numerable manifestations of adsorption. The recognition of all these factors will naturally be a somewhat arduous task, but will furnish at the very least a new method of attacking problems which cannot be solved by chemistry—in its narrower sense—alone. E. HATSCHEK.

PROF. J. W. HITTORF.

THE death of Johann Wilhelm Hittorf, at the age of ninety years, removes an eminent and honoured leader from the ranks of German physicists. Born and brought up in Bonn, Hittorf devoted himself to the study of mathematics and natural science at the Universities of Bonn and Berlin, and became Doctor of Philosophy in 1846. Shortly afterwards he attached himself, as privatdocent, to the Academy (later the University) of Münster in Westphalia, the institution with which he was to be associated during his lifetime. Appointed "ausserordentlicher" professor in 1852, Hittorf became full professor of physics and chemistry four years later, and this post he held till 1879. On the reorganisation of the institution in that year, the chair of physics and chemistry was divided, and Hittorf continued as director of the physical laboratories until serious illness compelled him, in 1889, to seek relief from active teaching work. With rest came recovery and renewed activity, to such good purpose that between his seventieth and eightieth years Hittorf published some half-dozen memoirs. He died on November 28 last, as professor emeritus of the University of Münster, full of years and honour.

Hittorf's investigations dealt with a number of problems on the borderland of physics and chemistry, and the results are embodied in about thirty communications to scientific journals. In appraising this output of original work, it must be borne in mind that the earlier researches were carried on under serious disadvantages in respect of laboratory equipment, and that he himself was personally responsible for all the experimental work described in these memoirs.

Some of the first researches were concerned with the allotropy of selenium and phosphorus, and the discovery of the so-called "metallic" variety of the latter element was made by Hittorf. This work, however, is quite overshadowed by the remarkable series of investigations (published 1853–9) on the migration of the ions during electrolysis. Whilst Faraday had studied mainly the nature and the quantity of the substances produced at the electrodes by electrolytic decomposition, Hittorf investigated the more subtle changes of concentration that take place in the electrolyte itself. From these concentration changes, the relative rates at which the ions of an electrolyte move during the passage of a current, and their relative share in the transport of the electricity, were deduced.

This work met with practically no recognition from Hittorf's contemporaries, and indeed was vigorously attacked by the leading German physicists of the time. Twenty years later the significance of these investigations began to be appreciated, and fortunately Hittorf lived to see his great work accepted as a fundamental part of the science of electrochemistry.

A prominent place among Hittorf's researches must be assigned also to investigations, carried out at the suggestion of his master Plücker, on the spectra of ignited gases and vapours. The memoir embodying this work, which was published in the Philosophical Transactions for 1865, deals with the plurality of spectra, and shows, more especially for the case of nitrogen, that the same substance can give two different spectra. Hittorf's association with Plücker may be further traced in a series of important papers on the passage of electricity through gases; the foundation of what is known regarding kathode rays, discovered by Plücker in 1859, was laid in these investigations.

The remarkable activity of Hittorf's later years, already referred to, was shown chiefly in a study of the passivity of metals, more especially chromium; it was found that this phenomenon cannot be attributed to the presence of a film of oxide on the surface of the metal. It is a striking fact that in his last published memoirs Hittorf returns to the transport of electricity in electrolytes, the field of research in which he laboured fifty years before, and with which his name will be inseparably associated.

J. C. P.

DR. N. C. DUNÉR.

THE death of Nils Christoffer Dunér has deprived Sweden of one of her most distinguished men of science, and astronomy of an active and devoted student. Born on May 21, 1839, Dunér entered the University of Lund in 1855, and took his doctor's degree in 1862. He became a member of the staff of the Lund Observatory in 1864, and occupied that position until his appointment, in 1888, as Professor in the University and Director of the Observatory of Upsala. He died at Stockholm on November 10, after a brief illness following his return from a journey to observe the solar eclipse of last August.

Dunér made notable contributions to many departments of astronomy, and his name will be especially remembered in connection with his work on double stars, variable stars, the spectra of red stars, and the investigation of the sun's rotation by the spectroscopic method. His work on double stars during the years 1867 to 1875 at once placed him in the front rank of double-star observers and computers.

Several variable stars were discovered or investigated by Dunér. Two of them—Y Cygni and Z Herculis—have proved to be of exceptional interest. Dunér not only found that the light-changes of these stars could be completely explained by supposing them to be eclipsing variables of the Algol type, with the difference that both components are bright, but was able to determine the elements and dimensions of the two systems.