The coefficients given by the first approximation, with their standard errors, were $a_{22}=4.8\pm1.3$; $a_{31}=6.2\pm2.3$; $a_{32}=2.0\pm0.6$, none of the others being as great as their standard errors. For a second solution he included a_{00} and also a_{20} (the main ellipticity term) and solved for the five coefficients by least squares. The result was: $a_{22}=4.0\pm1.4$; $a_{32}=1.3\pm0.7$; $a_{31}=4.2\pm2.4$; $a_{00}=2.5\pm1.9$; $a_{20}=-6.1\pm5.0$; and the coefficient b_{33} then had the value of 0.46 ± 0.26 . The coefficient a_{22} indicates that the 'ellipticity of the equator' is genuine, but that the uncertainty is greater than that given by Heiskanen.

Compensated inequalities that would account for the harmonics a_{22} , a_{32} , a_{31} and b_{33} would be of amplitudes 5.2, 1.9, 1.9, 2.2 km. respectively. Now Prey computed in 1922 coefficients which give the representation of the earth's figure by spherical harmonics up to degree 16, and from his results it follows that there is practically no relation between mean height and gravity anomaly for inequalities with horizontal ranges of about 30° . Thus, the hypothesis of complete compensation must be abandoned. To explain the distribution of gravity an internal interface seems to be required, the height of which has a negative correlation with that of the outer surface. We have, in fact, strong evidence that isostasy is not exact, and are led to something of the type of Glennie's 'crustal warping'. The value of the reciprocal of the ellipticity of the earth derived from this investigation is 296.17, with a standard error of 0.68.

R. STONELEY.

OBITUARIES

Prof. F. E. Suess

NEWS has been received recently that Prof. Franz Eduard Suess, emeritus professor of geology in the University of Vienna, the son of Eduard Suess, died in Austria about a year ago, aged seventy-four. After many years on the Austrian Geological Survey, he occupied several academic posts before his appointment to the chair in Vienna in 1911. As an enthusiastic pupil of Becke, he was one of the first to make use of the petrology of metamorphism to interpret the history of rocks, a method he applied in grappling with problems of the crystalline massif of Moldanubia and studies of the deeper parts of mountain ranges where intrusions play an important part. Later, he integrated his opinions by enunciating a theory of mountain building through loading caused by the carriage of a moving 'creative mass' over a passive foreland. The ranges as they exist to-day result from the erosion of this structure. Fragments of the load left by chance can be distinguished from the loaded under-ground by the different grade of metamorphism they display, and a passage can be traced from the loaded to the unloaded part of the old foreland. It follows that the occurrence of a mass of crystalline schists in a mountain system is no evidence that they are older than fossiliferous sediments not far away in the unloaded region. Indeed, the sedimentary rocks in the 'creative mass' may be as old as the schists and gneisses formed below them. He regarded the Caledonian and Variscan ranges of Europe, Asia and America as types of this orogenesis.

Suess was less prolific than his father, but he displayed an enviable erudition in contributions to a host of geological subjects. His lectures in Vienna were popular, partly on account of his masterly use of the

German language, and partly because they covered the geological globe in a well-balanced conspectus supported by a background of documented facts. He was particularly attracted to Britain, where his father was born, and visited the Highlands more than once to compare their architecture with that of the Caledonian masses he knew so thoroughly near the Danube. He contributed papers in English on the thorny problems of the structures of the Scottish Highlands, and they provide a welcome variety in a rather mystic literature.

Though somewhat crippled in later years, Suess was surprisingly active, and in pursuit of his science he would walk long days amidst the woods of the Wiener Wald or on his own particular ground not far from the Danube, over the Scottish moors in their less pleasant moods, or brave the winter frosts of the Bushveldt and sleep with only a cloak between him and the stars at an age when such expeditions would dismay most men.

Suess was an LL.D. of the University of Glasgow and had a large circle of friends in Great Britain. He had a discriminating taste in art and music, in both of which he was no mean performer. The former rendered his field notebooks models of their kind as his skilful, truthful pen recorded pictorial evidence unbiased by theoretical distortion and furnished illustrations of field facts in a way that few can hope to do even with the aid of a camera. In the latter, his piano was near his study and upon it he would discourse in a most versatile fashion. Like many an Austrian he loved Mozart and Schubert, Beethoven and Wagner, but besides he was tremendously attracted by the unexpected harmonies of Richard Strauss. He had an unusual knowledge and appreciation of the whimsicalities of Gilbert and Sullivan. He attracted around him a large circle of students and friends who used to meet once a week in one of the parks near the Danube during each summer. To those who knew him he was ever genial and as a man hospitable to a fault.

J. V. HARRISON.

Mr. E. A. Nahum

MR. E. A. Nahum, a research worker in the Cavendish Laboratory, was killed in Cambridge during a recent air raid.

Nahum, who belonged to a Manchester family, was educated at Clifton College and at Pembroke College, Cambridge, to which he went with an Open Exhibition in 1936. He read for the Natural Sciences Tripos and obtained a first class in Part I and in Part II (Physics). He returned to Cambridge with a Goldsmith senior studentship in 1940 and began work on the cyclotron. The Cambridge cyclotron had not long been installed, and as most of the senior nuclear physicists were away, it says much for the young research workers that they not only kept it in running order but also obtained material for four very comprehensive papers on the deuteron bombardment of the heavy elements. In the last two of these, with R. S. Krishnan, which appeared in a very recent number of the *Proceedings of the Royal Society*, the first quantitative measurements were made of the reaction yields, which made possible detailed comparison of experiment with results predicted by the present theory of the interactions of deuterons with heavy nuclei.

Nahum was known to many as a young scientific worker of great promise, but students throughout

the world will remember him as a leader of the anti-Fascist movement in the universities. His student life in Cambridge coincided with the struggle of the Spanish people against Fascism and he was the principal leader in building up the student anti-Fascist movement in Great Britain. After David Guest and John Cornford were killed fighting for the Spanish Republic, Nahum took the place of the latter as leader of the Communist Party in the University.

During this period he spent vacations in Paris working as a leading member of the committee of the World Student Association and became known to thousands of foreign students. In his third year, as president of the Cambridge University Socialist Club, he led the struggle among students against non-intervention in Spain, Japanese aggression and

the Munich policy of appeasement. In the same year he obtained his first class in Part II Physics.

In subsequent years he continued his work among students both in the National Union of Students, as chairman of the Science Faculty, and as chairman of the University Labour Federation.

In his short life he never failed to put into action his belief that the universities must not isolate themselves from the life of the community and that university people have a vital interest in the progressive movement. At meetings called by the University Labour Federation in different parts of the country, students are pledging themselves to work, train and fight against Fascism as never before as the greatest tribute they can pay to the memory of Ram Nahum.

J. D. BERNAL.

NEWS and VIEWS

Centenary of Sir James Dewar

ON September 20 occurs the centenary of Sir James Dewar, one of Great Britain's greatest experimentalists, occupying as he did for forty-six years the chair of chemistry at the Royal Institution and for thirty-six years guiding its destinies both by his position and his discoveries. Dewar added greatly to the lustre of the Institution, and by his many investigations, especially those on the liquefaction of gases and the attainment of high vacua, gained for himself a place among the leading chemists and physicists of his time. Born at Kincardine-on-Forth, he studied under Playfair at Edinburgh and Kekulé at Ghent, and at the age of thirty-three was made Jacksonian professor of experimental philosophy at Cambridge. Two years later he was chosen to succeed Gladstone as Fullerian professor of chemistry at the Royal Institution and after another ten years was made superintendent. The year he went to Albemarle Street had seen the experiments of Cailletet in France and of Pictet in Geneva on the liquefaction of the so-called permanent gases.

Following in the footsteps of his great predecessor, Faraday, Dewar in the early eighties began his own researches on gases which were to lead to many striking results. He first publicly exhibited liquid air, he obtained liquid oxygen and then liquid hydrogen in considerable quantities; in 1892 he invented and freely gave to science and the world the Dewar vacuum flask and in the early part of the present century discovered, as H. E. Armstrong said, "the marvellous power of charcoal to absorb gases at low temperatures" which "will render the period of 1900 to 1907 ever memorable". But Dewar's studies on gases, low temperatures and high vacua are but a part of his researches, which ranged from water to explosives, from atomic weights to spectroscopy, from the properties of soap bubbles to the temperature of the sun. He was elected a fellow of the Royal Society when he came to London in 1877, and lived to receive honours from scientific bodies at home and abroad. In 1904 he was knighted by King Edward. Above all else the welfare of the Royal Institution was his great ambition and anxiety, and after his death which took place on March 27, 1923, a bronze plaque portrait of him was placed on the staircase of the Institution he had served so long and so well.

Sir James Ivory, F.R.S. (1765-1842)

JAMES IVORY, the Scottish mathematician who died at Hampstead a hundred years ago on September 21, had the distinction of being among the first to introduce into Great Britain those methods of mathematical analysis which, from the time of Leibniz and the Bernouillis, had been gradually developed on the Continent. The only mathematical appointment he held was that of professor of mathematics at the Royal Military College then housed at Marlow, in Buckinghamshire. This post he held from his thirty-ninth to his fifty-fourth year. The son of a Dundee watchmaker, he was born in 1765, studied for six years at St. Andrews and Edinburgh and was then, in 1786, appointed a teacher in a school at Dundee. In 1789 he abandoned teaching to become partner in a flax mill, and it was on the dissolution of the partnership in 1804 that he came to Marlow. He gained a wide reputation for his mathematical and astronomical papers in the *Philosophical Transactions of the Royal Society*. He received several medals, including the Copley Medal of the Royal Society, and with several other men of science was knighted in 1831. He was a corresponding member of the Paris Academy of Science.

Soviet Scientific Films

A NUMBER of Soviet scientific films were presented at the Imperial Institute Cinema on September 12 by the Society for Cultural Relations with the U.S.S.R. in conjunction with the Association of Scientific Workers. The films, which covered a wide range of subjects, were of absorbing interest and high technical quality. They included novelties in Soviet scientific and technical practice besides the popularization of well-known facts for children and adult lay audiences. The former featured some excellent photographs of the Black Sea Express, a two-keeled motor sea-glider for passengers, with a speed of fifty miles an hour, Prof. P. Kapitza's miniature turbine for producing cheaply liquid oxygen, and a clever device for protecting workers at the forge from heat with a screen of running water which absorbs the infra-red radiation. An artificial fledgling, made by children, which automatically opens its beak and projects the food inserted by the unwitting mother bird into a bottle of formalin, enabling a