

## BOOK REVIEWS

**Origin and Development of Living Systems:** by J. BROOKS and G. SHAW. Academic Press, New York, 1973. xi + 412 pp., \$13.50, £5.

If YOU agree with Brooks and Shaw that the total function of the Universe is ultimately to allow the conversion of all matter into the living system (p. 41), you will find it difficult to believe that a single representative of this system, above a certain I.Q. of course, can remain uninterested in the contents of their book. And if you, in consequence, plunge into their story, you will discover slowly and excitingly that the only explanation of all the known facts is that life on Earth had an extraterrestrial origin. The originality of the present version of this theory and its experimental basis stems from the authors' discovery that there is a very close parallel between the pattern and type of the insoluble organic matter which occurs in terrestrial Precambrian sedimentary rocks, and that occurring in typical carbonaceous chondrites such as the Orgueil and the Murray meteorites. This matter is sporopollenin, an oxidative co-polymer of carotenoids and carotenoid esters, produced by some long-since-extinct micro-organism, as well as forming the outer protective layer, called exine, of present-day spores and pollen grains.

In order to propound such a proposal it is necessary to show that many workers in this field have not always been at pains to correlate their *in vitro* results with the evidence of the geological record or to examine the type of biological material which was in existence at the time when the events outlined in the theories are claimed to be occurring. Under criticism come such standard items of current thinking as the reducing atmosphere and the *primeval organic soup*, *fundamental requirements for efficient chemical evolution on the primitive Earth*. Now, there is perhaps nothing as entertaining in science as the juxtaposition of cool cautionary arguments and grandly launched dicta, chiefly if some of these bear the trademark of Nobel prize winners. It is this careful appraisal of theory in relation to facts that makes the book such fascinating reading, even prior to its dramatic conclusion. Carefulness, however, can be pushed to its limits, as when malonate is said to be presumably more active than acetate in the biosynthesis of fatty acids or, more seriously, when the concept of stereospecific autocatalysis for the abiotic production of chiral molecules is stated to involve purely chance phenomena and thus considered to be unconvincing. Another important concept which could have been discussed fruitfully, since it assuredly is part of the story, concerns catalysis due to orbital steering or orbital symmetry adaptation. It is due to the consideration of such phenomena that the origin of life is more and more being regarded as a physico-chemical process which, under appropriate conditions, occurs of necessity, or in another expression, would have been impossible to avoid.

Clearly advantageous in an interdisciplinary endeavour such as this book, is its attractive, colloquial style. The use of differing systems of measurement, however, should have been avoided and data in miles, m, ft and cm on the same page give a bad impression. It may surprise the authors to learn that indications in miles, ft, oz or the size of a cricket ball would not be immediately helpful respectively to 50, 85, 95 and 100% of the 185 Brazilian undergraduates in my 1973 organic chemistry class, were they to read their book. But this and the very few printing errors, which include some omissions on formulae, do not detract from the quality of this most stimulating work. About the only thing that irked

me was the sequence in which the topics are developed and which results in some repetitions (e.g. the term sporopollenin is defined in much the same way on pp. 216, 257, 283, 295, 341 and 345), at least until I arrived at the last pages and a better understanding of the authors' aims. You also will grasp an understanding of their talents if you consider that, 310 pages after the bold introductory statement, they find it equally plausible that the Universe began with a living system and we are now witnessing the conversion of this living system into simpler matter.

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**Phytochemistry Volume III: Inorganic Elements and Special Groups of Chemicals:** Edited by L. P. MILLER. Van Nostrand-Reinhold, London, 1973. 448 pp. £12.25.

AS THE subtitle implies, this third and final volume in Miller's treatise on Phytochemistry contains an assortment of different topics. Many of the critical comments on the arrangement of subject matter and depth of treatment made in the reviews of the first two volumes (see *Phytochemistry* **13**, 690 and 1636) apply here also. There is at least one chapter, for example, which seems to me to be outside the scope of Phytochemistry, namely W. D. Bonner's 'Mitochondria and Plant Respiration'. This is a useful summary of present progress in this field but, apart from the mention of the cytochromes, really belongs more properly in a treatise on plant biochemistry or plant physiology. In addition, the chapter by F. A. Robinson on 'Vitamins' seems to me to be of marginal relevance; it is also not very up-to-date, e.g. on ascorbic acid biosynthesis.

As an example of differing levels of treatment, one may take the two chapters on growth regulators. That by A. J. Vlitos and B. H. Most on auxins, cytokinins and abscisins is 20 p. long and is just at the right level for 1st yr undergraduates. On the other hand, J. MacMillan and R. J. Pryce's excellent account of 'the Gibberellins' (44 pp.) is aimed more at a postgraduate audience. Structures are listed for 36 of the presently known 42 gibberellins and there are sections on chemical inter-relationships, spectroscopic properties and biosynthesis. My only disappointment with this chapter was the absence of even a brief treatment of their biological properties and biochemical functions.

Of the remaining chapters of this book, I found the account of "Surface Waxes" by A. B. Caldicott and G. Eglinton especially stimulating to read. Comparative aspects of surface waxes have not been reviewed recently so that the section here on chemotaxonomy is particularly useful. A more general view of chemotaxonomy or "Molecular Taxonomy" is provided by H. Erdtman in a well rounded chapter where he illustrates his theme with examples mainly drawn from the alkaloid field.

Another notable chapter, on the role of minerals in phytochemistry written by the editor and his wife, includes a fascinating account of the many and varied plant substances containing halogen substituents in their structures, referred to here as halometabolites. A very recent and more comprehensive listing of such compounds has been compiled by J. F. Siuda and J. F. DeBernardis (see (1973) *Lloydia*, **36**, 107-143).