weather was generally pleasant. The freezing weather toward the end of the month caused some damage to potatoes that were in the ground. Farm work was well advanced and winter wheat and rye and clover were in good condition.—*W. M. Wilson.*

Wyoming.—The first week of the month was favorable for securing crops and for the completion of thrashing. The severe freeze of the 19th–20th destroyed some potatoes and other vegetables that had not been taken from the ground. While the month was cool and precipitation over much of the State above the normal, no severe storm occurred, and stock interests suffered but very little. The storms of the month gave good quantities of snow in the mountains of the State.—*W. S. Palmer.*

SPECIAL ARTICLES.

THE ZIEGLER RELIEF EXPEDITION.

By Dr. O. L. FASSIG. Dated Mount Weather Observatory, Bluemont, Va., October 25, 1905.

I left Baltimore on the morning of May 1, reaching New York about 3 p. m. of the same day. On May 3 I left New York on the White Star liner *Teutonic* in company with Mr. W. S. Champ, representative of the late William Ziegler and leader of the relief expedition. Mr. Champ's destination was a designated island of the group known as Franz Josef Land; my objective point was the northeast coast of Greenland, more particularly Bass Rock and Shannon Island, where stores had been laid down in 1903 for the use of an earlier exploring party in case any of the members should return by this route.

The steam sealer *Magdalena,* chartered by Mr. Champ for the Greenland journey, left Sandefjord, Norway, on June 21, 1905. I was the only representative of the late Mr. Ziegler to accompany the captain and crew of the *Magdalena*, and in fact the only passenger. The instructions were: (1) To proceed to Bass Rock and Shannon Island. (2) To bring back any members of the Ziegler Arctic Expedition of 1903 who might be found there. (3) To inspect the stores and storehouses found there. After leaving Sandefjord, Norway, we proceeded directly to Bass Rock and Shannon Island without making any intermediate ports. We reached the floating ice on July 10, in latitude about 72° north and 5° west of Greenwich. After considerable difficulty we forced our way through the ice and fog to the coast of Greenland, reaching Bass Rock (lat. 74° 46′ N., long. 18° 12′ W.) on the morning of July 21, and Shannon Island (about twenty miles northward) on the afternoon of the same day. After convincing ourselves that no members of the Ziegler party had been on these islands, and finding the stores and storehouses in good condition, we started on our return journey in the evening of the same day (July 21).

Returning by a southeasterly course we passed beyond the influence of the ice in the neighborhood of Jan Mayen Islands, very near the point at which we first met the floating ice. During the entire period, from July 1 to 27, foggy weather prevailed, and on all but two days of this period the fog was dense most of the day. This impeded our progress and added greatly to the difficulties and dangers of our journey, especially during the two weeks or more of our movements in the ice fields.

We reached Miofjord, Iceland, on August 1, where I left the *Magdalena* and took passage in the Danish steamer *Kong Inge* for Leith, Scotland, arriving at the latter port on the 7th of August. On the 10th of August I received a cable from Mr. Champ announcing that he had returned to Norway with practically the entire Ziegler party. On August 12 I left London and Southampton, taking passage on the American liner *Philadelphia* for New York, arriving on the 19th. I left New York on August 21 arriving in Baltimore on the evening of the same day.

A more detailed narrative of my journey is being prepared for publication by Mr. Champ.

STANDING CLOUDS AMONG THE NORTH CAROLINA MOUNTAINS.

By FRANK W. PROCTOR. Dated Fairhaven, Mass., November 8, 1905.

In Science, May 1, 1903, Prof. R. DeC. Ward, speaking of an account of a standing cloud observed in the mountainous region of North Carolina by Professor Davis (Bulletin of the Geographic Society of Philadelphia, Pa., III, No 3, 1903), says: "This is the first mention of the occurrance of helm clouds in this section."

If this means single standing clouds, it is probable that they have not been reported before, because they are seen so often. At Waynesville, N. C., they are of common occurrence. This village is surrounded on three sides by high and steep mountains, and, therefore, the topography is very favorable for the formation of dynamic clouds. The following account of an interesting standing cloud showing two wave crests, observed at Waynesville by the writer, is taken from a memorandum made at the time:

December 17, 1897.—Barometer high, wind southwest. Large, dense, standing cloud over Caney Fork Bald, and the Richland Balsam Range, cumulus form, carried down on lee side a short distance, and evaporating at its leeward edge as fast as it forms to windward. A short distance to leeward, perhaps one-fourth to one-half a mile, approximately at the same level, and separated from the main cloud by an entirely clear space, is a detached, standing, fracto-cumulus of good size, forming to windward and evaporating to leeward like the primary cloud. The sky over the valley is otherwise clear.

This mountain range forms the head of the valley, and runs athwart the direction of the wind that is blowing down the valley. Just across the narrow Balsam Gap, another ridge of mountains runs at right angles, forming one side of the valley. The wind meets this range at a small angle with the axis of the ridge, and the small component of motion up the slope forms a dynamic cloud, which driven by the main component, drifts along the summit of the ridge in a continuous, thin, strato-cumulus sheet, about eight miles long, and finally evaporates and disappears as the ridge descends to the valley. There are no other clouds in sight.

This long cloud sheet is at substantially the same level as the double standing cloud over the Richland Range, and the portion abreast the observer, shows by its motion that the wind at the level of the standing cloud must be blowing twenty miles an hour, probably more, yet that cloud is stationary, and so is the detached, secondary, standing cloud directly to leeward.

It may be added to the foregoing quotation, that on the sides of the mountains facing the valley, what might be called dynamic fog, is frequent. That is to say, after rains, or when there is much dampness, the wind blowing up these mountain sides, forms fog sheets on the windward slopes, when no fog is to be seen in any other direction.

A narrow, deep, and steep ravine between the main ridge last mentioned above, and a lateral spur, frequently has a fog cloud at its head, like that described by Mr. Eddy, in the MONTHLY WEATHER REVIEW, for December, 1904, and which he attributed to mixture. Here it is evidently of dynamic origin.

On two occasions the writer observed cumulus clouds crossing the valley, which were rotating on horizontal axes, similar to those mentioned by Mr. Eddy in the same article. The rotatory motion was supposed to be caused by the curling of the wind over the summit of the mountain ridge whose axis lay at right-angles to the direction of the wind.

SOUNDING AND PILOT BALLOONS OVER THE OCEAN.

By H. S. H., the Prince of Monaco.

[Translated from Comptes Rendus de l'Académie des Sciences, Tome 141, No. 11, September 11, 1905.]

Following the experiments made at Monaco and in the region of the trades for the exploration of the upper atmosphere by means of kites, I undertook, at the suggestion of Professor Hergesell, of Strassburg, to apply to these researches the method of sounding balloons already employed with great success on land. These experiments took place on the Mediterranean in April and on the ocean in July and August, 1905.

The results obtained have confirmed our expectations and the object of the present note is to describe the method employed.

The following is the principle on which rest the launchings of sounding balloons—a principle due to Professor Hergesell:

Two india rubber balloons, unequally inflated, carry the recording instrument and a float; at an elevation fixed, with sufficient approximation in advance, one of the balloons bursts and the entire system falls until the float and the débris of the balloon have reached the surface of the sea. The second balloon carrying the instrument then hangs above the water at an elevation of about 50 meters and serves as a guide to the vessel which has constantly followed the balloon.

In case it is desired to limit the ascension to an elevation absolutely fixed, the balloon is automatically freed by means of disengaging gear operated by an electromagnet, which is actuated by a dry battery, the circuit of which is closed by the pen of the barograph when it indicates the elevation selected.

The use of either of the methods described results in giving, only for the period of the ascension, with the aid of a register, the elevation, temperature, and humidity. But these data do not suffice to give a complete knowledge of the condition of the atmosphere. To complete them it is necessary to study at different periods in the ascent the direction and velocity of the air currents. To this end the vessel follows as exactly as possible the direction taken by the balloons, while two observers on board take at fixed intervals the azimuths and angular elevation of the system. The route and the speed of the vessel being known, a simple geometrical construction enables one to trace the horizontal projection of the trajectory followed by the balloons, a projection which determines for each moment the direction and force of the air currents.

But the application of this method requires that the balloons be constantly visible from the moment of departure until the moment of their fall into the water. In the frequent case where the second balloon becomes invisible after the bursting of the first, and especially in the lower layers of the atmosphere, Ensign Sauerwein has devised a very simple method for finding the point of descent.

The course of the ship being traced in distance and direction, on any scale, upon a chart, the point of descent, if the condition of the atmosphere has not changed, is measurable from the point of departure by reference to the horizontal projection of the point of bursting, calculated according to the vertical speed of the system. It is sufficient, therefore, as soon as the balloon is lost to view, to sail to the point thus determined.

If the investigation is limited to the direction and velocity of the air currents, it is sufficient, according to the method of Professor Hergesell, to launch an india rubber pilot balloon, the trajectory of which is determined, similarly, by sighting, the elevation being deduced from the vertical velocity, which is a function of the ascensional force, following a formula established by preliminary experiment.

By means of this method there have been made on board the yacht *Princesse Alice* 26 ascensions, eight in the Mediterranean and eighteen in the region in and north of the trades. The maximum elevation attained was 14,000 meters above the Atlantic; and several balloons have exceeded 12,000 meters. The results of these ascensions and of the kite ascensions made in 1904–5 will form the subject of a publication by Professor Hergesell.

WEATHER BUREAU CIPHER CODES.

By Prof. E. B. GARRIOTT.

The first cipher code used by our Government weather service for the telegraphic transmission of meteorological observations consisted of lines of figures that indicated the readings of the various instruments, and denoted, by series of numbers, the names of stations of observation, the direction and force of the wind, state of the weather, and the kind and amount of clouds. Twenty figures were employed to send the morning, and ten figures to send each afternoon and night observation, the figures for clouds, relative humidity, and rainfall being omitted in the afternoon and night reports. A calm and an absence of upper or lower clouds was indicated by the word "naught", and the word "blank" was used to indicate that upper or lower clouds were hidden, the words in each case being entered in the places assigned to the figures that ordinarily represented these elements.

In 1871 a cipher code[1] was adopted by means of which a full report was transmitted in ten words. By this system one word was used for the name of the station, and one each to encipher the height of the barometer, air temperature, relative humidity, wind velocity, rainfall, and day of the month and time of the observation, one for the direction of the wind and the state of the weather, and one for the kind, amount, and direction of movement of the upper, and lower, clouds, respectively. The code also contained words for reporting river stages.

During the succeeding seventeen years various changes were made in the code, the most important of which provided for a separate set of barometer words for the three daily reports, the words for the morning, afternoon, and night reports beginning with M, E, and N, respectively. During the entire period, however, the code words were arbitrarily selected and an expeditious deciphering of the data required that a large number of words, and their equivalents, should be memorized.

The code used since 1887 was devised by Gen. A. W. Greely, and by its use an average of six words is required to transmit a report of a meteorological observation. The code is known as a "key" code, and has for a base the consonants b, d, f, g, m, n, r, s, t, representing 10, 20, 30, 40, 50, 60, 70, 80, and 90, respectively, and the vowels a, e, i, o, and u or y, representing 2, 4, 6, 8, and 0, respectively. The consonants b to s are also used to indicate the eight directions of the wind beginning with b for north, d for northeast, etc., and the vowels also indicate the condition of the weather, a indicating fair, e cloudy, i rain, o snow, and u or y clear. Each syllable of the words of this code represents by the first consonant and the following vowel one or more meteorological elements. The meaning of a word depends upon its place in the message. Thus the first code word after the name of the station gives the pressure and temperature. The word "seldom", for instance, when written as the first code word of a message, indicates the height of the barometer and the temperature of the air; the first consonant with the first vowel, s and e, represent 84 for the barometer; the second consonant with the vowel following in the second syllable, d and o, represent 28, for the temperature. The height of the barometer, to the nearest whole inch, is, as a rule, apparent from the readings on the last map or at surrounding stations of observation. In another position in the message the first syllable of the word would indicate the direction of the wind and the state of the weather, e. g., s indicating northwest, and e cloudy, and the second syllable would indicate the reading of the maximum thermometer, 28, as shown by the letters d and o.

Adaptations of this code have been employed in transmitting reports of the Weather Bureau River and Flood Service, in telegraphing weather reports for the Climate and Crop Service, and in cabling reports from the West Indies, Europe, and some islands of the Atlantic. The latest adaptation provides for a transmission to Washington of reports received by wireless telegraph from vessels at sea, and furnishes in four or five words the position, in degrees of latitude and longitude, of a

[1] Modelled after the cipher code printed in 1869 for use by the Cincinnati observatory.—ED.