Summaries of Addresses of Presidents of Sections*

Trends in Modern Physics

IN his presidential address to Section A (Mathematical and Physical Sciences), Prof. Allan Ferguson, after referring to the heavy loss which physical science has suffered in the deaths of Sir John McLennan, Sir Richard Glazebrook, Sir Joseph Petavel and Prof. Karl Pearson, discusses those remarkable changes of outlook which have characterized the development of physical science in the twentieth century. The evolution of molar mechanics along Newtonian lines; the extrapolation of the perceptual facts involved in the behaviour of macroscopic masses down to the dimensions of atomic magnitudes, and the success attendant on this extrapolation; the wave theory of light, which was so successful in co-ordinating old facts and predicting new ones as to draw from Lord Kelvin a noteworthy expression of his belief in the objective reality of the ether; these were outstanding contributions of nineteenth century thought to physical science.

Withal, there was considerable simplicity—not to say confusion—attendant on the definition of such a fundamental concept as that of mass.

With the closing years of the century, the discovery of the electron, of radioactivity, and the investigation of the manner of distribution of energy in the spectrum showed the existence of complexities and contradictions beyond the powers of the classical theory to explain or to resolve; and the last year of the nineteenth century saw the birth of those ideas which have given to our vocabulary a new verb—to *quantize*. The development is sketched of quantum notions as shown in the Rutherford-Bohr atomic model, the vector model of the atom, the dualism of outlook which emphasizes now the wave-aspect, now the particle aspect of matter and of radiation and the resolution of that dualism by the later developments of quantum mechanics.

Discussion of the new concepts introduced by the discoveries of the neutron and positron, and the positing of the neutrino to save conservation processes, leads to consideration in some detail of the development of the doctrine of causality and the definitions of *cause* given by Locke, Hume and Mill, the effect on the doctrine made by the enunciation of the uncertainty principle, and the attempt made by Planck to save the principle of causality.

Is it possible for the plain man of science to order his daily work on a rational basis without of necessity becoming a technical metaphysician? The work of Karl Pearson, amended and extended to meet modern demands, points the way to a possible solution—a solution which, indeed, has some affinities with the endeavour of Prof. Planck to rescue the principle of causality. If the distinction is kept clear between the conceptual model, and the perceptual facts which the model is invented in order to subsume; if it is realized that the world-model, be it built up of billiard-ball atoms or probability-smears, in Euclidean or some esoteric form of hyper-space, remains a model still, and that, until any part of the model emerges into the region of perception, talk of its reality is rather beside the mark; if the twentieth century man of science is as ready to discard a worn-out model as ever Maxwell was, he is not likely to steer wide of the mark.

The man of science of to-day is called upon, more insistently than at any other period of history, to remember that he is a social animal. He can no longer continue to offer sacrifices at the shrine of the Idol of Purity; he must be prepared to consider the social repercussions of his work, whether these repercussions be eugenic or dysgenic. Section A has already initiated the consideration of such implications—it is hoped that the officers of the Section will continue to emphasize and to widen this aspect of the Section's work.

Training the Chemist for Service to the Community

THE place of the chemist in the present-day community, and the manifold ways in which chemistry is involved in the solution of national and industrial problems, is the topic of the presidential address to Section B (Chemistry) by Prof. J. C. Philip. Any society which is intellectually alive will foster the spirit of inquiry, and the prosecution of research is perhaps the fundamental service which the chemist renders to the community. Mere accumulation of knowledge, however, which does not lead to action directly or indirectly is inadequate and unsatisfying, and it is because in the field of chemistry the academic search for new knowledge has led to such abundant practical achievement in the industry of the nation and the health of its citizens that the science deserves fuller recognition by the public.

* The Presidential Address, and addresses by the Sectional Presidents, are being published as "The Advancement of Science, 1936". (Blackpool: B.A. Reception Room. London: Burlington House.) Price 3*s.* 6*d.*