NUCLEAR SPECIES*

THE study of the properties of various nuclides has been systematically pursued during recent years and a great many interesting results have been obtained. While most of these have been presented in papers and specialised review articles, a comprehensive elementary presentation of the whole field has been lacking. The timely appearance of Professor Huntley's lucidly written book will hence be welcomed widely.

Throughout the book, the need for viewing the entire collection of nuclides as a whole is stressed. The chart presenting nuclides with charge number against neutron number (Z-N diagram) is shown to be of basic significance much in the manner of the periodic system of elements to the chemist. The happy choice of descriptive phrases like "valley of stability", "northwestern slope", etc., would doubtless assist the beginner in retaining the mental picture of the Z-N diagram in relief. The usefulness of this method of presentation is elegantly brought out in the discussion of the stability of neighbouring isobars and of the connection between mass defects of neighbouring nuclides and their $\beta^{\pm}$, K activities. The deduction of the general properties of the "missing" element $Z = 43$ (technitium) is an interesting case.

The meaning of various concepts like "binding energy", "isomerism", etc., are clearly given; and illustrative numerical examples will give the student a feeling of the subject

The observed general properties of the nuclides are given in the form of empirical "rules" thirteen in all, five of them applying only to stable nuclei. While they are of value in giving a summary of the general characteristics, it is doubtful whether the student would be able to retain the "rules" as such. The reviewer feels that the excellent tabulations of otherwise not easily obtainable data is of much greater value.

A trend to oversimplification is apparent in the theoretical arguments, the worst example being in the attempt to explain the saturation property of nuclear forces. This is perhaps responsible in part for certain omissions. For example, in talking of Bohr's model of the atom, the radical nature of the assumption of non-radiating accelerated orbits which is in direct contradiction with classical electromagnetism is not even mentioned; similarly, the necessity to invoke the quantum mechanical tunnel-effect to account for the finite lifetime of α-decaying nuclei. But the omission of the π°-meson, with its well-known 2-photon decay (when a hypothetical ν-meson is postulated) from the list of elementary particles is inexplicable. The nuclear magnetic resonance technique of Bloch for the precision measurement of nuclear spins is also missing.

In the section on the origin of elements, the neutron capture theory is well presented, but rival theories are not even mentioned. A more substantial discussion of geo-chemistry and cosmo-chemistry would have been welcome. The tendency to one-sidedness is also evident concerning the "size" of the nucleus. The constant r_0 in the relation $r = r_0 A^{1/3}$ cm. from electron scattering by nuclei has been completely overlooked.

Apart from these defects, which can easily be remedied in the next edition, the book is a definite success. Intended for honours students of the British Universities, it is heartily recommended to the Second Year Honours student and the First Year Post-Graduate of the Indian Universities The Post-Graduate student of Chemistry will also profit by reading the book; and the research worker beginning to specialise in experimental nuclear physics will find it an excellent elementary introduction.

E. C. GEORGE.

* By H. E. Huntley. Macmillan & Co. Ltd., London, 1954. Pp. xix + 193. Price not given.

WINDS AT HIGH ALTITUDE

TESTS have been carried out in Australia on the behaviour of winds up to a height of 65 miles, by a research team working under the direction of Professor Huxley of the Adelaide University.

Previous knowledge of upper atmosphere winds was confined mainly up to 40 miles. The present tests have shown that winds reach a speed of 200 miles an hour at 62 miles height, and that they get faster in summer and slower in winter as altitude increases. They flow from east to west in summer and in the reverse direction in winter. Tidal winds have also been discovered which are caused by pulsations of the earth's atmosphere under the heat of the sun.