led to a better understanding of the archæological conditions causing, for example, bright blue patches of vivianite, or particular types of film on metal objects, found in such deposits.

Introducing the general discussion, Mr. L. Bick listed some features common to both technologies: high temperatures, often carefully controlled or applied at selected spots; use of refractories and charcoal; casting, sintering, annealing and soldering, including glass-to-metal joints. Possibly both materials owe their discovery to the same cause—a major fire. The same analytical techniques are used, and variety of approach is needed, including the crucial test of 'doing it yourself'. It is thus most valuable to consider glass and metal together. As a result of the preceding papers and discussion, excavators will know better what to look for, and analysts where methods can best be perfected. They have shown, once again, the great value of such study in revealing not only the astonishing level of some ancient skills, but also points of interest to modern research.

The following emerged from the discussion. Various laboratories analysing early copper implements are in touch with one another, and their results can be compared within the chosen limits of accuracy. Study of isotopic ratios in lead, for example, is not likely to be useful in suggesting provenance as regards the British Isles. Analysis by neutron irradiation is extremely sensitive but not uniformly so. Several speakers stressed the importance of testing archæological hypotheses by scientific analysis and experiment, and the need for provision of more facilities by the larger institutions.

L. Biek

[1] *J. Soc. Glass Tech.*, p. 14 (February); p. 12*T* (April); p. 1 (June 1956).
[2] *Amer. J. Archæology*, **53**, No. 2, 93 (April–June, 1949).
[3] See Coghlan, H. H., "Notes on the Prehistoric Metallurgy of Copper and Bronze in the Old World", Occasional Papers on Technology, No. 4 (Pitt Rivers Museum, Oxford, 1951).
[4] *Man* (in the press).
[5] *J. App. Chem.*, **3**, 80 (1953).

OBITUARY

Sir Francis Simon, C.B.E., F.R.S.

The death on October 29 of Sir Francis Simon, barely a month after taking up his new appointment as Dr. Lee's professor of experimental philosophy and head of the Clarendon Laboratory at Oxford, has come as a tragic shock to his very many friends and colleagues.

Simon was born in Berlin in 1893 and studied at the Institut für Physikalische Chemie there. Later he became professor extraordinary at Berlin and professor and director of the Laboratory of Physical Chemistry at Breslau. When he came to England at the invitation of Lord Cherwell in 1933, he was already known internationally for his work on the physics of low temperatures, and particularly on the heat theorem of Nernst, his former teacher. During the years leading up to the War he then built up a small but powerful school of low-temperature physics at Oxford with the help of his former students, Mendelssohn and Kurti. The accommodation and facilities of the old Clarendon Laboratory being extremely primitive, the activities of this school depended largely on the use of miniature helium liquefiers based on the 'expansion' method which Simon had already developed in Germany. Perhaps the most notable success of the period was his work with Kurti on magnetic cooling, in which the temperature-range below 1° K. was systematically studied.

At the beginning of the War, many foreign-born scientists found themselves left out of the then existing scientific war projects. It is ironic to realize how much the development of nuclear energy owes to this. Simon was one of the chief instigators of the project and, with Peierls, was mainly responsible for the development of the diffusion method of separating the isotope uranium-235, later realized in the enormous diffusion plant at Oak Ridge in the United States. With his wife and two young daughters evacuated to Canada, Simon worked with great energy in the direction of a group at Oxford and on government committees, and made several visits to the United States.

After the War, Simon re-started low-temperature work under the greatly improved conditions of the new Clarendon Laboratory, and quickly built up a school which, by comparison with the pre-war school, can best be described as large and powerful. The range of work of this school in recent years has been outstanding, covering almost every branch of low-temperature physics and linking up with workers in nuclear physics and radio-frequency physics in most fruitful ways. A few years ago their collaboration resulted in the first reported experiments on the orientation of atomic nuclei. Only a few months ago it was reported in *Nature* that Simon, Kurti and their collaborators had achieved a nuclear cooling, reaching temperatures of about twenty millionths of a degree absolute for the first time. This was a project squarely in the low-temperature tradition, and had been close to Simon's heart for more than twenty years since its original proposal by Gorter.

In recent years Simon became a considerable public figure as a vigorous campaigner for the proper development and use of science, which he advocated in books, newspaper articles, on the radio and in public lectures. He was well known on government committees and took a particular interest in fuel policy, about which he campaigned (as it now appears) with some effect. A Fellow of the Royal Society since 1941 and holder of the Rumford Medal, he was made C.B.E. in 1946 and was knighted in 1954. He was honoured by many other scientific societies in Britain and abroad.

Simon's position at Oxford was as reader and later professor of thermodynamics. In his case the title was exactly appropriate. His outlook was essentially thermodynamic and he saw scientific problems simply and as a whole. It is perhaps significant that in his recent Guthrie Lecture to the Physical Society he returned to his first love, the Nernst heat theorem, now elevated to the status of the Third Law of Thermodynamics. A great deal of the work which came from his laboratory was inspired by this Law, and many of our existing ideas about the solid state started as 'anomalies' in the specific heat – temperature curves of Simon and his students. It is interesting to note that although some of the detailed results of his school were later improved upon by workers with more highly developed techniques, his