

available for spending week by week, whether for war or for peace, in the leading countries of the world. The bare summary of what the International Education Board was able to achieve is fine testimony to the vision and understanding of those who were responsible for devising its policy and carrying it out. With them men counted for more than things, but they realized that even pre-eminent men cannot work without things, of which they deserve the best that are obtainable.

Now, some of the work of the Board is already in ruins. Buildings have been demolished, men of science driven from their homes, prohibited from pursuing their investigations, and some even put to death. In ever-widening circles across the world, all that the International Education Board stood for is in a state of dissolution and suspense, borne down by the forces of nationalism and ignorance which it strove to eliminate. As men of science we may reflect that even that is a natural phenomenon. Reaction and war have come upon us because we have not yet learned to understand

and control those mass movements of mankind which are called national policies.

In drawing up his plans Dr. Rose paid next to no attention to the social sciences. That in its way was characteristic of the period and country in which he lived and worked. His feeling was that in these sciences no clear principles are to be found. The principles may still be wanting. Their lack is the measure of how much is waiting to be done; for it is useless to go on piling up technical information if knowledge of man himself lags so far behind. We may question the economics which rendered so much scientific progress dependent on the fortune of one man, while realizing that without his aid technical science would have made less rapid strides. When the clouds of war lift again, let us hope that still larger endowments will be forthcoming for the progress of knowledge, the fount of all education, and that they will be used to make the threat of war remote, not by force but by international understanding directed to the good of all mankind.

OBITUARIES

Eng.-Captain J. Fraser Shaw

ENG.-CAPTAIN J. FRASER SHAW, of the Fuel Research Station, Greenwich, died at his home at Chislehurst on July 23.

As an engineer in the Navy he specialized in the burning of fuel and he took part in the organization of the courses for naval cadets who had to qualify in engineering. Later he was responsible for courses of instruction on oil fuel and turbines. He was present at the Battle of the Falkland Islands and his record throughout the campaign was a brilliant one. He was mentioned in dispatches and after the Battle of the Falklands was promoted immediately to the rank of commander. It may be recorded that he was a magnificent athlete and played for his country at Rugby football, being popularly known as "Rugger Shaw".

The knowledge Shaw had gained upon the use of liquid fuels was recognized towards the end of the War of 1914-18, when he was appointed liaison officer between the Admiralty and the Ministry of Munitions (Mineral Oil Production Department). During this period of his service he obtained a wide knowledge of all processes for the production of oil from indigenous materials, and in view of this special knowledge he was seconded from the Navy to take charge of the Fuel Research Station during its erection. He continued his service until 1922 when he resigned his commission to take up the appointment of chief engineer of the Fuel Research Station and liaison officer with the Admiralty.

As chief engineer of the Fuel Research Station he was responsible for the organization of most of the programmes, and in particular all investigations

which were carried out on a large scale. He was interested in the scientific and technical aspects of the carbonization programme, and especially processes for the production of oil by low-temperature carbonization and hydrogenation. In association with Dr. King he read a paper before the Institution of Gas Engineers and received the Gold Medal of the Institution. A year later he described in a Fuel Research Technical Paper the details of the low-temperature carbonization plant which had been designed and erected at the Station and for which he had been largely responsible. His long experience in the burning of oil in the Navy gave him a special interest in methods of heat transfer and in particular the burning of coal in a pulverized form. In order to realize the essence of his work it may be noted that some of the experimental plants at the Fuel Research Station are on such a scale that the results may be applied directly in industry, and it was the object of the organization to translate the observations made in the laboratory into plant which could be operated in industry. He possessed in a remarkable degree a capacity for improvising plants on an intermediate scale by which the inherent features of a process could be investigated in the first place on this scale before proceeding to the erection of a large-scale unit.

Shaw was a most enthusiastic and kindly leader and he brought together the industrial men who had to operate the large-scale units and the directing staff into the harmony which is necessary when laboratory observations have to be translated on to a large scale. His name will not be found on the title-page of many of the publications of the Fuel

Research Organisation because he wished his assistants to receive the maximum credit. It remains, however, to say that every investigator had been helped to the full by his wise and able guidance.

F. S. SINNATT.

Mr. L. A. Boodle

THE death of Mr. Leonard Alfred Boodle, formerly assistant keeper of the Jodrell Laboratory, Royal Botanic Gardens, Kew, on August 22, has removed from our midst a very learned botanist and a most conscientious and devoted public servant.

Boodle started his botanical career at the Royal College of Science, and after taking his A.R.C.S. he was for seven years demonstrator at the College under the late Dr. D. H. Scott. Soon after Dr. Scott went to Kew as honorary keeper of the Jodrell Laboratory, Boodle joined him as his private assistant, and it was then that Boodle's valuable work on plant anatomy commenced. Before that he visited South Africa and worked on marine algae, with the late Mr. George Murray. The genus *Boodlea* was named after him.

When Dr. Scott resigned his honorary keepership of the Laboratory in 1906, Boodle was put in charge, having been appointed an assistant at Kew in 1904. He was appointed assistant keeper of the Laboratory in 1909 and retired under the age limit in May 1930.

Boodle was blessed with a splendid memory and had a remarkable knowledge of botany and botanical literature; he was a very valuable critic. Diffident of his own powers and most meticulous in all he undertook, he spared no pains in working out fully any problem presented to him, but his published work was not very large and much first-class research work he carried out, unfortunately, was never published. His papers on the vascular structure of the Pteridophyta are a worthy memorial of his careful and exact methods.

Prof. E. J. Salisbury writes: "He was a man of whose profound anatomical knowledge and sure-footedness we all had the greatest respect. His extreme modesty and retiring nature led to many not appreciating to the full his great gifts."

ARTHUR W. HILL.

Dr. M. Benjamin

WE have learnt with deep regret of the death in a recent aeroplane accident of Dr. M. Benjamin, while engaged on work for which he was seconded from industry to the Ministry of Supply. He was a physicist of great promise who had begun to make his mark in pure science as well as in applications to industry.

His work in pure physics consists of a number of careful and interesting studies of electron emission from various types of surfaces. The earliest (Benjamin and Rooksby, *Phil. Mag.*, 15, 810; 16, 519; 1933) cleared up in a remarkable way the peculiar features of the emission given by coatings of mixed oxides of strontium and barium. Then followed studies of the migration of barium and thorium ions over various surfaces, the resulting changes in thermionic emission

being used to indicate the migration (and evaporation). Quite recently, in collaboration with Jenkins, Benjamin was engaged in the study of electron emission from metal points as a function of direction of emission and surface conditions, studies which are in course of publication by the Royal Society. The observed emission patterns were of great variety and complexity; they promise to provide new and important information for the electron theory of metals, and of the nature and properties of a metal point formed on a single crystal.

There was another side of Benjamin's life and character. He was one of those who took kindly to the practice of maintaining frequent personal contacts with the industry which, in effect, gave men such as him their chance. Although this left only part of his time and energies for his researches, it provided a fund of knowledge on recurrent but unexplained phenomena demanding inquiry. For him, however, the main urge was probably rather in the fact that, in the making of thermionic valves in thousands, the slightest misunderstanding leads to waste and delay; of these he was most impatient, and difficulties increased his activities in factory and laboratory to a fury. Nevertheless, his actual approach was always one of friendly interest, and he was as apt to learn as to teach. This attitude encouraged in all manner of people responsiveness and trust, so that his interventions were not merely accepted but were often claimed with insistence. His most recent work brought out his qualities to the full, with results which will be far-reaching.

That his colleagues in the Laboratory feel his loss to be most grievous goes without saying, but there will be many elsewhere who will miss him and will know the reasons for these feelings.

Prof. C. Bartel

News has reached his friends in Britain that Prof. Casimir Bartel, the distinguished mathematician and former Polish prime minister, was recently executed by the Germans for alleged co-operation with the Russians. His death, at the age of fifty-nine, deprives Poland of a man who would have been most useful to the nation in the future reconstruction after the country's independence is restored.

Born at Lwow, Bartel received a technical education before entering the University of Munich to study mathematics. When he returned to Lwow he taught mathematics (in particular geometry) at the Polytechnic High School, becoming in turn lecturer, assistant professor, full professor, rector and finally principal of this institution of university rank.

In science, Prof. Bartel was the most eminent of contemporary Polish mathematicians. After the War of 1914-18, when Poland regained its liberty, the nation depended upon its men of science and learning to undertake its leadership, and Prof. Bartel was among those who responded to the country's call. In 1919 he accepted the post of minister for railways and communications in Prof. Paderewski's first government, and he was therefore largely