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BOOK REVIEW

Ecological Physical Chemistry, C. Rossi & E. Tiezzi (ed). 651 pp. Elsevier, 1991.
ISBN 0444874305, \$225.50 US.

This could well be a very important book, although sceptics might suggest that it's no more than physical chemists jumping on the ecological bandwagon. Physical chemistry has made sense of many other difficult fields of study, so that one has some confidence that this will indeed be a significant step forward. The book contains the edited proceedings of a conference under the same title held at Siena, Italy in 1990. It has a strong Italian flavour, 29 of its 37 chapters having Italian authors or coauthors, but there are also contributions from notable American ecologists such as Odum and Pimental, and a sprinkling from other nationalities.

In a short but helpful preface the editors claim that "Ecological Physical Chemistry is a new transdisciplinary field of study concerned with the relationships between complex molecular systems and/or organisms". They emphasise that the behaviour of complex systems can only be analysed by means of relations including time. This is expounded by I. Prigogine in the first chapter, "The arrow of time", in which he goes beyond classical irreversible thermodynamics to develop Poincaré's theorem of interactions between the energies of complex biomolecular systems, leading to a theory of chaos on the microscopic scale but to self-organization on the macroscopic scale.

The book is organized in four sections: thermodynamics; ecological economics; structure and form; and physical chemistry approaches to environmental problems. It is impossible in a brief review to give any indication of the wealth of detail that is contained in such diverse topics. Suffice to say that while some of the chapters make a serious attempt to relate their subject to the theoretical framework outlined by Prigogine, others are traditional accounts of environmental problems or the straightforward application of physico-chemical techniques to molecules of ecological importance.

For any science to progress, it needs a firm foundation in basic principles. It is clear that energy drives biological systems, but precisely how it does across different levels of organisation is less clear. If ecological physical chemistry can provide a mechanistic foundation for ecology it will provide a valuable service. The evidence from this text is that it has a long way to go, for while the ideas are challenging and exciting, the theory is in its infancy and lacks the coherency necessary to understand the complex behaviour of ecosystems, cells and organisms.

B.W. Bache
14 October 1992