different at the close of its visibility from that seen at 5:45 is known without any doubt. On first noticing this phenomenon the impression was of a chain of stars, each separated from the next by a short space and all mingling their light into a line of white light of the shape before mentioned, but as a few minutes elapsed this appearance was not so noticeable. From a nearly upright position when first seen it had assumed one at an angle of about 45°, with the upper extremity to the left. There was no head, such as is usually seen in a comet, and one portion seemed as bright as another. Only flecks of cloud were in the sky at that time so that no obstruction interfered at any time. The width of the line of light was about that of a bright star, but in brilliancy it outshone any star in that portion of the sky. Inquiry does not as yet add the testimony of others who might have seen the phenomenon had they been out away from trees and buildings, and while it did not resemble any comet that the observer has ever seen, it has seemed impossible to ascribe any other explanation. Since destructive volcanic disturbances have been reported from Japan near the time this phenomenon was seen, it has been thought best to make a special report aside from that which will be given in the monthly Meteorological Notes.—[Sgd.] H. A. FRISE, Observer.

ANNUAL MEETING ROYAL METEOROLOGICAL SOCIETY.[1]

Mr. C. J. P. Cave, president, in the chair.

* * * The president presented to Mr. W. H. Dines the Symons gold medal for 1914, which the council had awarded him in recognition of his distinguished work in connection with meteorological science.

Mr. Cave, in his presidential address, dealt with the subject of upper-air research. He pointed out that research in the upper air may be [prosecuted] by means of a manned balloon with observer and instrument, or by self-registering instruments sent up in kite, captive balloon, or free balloon. Kites were first used for this purpose by Dr. Wilson of Glasgow, 1749; and also in Arctic expeditions in 1821 and 1836. The box kite and the use of steel piano wire instead of line enabled greater heights to be obtained, and both were adopted by the Blue Hill Observatory in 1895. [See the following historical note.—Ed.]

The use of kites was not taken up in England till 1902, when Mr. Dines flew them from a steamer. After referring to the use of balloons and the ascents made by Glaisher and others, the president said that danger to life in high ascents caused MM. Hermite and Besançon to use a registering balloon in 1893; a free balloon carried a recording instrument, the recovery of the instrument being dependent on the balloon being found after its descent; a height of 9 miles was reached in France, and 13 miles in Germany soon after. He next referred to various types of instruments used in this way, and described Mr. Dines's meteorograph, which is an extremely simple and light instrument. Rubber balloons are generally used, and as they ascend they tell us of the winds above the surface, a special theodolite being used for observing the balloons. The International Commission for Scientific Aeronautics directs the studies for upper-air research, and special days are arranged for international ascents of balloons and kites, stations in various parts of the world taking part in the work. The first great result of these researches has been the discovery that the atmosphere is divided into the troposphere, where the air is in constant movement, horizontal and vertical, and the stratosphere, where turbulent motion seems to cease. The stratosphere begins at about 7.5 miles in these latitudes. The method of investigation is new, but many other results are beginning to come to light, and it seems as though changes of weather do not begin at the surface of the earth, but are dependent upon movements taking place about 7.5 miles up.

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EVOLUTION OF THE METEOROLOGICAL KITE.

Very few appreciate the precise sequence of items in the evolution of a great invention.

In 1890 (see Proceedings International Conference Aerial Navigation held at Chicago, Aug. 1–4, 1893, p. 315) William A. Eddy, of Bayonne, N. J., began his enthusiastic experiments "to evolve the best form of kites to be used in raising self-recording meteorological instruments to a great height," and fully demonstrated the unrealized possibilities of the kite. In August, 1892, his Malay kite penetrated a shower cloud. In July, 1894 (see American Meteorological Journal, vol. 11, p. 298), at the Editor's earnest suggestion he temporarily transferred his experimental kites to the Blue Hill Observatory, established and maintained by the enthusiastic meteorologist, A. Lawrence Rotch.

On July 13, 1893, Prof. M. W. Harrington wrote the article on pages 203–206 of the American Meteorological Journal, volume 10, expressing his belief that any hope of marked improvement must lie in scientific investigation of the upper atmosphere, which he calls "the free air," by means of kites and balloons. A few weeks later, namely, at Chicago on August 1, he communicated to the International Conference on Aerial Navigation (see p. 349 of the proceedings) his paper on systematic explorations of the upper air, following which (see p. 354, op. cit.) the conference unanimously voted "that Congress should in our judgment make necessary appropriation to have the experiments made as recommended by Prof. Harrington." (See also Monthly Weather Review, Washington, July, 1897, p. 313.) At this same conference Mr. Lawrence Hargrave, of Melbourne, gave an account of his box kites and Mr. William A. Eddy of his Malay kite. (Aeronautics, vol. 1, p. 82, and Monthly Weather Review, 1897, p. 311.) The stimulus thus given at this conference, whose origin was due to Mr. Octave Chanute and Prof. A. F. Zahm, marks the beginning of the official kite work in the Weather Bureau, although it is quite true that its importance had been urged and many experiments had been privately and personally carried out during previous years by numerous officials, e. g., Abbe (1871), Hazen (1890), McAdie (1884), Marvin (1891), Potter (1890), Sherman (1879), Waldo (1882). The abrupt and lamentable dismissal of Prof. Harrington, July 1, 1895, interrupted his plans of cooperation in this work and led to the following order of November 18, 1895, by which Prof. Moore placed all further investigations relative to kite, aeroplane and balloons in the hands of Prof. C. F. Marvin:

WASHINGTON, D. C., *November 18, 1895.*

Prof. MARVIN:

You are hereby directed to investigate the problem of constructing appliances for carrying meteorological instruments into the upper air. Authority will be given you for any reasonable expense necessary for construction of appliances used in experiments. It is hoped that you will give early and thorough attention to this matter. You may consult with Prof. Hazen, if you wish, but I am inclined to think that independent action will be better.

You will also please give your attention to the construction of necessary instruments, but this part of the work is not so important as the making of the aeroplane, or balloon.

Very respectfully,

WILLIS L. MOORE, *Chief of Bureau.*

The account of the work done at Blue Hill, published by A. L. Rotch, January 13, 1897, in the Proceedings American Academy of Arts and Sciences, volume 32, pages 245–251, gives interesting historical items generally gathered from the pages of the Monthly Weather Review. The enthusiasm and energy shown by Eddy, at Bayonne, and Rotch, Clayton, and Ferguson, at Blue Hill, is to be compared only with the steady progress made at Washington in the theory, improvement, and construction of every detail in kite work considered as a problem in economic engineering. While recognizing the innumerable experiments and suggestions that are on record since the first work by Alexander Wilson, in 1749, at Glasgow,

[1] From The Athenæum, London, Jan. 24, 1914, p. 139.

yet we must recognize that the present kites and accessories ordinarily employed in the work are essentially the same as the perfected forms developed by Prof. C. F. Marvin when he was in charge of the investigations from 1895 to 1898.—[C. A.]

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RESULTS OF THE KOCH EXPEDITION ACROSS GREENLAND, 1912–13.

The scientific results of the Koch expedition across Greenland in 1912–13 are presented in abstract by Dr. Alfred Wegener in the Zeitschrift der Gesellschaft für Erdkunde zu Berlin, 1914, No. 1. Among the many subjects investigated on that trip the following will be of interest to our readers.

Temperature measurements of the Ice Cap, made at different depths in borings into the ice, showed that at a depth sufficient to get below the level of annual variations the temperature is about −15° C., departing but very little from the average annual air temperature of the locality. At increasing depths below this level there is a slight but distinctly measurable rise in temperature at the rate of 1° C. per 20 meters. The deepest boring attained a depth of 24 meters below the general surface of the ice. The temperature measurements in general indicate an average air temperature of −32° C. for the central portion of Greenland.

Studies in the granular structure of the snow and of the ice enabled the travelers to determine quite accurately the relative snowfall on either coast and in the interior. At an altitude of 2,000 meters, along either coast, there is no longer any evidence of summer melting of the snow and here the winter snow may be differentiated from the summer fall by the finer-grained structure of the former. The depth of the winter[?] fall decreases from about one-half meter on the east coast to about 30 centimeters in the interior, and then increases westward to its maximum of about 1 meter near the west coast.

A visit to the Jakobshavn glacier in west Greenland showed that this ice stream has receded several kilometers from where its retreating front stood at the time of the last visit.

A meteorological station was established at Borg (22° 12′ W. long., 76° 40′ N. lat.) on the Storstrommen, a great glacial tongue reaching down to the Stors-fjord from the inland ice of Queen-Louise Land. The observations here will prove of particular interest, when published, since they are the first series from a station located on the inland ice proper, and thus will furnish interesting comparisons with the stations Danmarkshavn and Pustervig of the Danmark-Expedition of 1906–8. In passing it is of interest to note that Borg has a mean temperature 5° C. lower than that of Danmarkshavn on the coast, and the precipitation is considerably less.

Special microphotographic investigations were carried out in the forms and structure of the various ice crystals met with at Borg; and the aurora was successfully photographed many times. Observations on the three twilight arches resulted in determinations of the altitude of the so-called geocoronium sphere, the most distant observable evidences of our atmosphere, at 600 kilometers. With these observations on the twilight arches go necessarily efforts to identify the zodiacal light, and Wegener succeeded in doing so even at this very high latitude. This is probably the first set of observations of the zodiacal light from a point so near the earth's poles.

Not least interesting among the results of this expedition are the observations on polarization of blue sky light, and the discovery that even as late as the spring of 1913 the Babinet and Arago neutral points still showed in those latitudes an observable though weak influence of the optic-atmospheric disturbance of 1912. Wegener even succeeded in securing for the first time photographic records of the interference bands, or "Polarisationsstreifen" appearing in the field of his Savart-Jensen polariscope.

Undoubtedly the publication in full of these Greenland observations (perhaps in "Meddelelser om Grönland") will give most interesting details to both meteorologists and geographers.—[C. A. JR.]

OBSERVATIONS OF EARTHQUAKES.

The Secretary of Agriculture has received from the Secretary of State an interesting report on the earthquake of January 15, 1914, at Leghorn, Italy. Unfortunately, a recent decision of the comptroller forbade the Weather Bureau to utilize its important apparatus for the observation and record of earthquakes, until the Weather Bureau is specifically authorized by Congress to engage in seismological work. The Editor believes there is no other institution in the country so well qualified as the Weather Bureau to carry on this important work.—[C. A.]