obtained with one organism may not be transferable to another, in contrast to results gained with such drastic agencies as X-rays and, presumably, mustard gas. Nevertheless, it is tempting to consider the possibility that one of the means by which evolution adapts mutability to environmental requirements is the achievement of a balance between the production of mutagens and sensitivity to them.

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Obituary

Henry Helm Clayton
1861–1946

With the passing of Henry Helm Clayton, on October 26, 1946, there ended a life of exceptional activity and eminence in meteorology, public service, and business.

Clayton was born on March 12, 1861, at Murfreesboro, Tennessee. Because of delicate health, early education was acquired in private schools and by study at home. It was during this period that his interest in meteorology developed.

Studies of local storms, beginning in 1878, were followed in 1882 by his first activity, aid in the organization of the newly formed Tennessee Weather Service, including analyses of reports and a gift of 30 rain gauges. In 1884–85 he was assistant at the Observatory of the University of Michigan and associate editor of the *American Meteorological Journal.* In February 1886, after three months at Harvard College Observatory, he joined the staff of Blue Hill Meteorological Observatory, founded by Abbott Lawrence Rotch in the preceding year, where he remained as assistant and meteorologist until 1909. During this period many important advances were initiated by him with the enthusiastic approval of Director Rotch. At first there was no assistant, and at various times, at his own expense, Clayton employed others to share his rapidly expanding program of research.

Clayton's studies of clouds, begun in 1886, yielded the first definite information concerning the circulation of the atmosphere over America and established the Clayton-Egnell law of the increase of velocity with height. The detailed observations during the period 1886–90 are the only hourly data of changes in form, height, and movement of clouds in the Western Hemisphere, and, with Clayton's discussion, undoubtedly stimulated the organization of the International Cloud Committee and the international series of measurements of heights and velocities of 1896. The colored pictures for the *Atlas of clouds,* issued in 1897 by the U. S. Hydrographic Office, were painted under Clayton's supervision. He was also consultant in the preparation of the first *International atlas* (1905).

Clayton's invitation to William A. Eddy to try his meteorological kites at Blue Hill led to the first use of kites to lift recording instruments, August 4, 1894, and to the adoption throughout the world of this method of sounding the atmosphere. Important results of Clayton's analyses of the accurate data obtained included the discovery of persistent, sharply defined stratifications in the lower atmosphere, and previously unsuspected, variable effects of mountains upon the surrounding atmosphere. Interest in this new method of research, later to be named "aerology," is indicated by his generosity in allowing free use in aerology, without royalty, of the form of Hargrave kite patented by him, which came into use at all aeronautical laboratories. Always envisaging improved techniques and advances in aerology, he encouraged Blue Hill to develop the first radio sonde, in 1935.

He described the solar eclipse as "a kind of laboratory experiment in which are eliminated practically all influences upon the atmosphere except that of a fall of temperature," and original studies led to his suggestion of the eclipse cyclone caused by the cooling of the air by the shadow.

Clayton's great interest in forecasting was first indicated by his paper, "A lately-discovered meteorological cycle," published in the *American Meteorological Journal* in August 1884. Later, at Blue Hill, his proof that forecasts made locally are better than those issued at a

distant central office caused the authorization of local forecasting at principal stations of the government weather service. An important public service at this time was his strongly supported effort toward removal of the national weather service to a civilian department, followed by action by Congress in 1891. He was local forecast official in the new Bureau, 1891–93, and in the *Blue Hill Weather Bulletin* of 1896–97, he published weekly forecasts based upon cycles. In 1910 he was invited to Argentina, where he was chief of the Forecast Service for nine years. There he inaugurated forecasting based upon variations in solar energy. On his return to the United States, Clayton continued this work in cooperation with the Smithsonian Institution and, starting a private weather service, forecasted and acted as consultant for business organizations while prosecuting his researches. At the beginning of World War II, the Government suspended private forecasting, but, during 1943–44, at the request of the Weather Bureau, he continued research on an extended scale to determine the relations between short-period changes of solar energy and variations of weather. This work, done through Harvard University, was aided by a statistical group maintained by the Weather Bureau.

Clayton's many studies of solar relations in cooperation with the Smithsonian Institution led to *World weather records*, a notable contribution to meteorology and climatology published by the Institution and highly praised by the International Meteorological Organization; the third volume is now in press. His researches were summarized in *World weather* (Macmillan, 1923) and in *Solar relations to weather* (Clayton Weather Service, 1943). A monograph amplifying earlier studies of the possible effects of the planets on solar variations, and of cycles, especially in their biological relationships, was completed only a month before his death.

In 1905 he headed the deBort-Rotch expedition for exploring the atmosphere over the Atlantic Ocean with kites and balloons. With Director Rotch, he represented Blue Hill at the International Meteorological Conference at Munich in 1891, and was delegate from Argentina to the first Pan-American Scientific Congress at Washington in 1915 and the Sixth International Meteorological Conference at Utrecht in 1923. In 1943 he was awarded a gold medal by the Foundation for the Study of Cycles. He was a charter member of the American Meteorological Society.

Clayton possessed the unusual combination of a vivid imagination, an ability to visualize atmospheric phenomena in their three dimensions, exceptional industry, steadfastness of purpose, and a keen sense of values. Throughout his life he was a pioneer, with all the courage and energy necessary to open new paths in spite of difficulties and hard knocks. Yet he was unassuming, warm and gracious in his manner, and always ready to concede values in points of view differing from his own.

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