

the prediction of the demand for electricity, in the vagaries of river flow, and in the effect upon local climates of the extension of built-up areas. The many specific topics covered are exemplified by the discussions on the influence of weather upon the following: the daily attendance at recreational districts; the optimum amount of salt to prevent icing on roads; the growing of early potatoes; and fluctuations in the demand for beer.

Throughout the book the exposition and diagrams are lucid and effective, and the approach is highly practical and orientated toward cost-benefit and minimum-risk analysis. Most readers will quickly be convinced that in an intensifying economy with soaring prices of labour, goods and services, more attention should be given to applied meteorology in order to extract the maximum benefits and to ensure the minimum losses and waste in all weather-sensitive occupations. Undoubtedly the message set out here will attract and be easily intelligible to a wide range of persons, practical and academic. But it is to be hoped that an eleemosynary edition will be issued to bring the volume within the purchasing power of undergraduates who will also find the contents much to their liking. Then perhaps in their day they may convert the British from being a nation of indecisionists in weather affairs into a society that treats the financial and social aspects of climate with due respect and sanity.

ROBERT P. BECKINSALE

Molecular Structure

Molecular Geometry. By R. J. Gillespie. Pp. ix+228. (Van Nostrand Reinhold: London and New York, July 1972.) £4 cloth; £2 paperback.

The Electronic Structure of Organic Molecules. By T. E. Peacock. (*The International Encyclopaedia of Physical Chemistry and Chemical Physics.* Vol. 2. Topic 4. *Electronic Structure of Molecules.*) Pp. xi+145. (Pergamon: Oxford and New York, July 1972.) £3.50.

In the first of these two books Professor Gillespie has written the first full-length account of the valence-shell electron-pair repulsion theory of molecular geometry. The original introduction of the theory goes back to Sidgwick and Powell in 1940, but the greater part of its subsequent development is due to Nyholm and Gillespie himself. The basic idea is simple; it is that, except for very polar (near-ionic) systems, molecular shape is determined by the very large repulsions which exist between lone pair electrons and the

smaller repulsions between electrons involved in bonding in the valence shell of a central atom. No precise description of the detailed shape or character of these electronic orbitals is attempted: and indeed Gillespie sometimes speaks of an orbital as a part of a space or a region, and sometimes as an electron cloud.

After a few introductory chapters in which the basic ideas are expounded, most of this book is devoted to understanding particular geometries in the light of the fundamental rules. It is quite astonishing to see how successful the method is, even though adherents of the more traditional theories may be a bit horrified to be told that there may be up to eight distinct valence-shell orbitals. This part of the book is admirably illustrated, with a wealth of information not readily available elsewhere.

There are strengths and weaknesses in this theory. Its strength is that so much experimental information is so nicely rationalized. Its weakness is that it is not susceptible to any numerical application, and that it disregards so much that is well known about orbitals in atoms. Moreover, without considerable extension, it cannot tell us much about the shapes of molecules in excited electronic states. Its failure to take account of our knowledge of atomic orbitals explains why the theory cannot naturally explain such matters as the difference between the linear structure of HgCl_2 and the angular structure of BaCl_2 , or the charge distribution in N_5^+ , whereas simple considerations of hybridization do so. The book would have been much strengthened if a more effective link could have been provided between the new and the old theories.

Read in conjunction with traditional texts and particularly as regards the qualitative insights that it provides, this can be a very useful book.

Dr Peacock's book is of a different kind. His concern is with the traditional theory of π electrons; moreover the first two-thirds of the book is devoted to the Hückel theory, and only the last forty-four pages deal with improved theories. The material covered is similar to that in many previous texts; presumably this book was written because it was felt that the complete series needed something of this form. The volume has a rather old-fashioned character. The author is more at home with the calculation of energies than of other properties, and he provides some useful tables for comparison between theory and experiment. Unfortunately the proof-reading is atrocious, and there are rather more distinct errors than one would have wanted in a volume intended for student use.

C. A. COULSON

Pertinent Biology

The Future of Man. Edited by F. J. Ebling and G. W. Heath. (Proceedings of a Symposium held at the Royal Geographical Society, London, on April 1, 1971.) Pp. xviii+211. (Academic: New York and London, February 1972.) £2.80; \$8.95.

THE symposia of the Institute of Biology are now an established event in the biologist's calendar and one might therefore expect that they would have lost some of the originality that they undoubtedly had in the beginning. But if we look at the subjects of the Institute's symposia over the past decade we cannot help but recognize and applaud the freshness and pertinence of all of them to the contemporary scene. Some have seemingly been in response to current biological thinking, while others have anticipated a popular movement in the science. How apt, for instance, was the symposium on *The Natural History of Aggression* which had papers presented by people of Lorenzian calibre at a time when animal and human behaviour studies were at their height and were soon to be fascinating a wider public: then again, when the pesticide problem was coming into public prominence with all its attendant confusion, the Institute chose as its symposium's theme *The Problem of Birds and Pests*.

Through these ten years or so the Institute has managed to provide a timely focus for some of the chief biological problems of our time and because of this it has helped greatly to get matters into some sort of perspective. In my opinion the two most important of the symposia are the last two, *The Optimum Population for Britain* and the subject of the present volume *The Future of Man*. It is an example of the timeliness of these now famous symposia that this one in particular should have been held a year before the United Nations Conference on the Human Environment and further that the papers should be published in the same year of the Conference. One could almost say that, taken together, all the Institute's symposia would have made an excellent guide to those whose work it was to organize that United Nations Conference.

In *The Future of Man* the Institute of Biology has, as it were, arranged some peculiar bedfellows between its sheets, but they do represent a wide range of viewpoints of a problem. Of course all the papers are not of equal standard or even relevance, though this could be due more to the outlook of the reviewer than anything else. However, someone once said that all things are relevant and this is presumably the philosophy of the Institute. All in all, the papers published here are worth reading,