cracking and the temperature at which transformation ceases in the hardened zone. This simple means of assessing weldability was demonstrated. Also on view was some of the work using weldability cracking tests which has led to this development.

Mechanical tests at very high temperatures are being made on specimens cut from weld metal, and the results related to the defect known as hot cracking. In these tests, a 6-kVA. high-frequency generator is used. A wider range of investigation of the same problem is being made, using the 'Murex' hot-crack machine.

An investigation is being made of the problem of fissuring in weld metal; that is, the occurrence of very fine intergranular cracks. It has been found that these are liable to occur for given threshold values of hydrogen content and cooling-rate.

Visitors saw something of some relatively new work on the welding of structural steels, using the self-adjusting arc process. The field of high-temperature brazing was represented, and creep tests of brazed turbine assemblies were in progress.

Good progress has been made in the microscopical identification of inclusions in steel plate and weld metal, using a Reichert *MeA*. metallurgical camera (with polarizing equipment) and a Reichert 'Zetopan' metallurgical microscope for visual work. Here the use of diamond dust for the preparation of metallographic specimens has been invaluable; the technique was demonstrated.

Apart from routine chemical analysis, micro-gas analysis has been increasing in importance during recent years. The latest methods for the determination of hydrogen by vacuum extraction were shown, and the way that these have been adapted to deal with the problems of determining hydrogen, not only in weld metal but also in the parent wire and plate materials. One interesting problem has been the determination of the relative amounts of hydrogen dissolved in the aluminium welding wire and that produced by reaction from corrosion products on the surface. These experimental investigations sometimes require the artificial introduction of hydrogen, and this is done by means of cathodic charging.

The light alloy researches cover a fairly wide range of welding processes and aluminium (and magnesium) alloys, but certain problems with respect to heat flow, dilution effects and porosity have been found to be basic to this field of study.

The work on heat flow, which is derived from an investigation of the welding of heat-treatable alloys, is concerned with the production of basic formulæ by means of mathematical analysis, in parallel with measurements of the thermal cycles characteristic of the weld pool and various positions in the parent plate. Methods have been developed for the location of thermocouples in the plate metal, and also in the weld pool itself. The temperatures can be recorded using a ciné camera with a sensitive millivoltmeter, or, where faster rates are involved, using a cathode-ray oscillograph with a d.c. amplifier and camera. It has been found that the arc and weld pool cannot here be treated as a point source, and some progress has been made in the determination of weld pool shapes by calculation.

An important advance has been made respecting the dilution effect; that is, the extent to which the composition of the weld metal is changed by dilution with melted parent-plate material. Nomograms have been prepared to facilitate the estimation of weld metal composition obtained with particular welding conditions. This has been found to be important in the metal-arc welding of *H*.10 plate and in the tungsten-arc welding of a high-strength heat-treatable aluminium alloy, in particular with regard to the development of suitable filler-wire compositions. In the assessment of joint properties in light alloy materials, porosity is especially important. For the measurement of porosity a code has been drawn up for its assessment under the microscope, following detailed investigations. Visitors were able to see the method used for the measurement of elongation over small gauge lengths, found necessary to investigate the variation in ductility across a welded joint. Various forms of weldability cracking tests were shown, in some of which slotted plates are used to give quite severe conditions without the necessity of employing rigid and cumbersome jigs.

Investigations are also in progress on a number of specific alloys, including the metal-arc welding of *H*.10 plate from the point of view of eliminating cracking and porosity, the development of improved filler materials for *H*.14, *H*.15 and *D.T.D*.683 alloys, and the self-adjusting arc welding of *NP*.5/6 alloy.

The relatively new self-adjusting arc process has naturally required some investigation, and, in particular, work on the fundamental characteristics of the process has been done in co-operation with the Electrical Research Association. The effect of power source characteristics on the degree of self-adjustment has been determined. In parallel, work has been done on drift in power source output. This is making possible the development of idealized generators for the process, or at least the modification of existing generators in this direction. The efficacy of the improved power source characteristics was demonstrated by comparative welding tests over a stepped plate.

OBITUARIES

Sir John Lennard-Jones, K.B.E., F.R.S.

THE death on November 1 of John Edward Lennard-Jones has deprived British theoretical chemistry of its most senior and distinguished representative. Yet he did not begin his career as a chemist. Born in 1894, he was educated at the University of Manchester and then at Trinity College, Cambridge. The First World War interrupted his studies and he became a flying officer (pilot) in the R.F.C. and later experimental officer at the Armament Experimental Station, Orfordness. In 1919, however, he returned to the University of Manchester, this time as lecturer in mathematics. This post was followed by a readership in mathematical physics and later the first professorship in theoretical physics, both at Bristol. It was during this time that he became deeply interested in the nature of interatomic forces, and introduced the semi-empirical law of force $a/r^n - b/r^m$ with which his name will always be associated. These Bristol years were productive of other new ideas, and in particular it was then that Sir John initiated the wave-mechanical study of molecular structure in the form of molecular orbitals. His first paper on this topic, published in 1929, is still a standard piece of work, and the whole subject owes a great debt to him for the way in which he brought out in a simple way the mathematical implications of experimental studies on quantum numbers in molecules then being made by R. S. Mulliken and others.

This migration from mathematics through physics to chemistry made him an excellent holder of the John Humphrey Plummer chair of theoretical chemistry established at Cambridge in 1932. At the same time (1933) he was elected a Fellow of the Royal Society. This post at Cambridge was—and still is—the only chair of theoretical chemistry in Britain. While he was in Cambridge, Lennard-Jones (or 'L. J.' as he was known to his many friends) laid the foundations of the present vigorous school of theoretical studies in Britain. During this time he extended his earlier work on molecular orbitals, he made some useful progress in the very difficult field of chemical interactions at a metal surface, and he developed the 'cage-model' of liquids. Had it not been for the Second World War, in which he played a conspicuous part as Superintendent of Armament Research and Director-General of Research (Defence) at the Ministry of Supply, there is no doubt but that he would have done even more.

At the end of the War, Sir John returned once more to Cambridge, and although he became chairman of the Scientific Advisory Council of the Ministry of Supply, he and his younger colleagues completed an extensive study of the most fundamental problem in all chemistry—what is meant by a chemical bond ? But by this time his administrative abilities were becoming widely known. He was a member of the Advisory Council for the Department of Scientific and Industrial Research, a member of the Scientific Advisory Committee of the National Gallery, and president during 1948–50 of the Faraday Society. His quiet manner and understanding approach to difficulties made him an excellent chairman on all occasions where conflicting claims had to be reconciled. It was not surprising, therefore, that in April 1953 he was invited to follow the late Lord Lindsay and become the second principal of the new University College of North Staffordshire at Keele. He threw himself whole-heartedly into this work, which he so evidently liked, and in which he had become much appreciated, not only in the College itself, but also in the neighbourhood.

Sir John received many honours. He held the D.Sc. of Manchester and the Sc.D. of Cambridge ; he was made K.B.E. in 1946, was awarded the Davy Medal of the Royal Society in 1953, and an honorary D.Sc. at Oxford on the occasion of the British Association meeting there only a few weeks before his death, when he was president of Section B (Chemistry). He had recently been awarded the Longstaff Medal of the Chemical Society. All those who knew him respected the complete integrity of his life, the exceptional simplicity and clarity of his lectures and his obvious enjoyment of everything that he did. His home life was a most happy one ; he is survived by his widow, a son and a daughter.

C. A. COULSON

Mr. B. H. St. J. O'Neil

THE unexpected death on October 24 of Brian Hugh St. John O'Neil at the age of forty-nine has deprived the Ancient Monuments Department in the Ministry of Works of the chief inspector who followed Mr. J. P. Bushe-Fox, whose death was so recently recorded in these pages (*Nature*, November 6, p. 860).

Educated at Merchant Taylors' School and St. John's College, Oxford, of which he was a scholar, Mr. O'Neil began a career in the City of London, but soon deserted to Westminster and the Ancient Monuments Department in fulfilment of interests always near his heart. His most particular delight was in medieval and post-medieval fortifications and in early artillery, of which he had a profound and detailed knowledge, well employed, for example, in a recent visit to advise upon the treatment of early Portuguese fortifications in West Africa. He spoke and wrote of these matters with an authority and relish good indeed to meet. But his work extended also with distinction to other fields. He was no mean numismatist, as his classic study of Theodosian silver coin-hoards in late fourth-century Britain proves. He could take a prominent part in discussions concerning late-Roman copies of earlier coinage. No less notable was his discussion of the Silchester dykes and their relation to Britons and Saxons. Among his field-work should be specially cited his excavation of Frith Ffaldwyn Iron-Age fortress in Powys and the Caerau settlement in North Wales, and the unstinting unofficial help accorded in the excavations by his wife of Roman villas at Park Street, Whittington Court and Bourton-on-the-Water.

His appointment as chief inspector of ancient monuments brought him into close quarters with war-time and post-war problems in archæology. The application of State aid to the examination and record of sites threatened by destruction was liberally and wisely interpreted by him, and presently extended to cover sites of national importance which private resources, impoverished by taxation and inflation, were no longer equal to tackling. This was a valiant service to knowledge of which the full effects are not yet apparent, for he was planning publication in promising fashion, talking of the matter with the writer less than a week before his death. We have lost far too soon a judicious innovator, a good (if perhaps fatally self-sufficient) administrator, a zealous public servant, a keen scholar and a staunch friend, who in all these capacities will be widely and deeply mourned.

I. A. RICHMOND

Miss Rosamund F. Shove

AFTER a long illness borne with great fortitude, Miss Rosamund F. Shove died on October 17 in Richmond Hospital, aged seventy-six. Until the last few months of her life she had hoped to renew some of her many activities in the field of science and remained keenly interested to the end. Educated at Girton (1896–99), Miss Shove was trained in research by Prof. A. C. Seward ; and in 1900 "The Morphology of the Stem of *Angiopteris erecta*" appeared in the *Annals of Botany*. Miss Shove's professional career included seventeen years of science teaching in schools, followed by twenty years of university and training college work in biology and hygiene. Her last post was at the Maria Grey Training College (1921–38). She served on the council of the Linnean Society during 1943–47.

In 1937 Miss Shove became honorary secretary of the School Nature Study Union, and in 1940 undertook the editorship of its journal, *School Nature Study*, at a critical time. She sustained both the Union and the journal throughout the War and continued her labours until 1953, when the jubilee number was published. The journal had appeared regularly each quarter, thanks to her tireless devotion.

At the British Film Institute, Miss Shove was a faithful member of a volunteer panel who viewed natural history films from many sources. She con-