of the gliding cyanobacterium *Phormidium uncinatum* are particularly elegant — I find myself sceptical of the work as a whole. A modern-day bioenergeticist comes armed with a number of chemical weapons (ionophores, uncouplers and inhibitors) with which I have had limited experience. How secure are the conclusions drawn from experiments in which such weaponry is applied? These reagents are not all highly specific. For example, the calcium ionophore A23187 has poor selectivity for Ca^{2+} over Mg^{2+} and can even exchange Na^+ for H^+. The ATPase inhibitor DCCD reacts with alcohols and amines, not only with carboxyl groups in hydrophobic pockets. Furthermore, not all such reagents readily penetrate the outer membrane of gram-negative bacteria. The permeability properties of the outer membrane of *E. coli* are reasonably well understood, but what about *Ph. uncinatum, Rhodospirillum rubrum* or *Vibrio harveyi*, to name but a few of the organisms discussed here, or the archaebacterium *Halobacterium halobium*? These systems are complex. More than one function can be perturbed by chemical modification. How is the novice to judge the reliability of this approach when discussions are so brief?

My concern is reinforced by recent results obtained by the genetic approach. For example, by comparing the effects of the inhibitors DCCD and KCN on both phototaxis and motility in *H. halobium*, Glagolev argues that phototaxis in this organism is mediated by changes in $\Delta\tilde{\mu}H^+$. This bolsters his argument that sensory systems in bacteria might have evolved from a primitive protometer. However, as he readily acknowledges in his addendum (August 1983), the discovery that phototaxis in *H. halobium* is mediated by a slow-cycling rhodopsin distinct from either bacteriorhodopsin or halorhodopsin — see Spudich and Bogomolni *Nature* **312**, 509-513 (1984) — makes this interpretation highly unlikely. Or take the molecular model for chemotaxis (Fig.38), which includes (i) activation of cGMP by an attractant-receptor-MCP (methyl-accepting chemotaxis protein) complex, (ii) blockage by cGMP of the chemotaxis signal, comprised of a repellent-receptor-CheB (methylesterase) complex, which (iii) affects the flagella by binding to CheZ (a cytoplasmic protein), thus liberating CheC (the flagellar switch) and allowing Ca^{2+}-dependent (possibly membrane potential-dependent) flagellar reversals. As far as I am aware, evidence for the involvement of either cGMP or Ca^{2+} in this process is equivocal, while mutants deleted for *che*B and/or *che*R (the methyltransferase) have normal excitation kinetics. So I find this model speculative in the extreme.

I therefore do not agree with the writer of the book's promotional blurb, who claims that this is "the first rigorous survey of the major new discoveries pertaining to bacterial behaviour". But I do find the book a lively, honest, even exuberant work, full of interesting facts and figures, that carries the discussion of bacterial behaviour well beyond the narrow confines of the *E. coli/S. typhimurium* school.

One of the problems, regrettably, is that our Soviet colleagues have not had the benefit of much feedback from the West — one learns a great deal from peer review and the grapevine. Nor have we absorbed as much as we should of their bioenergetic expertise. The channels of communication should be strengthened. We need more bacterial diplomacy. □

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Only natural

L. Crombie

The Chemistry of Natural Products.
Edited by R.H. Thomson.
Blackie/Methuen: 1985. Pp.467.
£46, $75.

ONE of the great barriers to a general appreciation of organic chemistry is the system of structural formulae employed by organic chemists. This is a pity, but understandable. The structural formula, with its dense information content, has evolved to its present form over a century and the practised organic chemist can take in at a glance an enormous amount of precise and detailed scientific information. Like any other language this pictogram system has to be learnt and practised, but once fluency is attained it is easy to use and, mathematical notation apart, is more universally accepted in science that any other language.

The Chemistry of Natural Products is full of such formulae, beautifully drawn and presented, and very helpful they are too. However, despite their plentiful use, the field of natural products is so large that a writer or editor must be very selective in the choice of topics to be covered in a single book. Professor Thomson has assembled a group of ten excellent authors to write about some of the principal sectors of the subject — carbohydrates, aliphatic and aromatic compounds, terpenes, steroids, alkaloids, nucleosides, nucleotides and nucleic acids, amino acids, peptides and proteins, and porphyrins and related compounds. Even so, limitations have had to be imposed. Authors were asked to emphasize stucture, chemistry and synthesis, and make only passing reference to biosynthesis. Additionally, their brief was to describe what has been happening in each of these areas during the past ten years. This of course places some restrictions on the readership which has to have an appreciable basic knowledge of the subject: for such people, however, the book is stimulating and valuable for keeping abreast of developments.

Undergraduates will probably find the chapters too terse and lacking in detailed explanation for direct use, but this should prove to be a useful book to their teachers for updating lecture notes. Postgraduates, especially those undertaking research in this area, will find it invaluable for acquiring a broader, up-to-date view of their subject. However, a price has had to be paid for this wide coverage in that, because of constraints on space, some authors have adopted a rather telegraphic style reminiscent of *Annual Reports of the Chemical Society* or certain of the *Specialised Periodical Reports*. For the purposes of this book, I would have preferred to have seen some reduction in the number of subjects covered and rather more relaxed and extended treatments.

Looking over these various topics, I sense that the contributors were necessarily assigned tasks of unequal difficulty. It is distinctly harder for authors of general sections such as "Aliphatic Compounds" or "Aromatic Compounds" to produce an exciting account because of the diversity of their material. On the other hand, more homogeneous topics — "Porphyrins and Related Compounds" or "Amino Acids, Peptides and Proteins" for example — make attractive reading and were doubtless more pleasurable to write. The book itself is a good example of a stout, well-produced product at an acceptable price. □

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Making waves — climbing parabolic sand dunes approaching Juniper Buttes, Snake River Plain, Idaho; wind direction is from lower left to upper right. The picture is reproduced from Wind as a Geological Process (on Earth, Mars, Venus and Titan), *by Ronald Greeley and James D. Iversen. Publisher is Cambridge University Press, price is £35, $59.50.*

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