Biophysics as natural history

R. McNeill Alexander

How Life Learned to Live.
By Helmut Tributsch.
MIT Press: 1983. Pp. 218. $19.95, £17.95.

PROFESSOR Tributsch had been working at Berkeley on the biophysics of photosynthesis when he came to feel that his subject was losing contact with nature. He had been spending his time operating electronic and optical instruments, reading scientific journals and thinking about abstract models. He felt the need to get out into the sun and see it shining on plants. He wanted to remind himself and others that biophysics is about nature.

So he spent two years travelling in South America — on foot, on horseback, on trucks and on freighters — visiting Amazonia, the Chaco, the Andes, the Galapagos Islands and Tierra del Fuego. He sought out the animals and plants that most of us know only from books and museum specimens, and came back to write his book. It was published in German in 1976 and has now been translated into English.

The book aims to show how animals and plants exploit physical principles. There are chapters on structural mechanics, locomotion, acoustics, heat, light and electricity. There are passages about beavers' dams, flying seeds, insect song, electric fishes and many other fascinating topics. Professor Tributsch reminds us frequently that he has seen many of the organisms he describes, in their natural habitats. Occasionally he makes good use of his experiences, for example in accounts of the flight and diving of gannets, and of echolocation by oilbirds. More often his reminiscences are mere ornaments in a text that depends more on what he has read than on what he has seen and thought.

He seems to want to amaze us with the marvels of nature. They come out in a rush, example after example, with explanations that are intended to be comprehensible to the layman and never seem to get seriously to grips with the physical principles involved. Physical laws are seldom stated explicitly, and hardly ever quantitatively. Explanations are, therefore, superficial. They are also so condensed that I frequently wondered whether they would have made any sense to me if I had not already been familiar with the subject. There is too much uncritical acceptance of statements from other books and too many errors such as writing "work" when "power" is meant, or assigning an animal to the wrong phylum. There are however some well-devised diagrams which, properly explained, could have been most revealing.

There are many books designed to teach biologists the most relevant branches of physics, but few that review the biological applications of physics. The ones that I know are books aimed at the mass market, full of slick half-truths and large colour photographs. It is disappointing that Professor Tributsch has not used his expertise in biophysics to break this mould and to write an intellectually more satisfying book. □

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Sic publishing

Thressa C. Stadtman

Biochemistry of Selenium.
By Raymond J. Shamberger.
Plenum: 1983. Pp. 332. $42.50, £29.75.

RAYMOND Shamberger's *Biochemistry of Selenium* is the second volume in a series dealing with the biochemistry of the elements, edited by Earl Frieden. In view of the ever-increasing interest in selenium as a micronutrient the book is particularly timely. However it can be recommended only to those readers who wish to own a completely uncritical, annotated bibliography of work involving or related to selenium.

Many of the accounts of experiments are presented in a form garbled to the point of incomprehensibility. The following quotation from p.232, under the heading "Antimutagenicity", is an example:

> Sodium selenite and seleno-amino acids interfere with the crossing over in barley (Walker and Ting, 1967). The authors provide cytological evidence for the deformation of the chromatin content of the meiocyte as a result of selenium treatment. Their observations of normal pairing discount the possibility of an effect on the ability of homologs to synapse. The latter two observations lead to the suggestion that selenium may reduce crossingover by a relaxation of the chromosomal protein which may lead to a relaxation stress in the chromosomal fibril. The selenohydryl group is less reactive than the sulfhydryl group (Nickerson *et al.* 1956); hence this and associated differences in bond strengths and distance might introduce alterations in the physicochemical properties of selenosubstituted proteins.
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> Similarily [*sic*], selenocystine and selnomethionine [*sic*] also interfere with the crossover distribution along the X chromosome of *Drosophilia* [*sic*] *melanogaster* (Ahmed and Walker, 1975). These results were attributed in proteins by the error incorporation of selenocystine residues which supported a mechanism of preexchange DNA breakage induced by stress in an associated protein.

In the area of Shamberger's own expertise, clinical studies are merely enumerated in excessive detail with little or no attempt critically to evaluate the results. Elsewhere in the volume the reader may be informed at the top of the page that a selenium compound in a particular protein is unknown only to be told in the next paragraph of its precise identity. Numerous such examples illustrate the chronological approach which is used throughout the book at the expense of presenting a concise, up-to-date summary of work in this area.

The entire text is full of glaring errors involving the names of chemicals, details of chemical reactions and concentrations of selenium compounds administered, in many instances wrong by several orders of magnitude. For example, on p.254 it is stated that the human patient received *100 mg* selenium four times daily for one week and then *25 mg* four times daily for the next five days. Had these amounts actually been given the patient should have been dead in 24 hours.

Throughout the book there are incomplete sentences, bad grammar and innumerable spelling errors. Apparently neither the series editor nor the redactory office of the publishing house made any attempt to correct even the most obvious mistakes. □

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