

obituary

Alexander Naumovich Frumkin the father of modern electrochemistry died in Tula (200 km from Moscow) after a heart attack on May 27, 1976.

He was born in 1895 in Kishinev, capital of Moldavia (now the Moldavian Soviet Socialist Republic), and attended the St Paul's Real School in Odessa, 150 km from his birthplace. On leaving school in 1912, he studied in Strasbourg and Bern but returned to graduate in the physico-mathematical faculty of the Novorussian University at Odessa, and become a staff member there. During this period he laid the foundations of the electrochemical studies which formed the mainstream of his work. His thesis, published in 1919 (he never in fact received a doctorate, as such distinctions were abolished in the early days of revolutionary Russia) besides giving a masterly survey of the current views on these problems, contained several notable original contributions (among which, many of the major themes of Frumkin's later work may be seen to have their origin): a careful experimental test of the basic equations of electrocapillarity, the identity of the point of zero charge determined by several methods, how Gibbs' equation may be used to derive surface excesses from electrocapillary curves, the nature of the potential-dependence of the adsorption isotherm, the lack of a simple relation between the double-layer capacity and the bulk dielectric constant, and finally the origin of the e.m.f. of a galvanic cell (one of the basic problems of electrochemistry).

In 1922 he moved to the Karpov Institute of Physical Chemistry in Moscow, formed to investigate the

fundamental physico-chemical basis of industrial processes. Here he extended his interests to the gas-liquid interface, to the adsorption of electrolytes on activated charcoal and platinum black and to the problems of wetting and contact angles. He made pioneer measurements of the Volta potentials of solutions and showed how they depended on molecular orientation at the surface. His outstanding research was recognised by his election to the Academy of Sciences of the USSR.

His work in the decade after 1930 was even more important for electrochemistry. His first achievement was the marriage of surface chemistry and electrode reactions, in a paper which brilliantly used some earlier polarographic studies to give a rational theory of the salt effect on electrode reactions. The second major success was the first reliable direct measurement of the double-layer capacity and the demonstration of the catastrophic effect of minute traces of impurities. This led to the first reproducible measurements of hydrogen overvoltage through the use of adequate purification by adsorption (on platinum black) and by electrolysis. Similar careful studies of the charging curves of the platinum electrode were used to study the adsorption properties of this complex system for hydrogen and oxygen as well as electrolytes, and culminated in the proposal of the logarithmic adsorption isotherm as well as in the first use of the alternating current method for the measurement of the rate of electrode reactions. He later showed how this method may also be used for studying rates of adsorption.

During the second world war Frum-

kin was Director of the Colloido-Electrochemical Institute and, after the war, became for a time Director of the Institute of Physical Chemistry before, in 1958, a new Institute of Electrochemistry was formed with him as its Director, a post he held until his death. His own work broadened and extended in all directions in collaboration with the eminent coworkers he had attracted. This work was characterised by the intimate collaboration of experimentalists and theoreticians (notably V. G. Levich) which led to such developments as the rotating disc and ring-disc electrodes, the laws of photo-electric emission into solutions and the detailed understanding of the structure of electrified interfaces. His own interest in the last few years centred on the development and testing of the thermodynamic theory of interfaces across which charge may be freely transferred.

His encyclopaedic knowledge of all parts of electro- and surface-chemistry earned the admiration of everyone who knew him and his achievements were recognised by many honours (including the title of Hero of Socialist Labour, on his 70th birthday). He was also a man of broad general culture. He spoke English, French and German fluently and had a passionate interest in literature and the visual arts—he would travel far under difficult conditions to see an early church with fine frescoes. His other passion was mountaineering; naturally his activities were more restricted in recent years, yet as late as last September he organised a car trip from Alma Ata as high as possible into the Tien Shan range, and was delighted to find that he suffered no ill effects.

Roger Parsons

announcements

Appointments

Dr R. C. Smith as professor of Physical Electronics at the University of Southampton.

Drs J. B. Harborne and **D. M. Moore** as Professors of Botany at the University of Reading.

Professor Sir John Dacie has been nominated President-elect of the Royal Society of Medicine.

M. Hubert Curien has been appointed president of the Centre National d'Etudes Spatiales (CNES).

Meetings

August 2-6, **Cell Wall Biochemistry Related to Specificity in Host-Plant Pathogen Interactions**, Tromsø, Norway (Jan Raa, University of Tromsø, Tromsø, Norway).

August 17-19, **Water Relations in Membrane Transport in Plants and Animals**, Philadelphia (American

Physiological Society, c/o Dr Robert E. Forster, A-201 Richards Building G4, University of Pennsylvania, Philadelphia 19174).

August 23-27, **Congress of the International Primatological Society**, Cambridge (Dr D. J. Chivers, c/o Laundry Farm, Barton, Road, Cambridge, UK).
September 7-9, **Arboreal Conference**, Worplesdon, Guildford (P. H. Bridgeman, c/o Merrist Wood Agricultural College, Worplesdon, Guildford, Surrey GU3 3PE, UK).