology, present reviews of mining and ore-dressing and coal, coke and petroleum, while Hofman, of the same school, discusses lead. Here no government expert is heard, but Fulton, president of the South Dakota school, Macgregor, of Columbia, and two engineers and an editor, Stoughton, Fulton and Ingalls, contribute other special articles. Mathematics in general is from the pen of Wilson, of the Massachusetts Tech, while Todd, of Amherst, writes quite at length and in an interesting manner of the astronomical world, outlining the important movements of the science. Geological topics are divided between Woodworth and Palache, of Harvard, Reid, of Johns Hopkins, who discusses vulcanology and De Wolf and Ransome. Meteorology of course is considered by Ward, of Harvard, terrestrial magnetism by Faris, in government employ, and in geography, Davis, of Harvard, is the only college man, Gannett and Littlehales, of Washington, and Adams, editor of the publications of the American Geographical Society, caring for the other sections. Chemistry enlists a full company of experts, Cornell and Columbia tieing the government number, two, with one each from Technology and Wisconsin, while the story of physics is presented by Saunders, of Syracuse. In the same way are taken up zoology, botany, paleontology, ethnology and archeology, the last three together by the presentation of abstracts of the books, publications and society achievements of the year. These notings will serve to show the method in which the subjects are attacked and the kind of men who have contributed the different essays. Psychology and philosophy, medicine and surgery and engineering follow, while religion, the arts and literature round out the whole.

The book is of convenient size, 8vo, well printed on light-weight paper, so that it is—despite its bulk of 900 pages—not inconvenient to hold in the hand, and it is quite well indexed by larger topics, which will probably serve the purpose since the articles are in general not long and are arranged with well-displayed headings.

John Ritchie, Jr.

## *NOTES ON METEOROLOGY AND CLIMATOLOGY*

### A NEW AEROLOGICAL LABORATORY

The close relationship between meteorology, the science, and aviation, the art, is becoming more generally recognized as time progresses. At present there is being erected at Rostock, a small city in northern Germany, on an arm of the Baltic Sea, an institution which is to be an aerological observatory as well as an aeronautical laboratory. The aerological researches will be based upon data obtained from aloft by means of kites and balloons, while the aeronautical experiments will consist mainly of the adaptation of aircraft to the conditions thus determined. Professor Otto Krümmel will direct the aerological investigations, while Captain Alfred Hildebrandt will have charge of the aeronautical work, which will include a manufacturing plant. Because of the favorable location especial attention will be paid to hydro-aeroplanes. As is customary in Germany, municipal aid will be given the new institution.

### THE NEW YORK METEOROLOGICAL OBSERVATORY

The New York Meteorological Observatory, located in Central Park, New York City, has

recently been placed under the supervision of the U. S. Weather Bureau. This institution, the first in the country to be equipped with self-recording meteorological instruments, was founded by Daniel Draper, Ph.D., in 1868. The expense of conducting the work of the observatory was provided for by municipal appropriations, while the founder remained the active director until his retirement a year ago. The meteorological record, exceeding in length that of the Signal Service and Weather Bureau, has been constantly referred to by a variety of interests in the development of the American metropolis. Under the new arrangement the Weather Bureau has two observatories in New York City. At the Central Park station observations are taken for the city by the federal officials just as was done when it was entirely under city supervision.

### ICE STORMS

WHEN rain falls while the temperature of the lower air is below freezing the drops solidify immediately after striking solid objects, and we have an ice storm—a frequent occurrence in the northeastern part of the United States. The precipitation continues in the form of rain when the temperature of the air near the ground is sometimes as low as 9° F., showing that there must be an inversion stratum but a short distance aloft, otherwise the condensation would result in the formation of solid particles rather than liquid drops. In New England, where these storms are particularly frequent, it is not uncommon for the ice to accumulate to a depth of an inch on all exposed objects, and on one occasion, February 14–16, 1909, ice was thus formed to a thickness of three inches in the suburbs of Boston, and did not disappear until four days after the storm had ended. The supposition that there is a relatively warm stratum aloft during an ice storm was verified by means of a kite flight at Blue Hill Observatory on March 7 last. In that flight the auxiliary kites added to lift the line became so heavily coated with ice that they pulled the leading kite down instead of aiding in its ascent, thereby rendering the maximum height reached during the flight considerably lower than usual. It was found that the air was practically isothermal from the summit of Blue Hill (200 meters above sea-level) to 625 meters above sea-level, the temperature being about 30.8° F. Beyond the latter level, however, the temperature increased steadily with height, and was 36.8° F. at 874 meters, the maximum height reached by the meteorograph. Raindrops falling from this relatively warm stratum were undercooled by their passage through the colder air below, and immediately changed to ice upon striking solid objects.

### EXTREME COLD IN THE UNITED STATES

IN persistence and severity the cold experienced in the central and eastern parts of the United States during January and February is noteworthy, as is seen from the following: At Grand Forks, N. D., the temperature fell to zero or below every day of January except the last, the lowest temperatures for all the days of the month averaging —20.0° F. At Washta, Iowa, —47° was officially recorded January 12. At Chicago, Ill., where the average daily deficiency was 11.9° F. the month was the coldest since the establishment of the Signal Service station there in 1871, and in unofficial records prior to 1871, extending back to 1830, the coldest January was 1.4° warmer than that of 1912. The mercury fell to zero or lower on 13 days, 10 of these being consecutive, and was continuously below zero for 79 hours during the 3d–7th, the longest period on record there. At Washington, D. C., usually a place of mild winter weather, —14° was recorded January 14, this reading being within 1° of the lowest temperature officially recorded there in 42 years, which is the length of the record. Some results of the extreme cold were unprecedented. For the first time since white man has lived in its vicinity Lake Superior was frozen over from shore to shore, the ice being of sufficient thickness to allow moose to cross from Canada to the American shore, according to press dispatches. For the first time in 28 years ice completely spanned Lake Michigan in places

on February 10. Lake Erie was also frozen completely across in some places. Since 1885 Cayuga Lake, in New York State, has not been frozen from end to end until last winter. Many important harbors along the Atlantic coast were kept open only by the ceaseless work of ice-breaking vessels, and for more than a week Long Island Sound was ice-covered, except for the narrow lane kept open by the frequent passage of steamers. Fire losses in the United States for the six weeks ending February 17 were the heaviest for a period of that length in the history of American underwriting, barring periods in which notable conflagrations occurred. The losses for January, 1912, were 67 per cent. greater than those of the same month a year ago, and 134 per cent. greater than those of two years ago. These facts are explained by underwriters as being largely due to frozen water-mains and hydrants, and to snow-blockaded streets, which handicapped the firemen. Doubtless the "oldest inhabitant" can recall many winters which were accompanied by considerably heavier snowfall, severer and more frequent storms and higher and more destructive winds than those just experienced, but few there are probably who can remember a longer period of frigid temperatures, with results similar to those cited.

### WINTER WEATHER IN FLORIDA

Florida, widely advertised as having "perpetual summer," or as one railroad puts it, "where every day is a June day," has been generally regarded as having a fountain of perpetual something or other ever since the days of Ponce de Leon. Its real climate, however, did not receive careful attention until large numbers of settlers were attracted by the recent land-boom. In A. J. Henry's "Climatology of the United States" it is stated that in 1886 and 1894 frost destroyed practically all citrus fruits in the state, and in 1895 and 1899 trees in the northern counties were killed in that manner. During the past century there have been at least seven severe freezes in the state, during two of which, 1835 and 1899, practically a zero temperature prevailed over the interior of the northern and western counties. Snow has fallen over the greater portion of the state, and on February 7, 1835, when a temperature of 7° above zero was recorded in Jacksonville, the St. John's River was frozen. A temperature of —2° F. has been recorded within the state. In all but eight of the last seventy years freezing temperatures have occurred in Jacksonville. January last, an extremely cold month over much of the United States, was also severe in Florida. The isotherm of freezing reached as far south as the middle of the peninsula on the 16th. At Miami, latitude 26° N., the most southerly city on the mainland of the United States, frost was recorded on February 11. As a winter resort contrast Florida with certain parts of California. According to official reports, 42° F. was the lowest temperature recorded during January at both San Francisco and Los Angeles.

### A STORM DETECTER

Reference has already been made in these notes[1] to the use of a wireless telegraph receiver to detect the approach of storms through the waves set up by electrical discharges. The idea was taken up by M. Flageolet, who has just invented an instrument of such acute sensitiveness that it records a storm at a distance of 300 miles. As it usually takes a storm about a day to travel this distance, the practical importance of the new invention will be considerable. The instrument was recently demonstrated before the Academy of Sciences in Paris by M. Violle.

### THE DISTRIBUTION OF RAIN IN CYCLONES

The distribution of rain in cyclonic storms has long been a problem of interest to meteorologists. As yet, however, all do not agree as to the region of heaviest precipitation with reference to the storm center. From early investigations it appeared that the rainfall was heaviest near the center of the depression, and became less and less toward the sides. Observations made at Blue Hill Observatory showed that clouds were densest and most fre-

[1] Science, Vol. XXXI., No. 807, June 17, 1910, p. 952.

quent in the southeast quadrant of a depression. Professor Waldo ("Elementary Meteorology," p. 221) says:

> In the eastern and northern parts of the United States the area of maximum rainfall lies southeast of the center of the cyclone, and usually at a distance of about 300 miles from it; but the distance varies greatly in individual instances.

In New England, however, the rainfall seems to be heaviest in the northeast quadrant of a cyclone, the precipitation accompanying a "northeaster," in which the center of the depression remains south of the observer during its eastward movement, is usually heavier than that of a storm whose center passes down the St. Lawrence Valley. Dr. Shaw ("Forecasting Weather," p. 206) seems to be of the opinion that the precipitation is most abundant, or at least is most frequent, in the "left front of the depression." In the latest discussion of the problem, Mr. F. J. Wardale (*Symonds's Meteorological Magazine,* February, 1912, p. 8) concludes that when a depression crosses England the bulk of the rain falls in subsidiary eddies on its northern side, the region of heaviest precipitation as the storm advances being "a broken band parallel to or gradually diverging from the central track on its left side." He believes that these eddies, too shallow to be evidenced on the meteorological charts, have a counter-clockwise orbital movement around their primary, at the same time sharing its forward movement. These eddies, in which the heavier downpours occur, pass quickly over and hence give slight precipitation to a place south of the storm track, for there they are accelerated by the general forward movement. For a place to the north of the center, the orbital velocity of the secondary is subtracted from the general forward movement, consequently the eddy passes slowly and in some cases might remain stationary, resulting in prolonged and therefore heavy rain. These eddies, he believes, are formed at intervals during the progress of the cyclone, thus accounting for the patchiness of the band of high rainfall. Mr. Wardale's suggestions are well worth the serious consideration of forecasters, since unnoticed secondaries and trough-like isobars have often resulted in heavy precipitation when fair weather was expected. His conclusions agree closely with those previously reached by Mr. W. G. Reed in a study of the cyclonic distribution of rainfall in the United States (*Monthly Weather Review,* October, 1911, p. 1609).

### NEW BOOKS

AMONG the books which have recently appeared are: (1) "Meteorology," by W. I. Milham. New York, The Macmillan Co. 8vo. 549 pp. $4.50 net. (2) "Weather Signs and How to Read Them, for Use at Sea," by W. Allingham. Glasgow, J. Brown & Son. 117 pp. 2s. net. (3) "The Sun," by C. G. Abbot. New York, D. Appleton & Co. 448 pp. (4) "Über die Helligkeit des Himmels in der Nahe der Sonne," by H. Diercks. Kiel, Lüdtke & Martens. 48 pp. (5) "Über die Gesetze der Wärmestrahlung," by W. Wien. Leipzig, J. A. Barth. 21 pp. 1 Mark. Among the books soon to appear are: (1) "The Meteorology of the Globe," by W. N. Shaw. (2) "Clouds," by C. T. R. Wilson. (3) "Structure of the Atmosphere," by C. J. P. Cave. (4) "Weather-science," by G. F. K. Lempfert. (5) "Radiation," by P. Phillips. Professor R. DeC. Ward has begun the preparation of a "Climatology of the United States."

ANDREW H. PALMER
BLUE HILL OBSERVATORY,
May 1, 1912

---

## *SPECIAL ARTICLES*

### THE ORIGIN OF ERYTHROCYTES BY A PROCESS OF CONSTRICTION OR BUDDING

IT is gradually becoming apparent that in the solution of some of the more intricate morphological problems, involving phenomena of development and histogenesis, recourse will be necessary, in part at least, to data other than those obtained from fixed and stained preparations alone. Sabin, '05, in a discussion of evidence from fixed histological material bearing on certain questions regarding lymph-