Water and aqueons solutions

Liquids and Solutions: Structures and Dynamics. By P. Kruus. Pp. 592. (Marcel Dekker: New York and Basel, 1977.) SFrs. 145.

THIS book is based on a graduate course and seminars, and is intended for physical chemists and people with related interests—for example, engineers and biologists. Certain topics are deliberately omitted—for example, glasses, melts, quantum liquids, liquid metals, and liquid crystals. A feature is the considerable attention given to water and aqueous solutions. These topics are of the greatest interest to other scientists but are often neglected because water (or an aqueous solution) is extremely difficult to handle theoretically. The author does not try to deal with any topic in depth but has produced what amounts to a very interesting series of review articles with a very large number of appropriate references. These will certainly be valuable both to specialist research workers, and to workers in related fields, for many years to come. One is struck both by the author's vast reading, and by his ability to summarise a particular field and put it into proper relation with other fields.

The book is divided into three parts. Part A deals with theoretical approaches: what are the forces between molecules or ions and how do we allow for their effects? Model treatments, distribution function theory and the theory of electrolytes are all summarised with appropriate references, but the reader is always left wanting more. Two chapters on transport properties and molecular motions can only be described as sketchy.

Part B is concerned with experimental studies. We can distinguish between what we can deduce from the equilibrium properties and transport coefficients (chapters 8 and 9), what we can deduce by bombarding the liquid with neutrons or by imparting various forms of energy to it (chapters 10 and 11, and 14–16), and what we can learn by using a typical molecule as a probe in magnetic resonance and spectroscopic studies (chapters 12 and 13). Each chapter has some specific examples of the application of each method. A considerable amount of very interesting material is given, but one would have welcomed a further chapter explaining exactly what sort of information can legitimately be expected from each method. For example, it may seem elementary to the author that because of wavelength considerations, ultrasonic and light-scattering studies tell us nothing about the distribution function but a great deal about critical fluctuations; but such information would be welcome to some of his likely readers.

Part C gives very brief accounts of thermodynamics statistical mechanics, electromagnetics and quantum mechanics. This is the weakest feature of the book. Although over 70 pages are used, these chapters are no substitute for a proper textbook, as the author himself recognises. If these topics are to be treated at all, why not include hydrodynamics also? I would like to have seen these pages used instead in expanding the excellent parts A and B, some chapters of which have quite clearly had to be unduly compressed.

Despite this tactical error, I adhere to my opinion that the author has done a good job in summarising what is now a considerable body of knowledge and that the result will be helpful to research workers. The emphasis on water and aqueous solutions is particularly to be commended at the present time, much of the material given being hard to find elsewhere.

H. N. V. Temperley

H. N. V. Temperley is Professor of Applied Mathematics at University College, Swansea, Wales, UK.

Complexities of intelligence

Intelligence: Nature, Determinants and Consequences. By E. B. Brody and N. Brody. Pp. x+241. (Academic: New York and London, 1977.) $12.50; £8.85.

INTELLIGENCE TESTING has been with us for some seventy years, and the results used—and sometimes misused—for important social and educational purposes during much of this period. From the start, at least two irreconcilable lines of thought about intelligence test scores can be traced. The first was at the outset peculiarly British, initiated by Galton and developed by Spearman, suggesting that there exists a central, inherited general intellectual capacity, fixed and unalterable, and directly measurable by tests. The second, which arose from the work of Binet in Paris, stressed the potentially plastic nature of intellectual functions.

Today, the questions of plasticity of intelligence, the degree of its heritability both within and between groups and races, remain central and controversial. The debate has been sharpened by Jensen's article (1969) which suggested a strong inherited component in the well-attested average negro–white IQ differences, and by revelations in 1974 by Jensen and by others, that some of the major post-War data of Sir Cyril Burt, the arch-hereditarian, were worthless.

The book by Brody and Brody addresses itself to problems such as these, sketching initially a little of the historical background, considering the work of Cattell and Guilford on the structure of the intellect, and outlining the quantitative characteristics of global indices. The relationship between test scores and achievement is reviewed and the respective roles of genetic, biological and social environmental factors as determinants are considered. A critical chapter is devoted to the problems of racial differences, birth order and family size, and the volume concludes with a review of the use of tests in the educational system, in selection and in clinical assessment.

Like many new American books in this field, this volume reflects the radical change which has taken place in recent thinking on what intelligence tests measure, their social and educational applications, and the constellation of variables which affect their results. It is up-to-date, clearly written and indicative of an unusual width and depth of knowledge. Surprisingly, however, it is weak in the section on stability and change in individual intelligence during the lifespan, considering in detail only one major longitudinal study; indeed, it underestimates the amount of relative change occurring in children reared in fairly constant environments. It also pays too little attention to the many careful studies on larger IQ changes following major environmental shifts. Yet the authors are rightly doubtful of "critical period" hypotheses which suggest that only early interventions may be rewarding for the disadvantaged. They fail, however, to spell out in detail the implications for successful interventions, in particular duration and totality.

Here and there, one can fault the authors' statements: for example, the results of the important Dutch Famine Study are open to alternative explanations than the one they favour, and they do not reveal any awareness of this controversy. The omission of an author index and the sketchiness of the subject index are also surprising. All in all, however, this book achieves its aim—a balanced account of the major issues. It will be valuable to those who seek an introduction to understanding these complexities.

A. D. B. Clarke

A. D. B. Clarke is Professor of Psychology at the University of Hull, UK.