times over to the substance of previous knowledge.

After a general introduction dealing with climate, hydrography and seasonal effects with zonation, four types of hard shore (including wharf piles) are described, then four kinds of soft shore with a final account of the subtidal coral shores. The book ends with a discussion of probable future problems, notably pollution and conservation on which both authors have already written extensively. In addition to 28 colour or black-and-white plates there are 132 line drawings, many occupying full pages; both authors are capable artists and deft in the production of the pictorial diagrams of which Alan Stephenson was such a master.

This is a major addition to knowledge about the sea shore in general and also the marine fauna and flora of this region of the Pacific. Above all the book tells much about the living animal with which both authors are primarily concerned. It is a pleasure to see their work in print. □

Sir Maurice Yonge is Honorary Fellow in Zoology at the University of Edinburgh.

In the beginning . . .

W. Graham Richards

Modern Quantum Chemistry: Introduction to Advanced Electronic Structure Theory.
By Attila Szabo and Neil S. Ostlund.
Macmillan/Collier Macmillan: 1983. Pp.446. $49.95, £36.

Introduction to Advanced Electronic Structure Theory, the subtitle of Szabo and Ostlund's book, is a better indicator of the contents than the main title. Better still would have been something which emphasized that the book is largely about the *ab initio* computation of molecular wavefunctions at the highest levels of accuracy currently available. Many texts on quantum chemistry take the student to the Hartree–Fock level, but few go much further. Here, however, more than half of the content is devoted to methods of improving upon the wavefunctions which can be obtained from standard packages such as those available from the Quantum Chemistry Program Exchange.

Configuration interaction is the subject of the first of four chapters which deal with the incorporation of electron correlation. One-electron density matrices, natural orbitals, multiconfiguration self-consistent field calculations and the generalized valence bond method are covered. The size-consistency problem associated with truncating configuration interaction is used to highlight the need for many-body approaches which avoid this deficiency.

Full chapters are then devoted to pair and coupled-pair theories, to many-body perturbation theory and to the one-particle many-body Green's function. These chapters contain some fairly advanced material and despite the liberal use of examples will be hard going for many students. Probably the most receptive users of this admirable work will be researchers and graduate students who are already familiar with the computation of *ab initio* wavefunctions using programs such as the Gaussian 80 series, but who want to go beyond that level of accuracy.

In general, calculators of wavefunctions fall into two categories: those who want to do very accurate work on rather small molecules and those who are prepared to sacrifice accuracy in order to study larger molecules of more interest to experimental chemists. The authors are unashamedly in the former group and their work will be appreciated by like-minded computational chemists. In addition, one can hope that with the help of this exposition and the continuing developments in computer power, the authors' conception of accuracy will be accepted by the more pragmatic practitioners. Certainly those who merely feed data into universal programs could have their confidence troubled by learning just how much better things can be done. The description "*ab initio*" often gives a spurious hint of quality. It should not be taken as an indication of the last word in sophistication. □

W. Graham Richards is a Lecturer in Physical Chemistry at the University of Oxford. The second edition of his Ab Initio Molecular Orbital Calculations for Chemists *was published by Oxford University Press earlier this year.*

Biology and business

Peter Newmark

The Gene Business: Who Should Control Biotechnology?
By Edward Yoxen.
Pan: 1983. Pp.264. Pbk £3.95.

EDWARD Yoxen's book, *The Gene Business*, is part of a series called *Crucible: Science in Society*, "designed to make critiques of the role of expert power — power through knowledge — in our lives". Each book is linked to a television documentary shown under the same series title on British television's Channel 4.

The "expert power" picked upon by Yoxen is biotechnology, and he takes the threat to the sugar industry as one of his examples. Traditionally the economic mainstay of a few underdeveloped nations, sugar now faces increasing competition from "engineered" products. Immobilized enzymes already produce high-fructose corn syrup on a large scale. Aspartame, the combination of two amino acids produced by fermentation, promises to become widely used as a sweetener. And, he might have added, the gene for thaumitin, an exceedingly sweet component of a plant gathered from the wild in Africa, has been expressed in bacteria. In the face of those who unremittingly support the development of all such alternatives to sugar from the cane, if only because they favour the survival of teeth over that of dentistry, Yoxen waves the banner of Social Responsibility in Science and Technology.

Fortunately, he is mostly sensible about the genuinely important issues associated with the growth of biotechnology. For example he raises the question of the fate of the superseded agricultural workers if biotechnological products ever displace cane sugar, but without giving support to the far-fetched notion that American efforts in alternative sweeteners are essentially a way of attacking Cuba by driving down demand for cane sugar.

How, he asks more generally, can research be directed towards social needs and away from the twin evils of what he sees as a self-indulgent elite of research scientists and a business community preoccupied with maximum profits. His answers are few, and as often as not they seem to be reflex reactions (worker participation, public ownership). Indeed, Yoxen's "radical–reformist" policy for university–industry collaboration in biotechnology is distinctly conservative: no firms on campus, no direct university investment in the companies with which they collaborate, strict rules on academic consulting. Well before the end of the book, one senses Yoxen's feeling of impotence to alter the course of the tide of capitalism which, to give him his due, he recognizes will bring good along with the bad.

What irks him most is that he has seen slip away the hopes kindled by the involvement of trades unions and the public in the early days of genetic engineering. The hopes faded as the business interests moved in and wooed the experts away from righteous paths towards those that were paved with gold; so the argument goes — and with an element of truth.

It is a pity that Yoxen is unwilling to acknowledge the extent to which the interests of profit and social needs seem to go hand in hand, at least in the innovative phase of technology: it is later that so much effort is wasted on redundant products purely for the sake of competition and profit. Nevertheless, in *The Gene Business* Yoxen broaches many of the disturbing questions that tend to be swept aside in the biotechnocrats' rush towards riches. His analysis could have been more penetrating and original, but the book is undoubtedly a provocative read for those who have never stopped to consider such matters at all. □

Peter Newmark is Deputy Editor of Nature.

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