be enclosed. The deep purple of the sky noticed by both the Belgian and the Russian observers must always be seen through glass.

Of all the observations likely to be made, the greatest promise comes from the projected Wilson chamber experiments by Dr. Cosyns that were mentioned in NATURE of November 25, p. 812. The need for a further examination of cosmic rays is urgent, for their origin remains unknown. The interesting effect accentuated in the Belgian flights was the difference in the behaviour of the ionisation chamber and the Geiger counter as standardised on the ground with γ-rays from radium and used in the upper atmosphere. The relative indications of the counter increase at a greater rate than those of the ionisation chamber, and in the highest altitudes reached, the activity of one has become thrice that of the other. The greater attenuation of the ions along the track of the cosmic ray than along that of the standardising β-ray accounts for the comparative falling off of the indications of the ionisation chamber, whilst the counter goes on no matter how small the disturbance. This result, however, is deceptive, for as the ground experiments of Blackett and Occhialini have abundantly shown, only a very inadequate part of the life-history of a cosmic ray may be obtained from the study of a localised portion of the track of one of the secondary particles. The intrinsic ionisation per centimetre along the track with its secondaries and tertiaries may be just as high as along that of a β-ray. It is well known that, of all the instruments, the Wilson chamber set for photographing β-rays and cosmic rays is most delicately poised. Small variations in temperature conditions and expansion ratio with water or alcohol vapour as indicator upset the observations. Such an instrument, if it is ever constructed for the purpose, must be used in a closed gondola, on account of its heavy coils for obtaining the requisite magnetic field and extra large chamber for taking in as much as possible of these simultaneous happenings, the non-ionising links, the tracks radiating forwards from diffuse centres consisting of neutral particles and positive and negative electrons and the localised heavy bursts of ionisation supposed to be associated with the complete destruction of a chance heavy molecule.

Apart from the investigations in pure science for which such heroic efforts have recently been made and are likely to be made in the future, the reported change in tactics has reopened the question of the feasibility of employing such a flying suit in an open aeroplane flying the stratosphere. It is claimed that the control will be easier than from a completely sealed cockpit.

Obituary

MR. H. R. A. MALLOCK, F.R.S.

WHEN Mr. Henry Reginald Arnulph Mallock died on June 26, 1933, we endeavoured to find particulars of his career upon which a suitable obituary notice could be based, but were unsuccessful. He was an esteemed contributor to our correspondence columns, yet, on account of his dislike for publicity, few personal details were known concerning him, and no one felt able, therefore, to deal adequately with his life and work. Dr. C. V. Boys has, however, since contributed to the *Proceedings of the Royal Society* an appreciative account of Mallock's upbringing and some of the products of his fertile brain and mechanical ingenuity. We give below an abridgement of this obituary notice and are glad thus to be able to place on record a tribute to a great physicist and engineer.

Arnulph Mallock, the youngest son of the Rev. William Mallock, was born at Cheriton Bishop, on March 12, 1851. After leaving school he entered St. Edmund's Hall, Oxford, and when he left Oxford he assisted his uncle, Mr. W. Froude, of Chelston Cross, Torquay, in working out the very beautiful gear of the original ship model tank. In 1876 Mallock went as assistant to the late Lord Rayleigh. He had some doubt whether his mechanical skill would be sufficient to enable him to meet Lord Rayleigh's requirements. It would seem that his misgivings were unnecessary for two reasons. He was in fact an accomplished mechanic, capable of the finest instrument construction if he had suitable tools, and Lord Rayleigh was such a genius in devising means almost absurdly simple for conducting experiments of the most crucial character. The time spent under that benign influence must perhaps have been the most precious of all in encouraging Mallock, if indeed he needed encouragement, in confidence in first principles where difficult problems were to be met.

Mallock was fortunate in having lived among a group of brilliant men in the engineering world —Brunel, Froude, Tower, of spherical engine fame, Baker, Metford and others—and with his very great mechanical skill and considerable mathematical ability and ingenuity, was ready to attack and solve problems as they arose.

Perhaps the class of experiment for which Mallock showed especial genius was any in which the smallest movements, tremors, bendings or stretchings had to be determined. He designed and either made himself or designed and superintended the construction, by the firms of Troughton and Sims or Adie in particular, of the beautiful instruments with which he examined tremors due to the underground railway, disturbances of St. Paul's Cathedral, problems connected with the Forth and Tower Bridges and many more. As a civilian member of the Ordnance Committee he wrestled with many of the problems of ballistics.

Mallock was also interested in many problems in optics, and in particular he was skilled in dissection under the microscope and wrote many