

As the investigation progressed, greater heights were required than could be attained by kites, and Dines used sounding balloons. His balloon meteorograph with its metal case weighed only two ounces, and cost only about one-twentieth of the price of instruments used on the Continent and in the United States. Being so light it allowed much smaller balloons to be used. The whole cost and difficulty of sounding balloons were so much reduced that the Department of Physics at the University of Manchester was able on two occasions to send up a balloon every hour for twenty-four hours. He designed also a very ingenious apparatus for calibrating the meteorographs. Accounts of these and many other instruments, and many papers on meteorology, especially on wind pressure, upper air research, and, later, on radiation, are to be found in the publications of the Royal Society, the Royal Meteorological Society, the Meteorological Office, and elsewhere.

Dines had a wonderful insight as to what was necessary in an instrument. He could design it, make it himself in many cases, use it to the best advantage, and afterwards discuss the results obtained. It was the possession of these qualities, seldom all united in one person, that marks the genius that he applied to meteorology. It was as an amateur that he worked. Most sciences have been started by amateurs, but by degrees they have grown out of the stage when an amateur can usefully apply himself to their problems. Meteorology has possibly reached this stage. Dines was the last and the greatest of the amateurs who built up the science, and he has left it in a very different condition from that in which he found it. Now it is recognised as a real science worthy of study by mathematicians and physicists of the first rank. He had a great share in bringing it to this stage.

Most of the sounding balloon work was done by Dines at Benson, near Wallingford, where he went from Pyrton Hill. It was chosen as being in a part of England most favourable for balloon ascents. Dines himself hoped that Benson would become ultimately a permanent aerological observatory, and indeed at one time this was to have been its destiny. Fate, however, intervened, and to the regret of many the dream will not come true.

Dines joined the Royal Meteorological Society in 1881; he was for a number of years a member of council; he was president in 1901 and 1902; and in 1914 he received the Symons Gold Medal of the Society. In 1905 he was elected a fellow of the Royal Society. From 1905 until 1922 he was Director of Experiments on the Upper Air for the Meteorological Office, and a small annual grant was made for the maintenance of the establishment, first at Pyrton Hill, afterwards at Benson; but Dines received no personal emolument; so far as his own services went, his position was an honorary one. Perhaps because he was never in the employment of any Government office, or the holder of any public post, perhaps because he was of a very modest and retiring nature, and would never have dreamt of pushing himself into public

notice, he received no public honour of any kind. Probably in no country but Great Britain would such eminence in a science which has become of such great practical importance have passed unrecognised.

Dines was a real student, wrapped up in his work, and in the subject he had made his own. He was singularly retiring, and had the constitutional shyness which not seldom goes with genius. But those who penetrated his reserve found that he could have, and maintain, strong opinions, and that he had a quiet but very real sense of humour. He was ever ready to help others who were working on the same lines as his own, and took infinite pains in this way, as the writer can testify from the experience of many years. He is survived by a widow, and by two sons who carry on the family tradition of meteorology into the third generation, for they both have posts in the Meteorological Office.

The early years of the century will stand out by reason of great advances made in many sciences, especially in physics and astronomy. Meteorology advanced rapidly at the same time, and in Great Britain it was Dines who led the way. Physics and astronomy are still in the period of rapid advance. Meteorology shows signs of decreasing acceleration. Can we look forward to a further advance, which only research can ensure? Given the will, it is possible; but we shall not so easily find again the genius of a Dines. C. J. P. CAVE.

DR. HERMANN KAST, well known for his work on explosives, died on Sept. 6, 1927, aged fifty-eight years. After a period of study in A. W. Hofmann's laboratory in Berlin, Kast graduated in 1893. For many years he was a member of the council and deputy-president of the Berlin Bezirksverein deutscher Chemiker. In addition to numerous original scientific publications, Kast published two comprehensive works dealing with explosive materials.

WE regret to announce the following deaths:

General Henry L. Abbot, the distinguished U.S. Army engineer, who was elected a member of the National Academy of Sciences in 1872, on Oct. 2, aged ninety-five years.

Mr. Leon Gaster, honorary secretary of the Illuminating Engineers' Society, on Jan. 7, aged fifty-five years.

Prof. H. W. Mackintosh, formerly professor of zoology and comparative zoology in the University of Dublin, a post which he held for nearly fifty years, on Jan. 8.

Dr. Frederick C. Newcombe, emeritus professor of botany in the University of Michigan, and secretary in 1897 of Section G of the American Association for the Advancement of Science, who worked particularly on the sensitive reactions of plants, on Oct. 1, aged sixty-nine years.

Dr. Geo. A. Osborne, emeritus professor of mathematics at the Massachusetts Institute of Technology, on Nov. 20, aged eighty-eight years.

Prof. F. W. Very, director of the Westwood Astrophysical Observatory at Westwood, Mass., since 1906, on Nov. 23, aged seventy-five years.