Prokaryotic cell surface polysaccharides

Surface Carbohydrates of the Prokaryotic Cell. Edited by I. W. Sutherland. Pp. 472. (Academic: London and New York, 1977.) £19.50; $38.

In his introduction, the editor of this volume says that "emphasis has been placed on topics which have received relatively little attention in review journals or in other volumes"—a creditable aim. Where it has succeeded, it has produced some very valuable reviews, such as that by Alvin Markovitz on the genetics and regulation of capsular polysaccharide formation; perhaps "radiation sensitivity in the title to this article might have been omitted. But because of the pace of advance of the biological sciences over the past ten years and the number of review journals, such an aim is not easy to fulfil.

When certain subjects have indeed not been reviewed, there may be good reasons for this. For example, Dr Roth was struggling against impossible odds in his chapter dealing with the physical structure of polysaccharides. Unfortunately polysaccharide capsules around bacteria are like the wholesome melon, mostly water; just how seriously one can take the spikes, filaments and networks of material, left to be seen under the electron microscope after the necessary dehydration of such structures, is questionable.

On the other hand the structures of lipopolysaccharides extracted from *Enterobacteriacea* can hardly be said to have been ignored by other recent reviewers. Nevertheless they are described in three separate chapters in this book by Stephen Wilkinson, by Jann and Jann, and by Lindberg. The story is told from different viewpoints and each author introduces much other material, but perhaps a stern editor would have brought the three authors together and asked them to cross-reference their articles, only one description of the lipopolysaccharides of *Salmonellae* or of *Escherichia coli* was necessary.

Much interesting information is contained in Dr Dudman's article on the function of surface polysaccharides. But as he himself says it is really a series of small almost unrelated essays, just because too little definitive work has been done on the subject as a whole, to make a coherent review. Lindberg's article on bacteriophage adsorption and surface polysaccharides is an outstanding and valuable one, as is Stephen Wilkinson's on the structure of lipopolysaccharides; the authors cannot be wholly blamed for the overlap referred to above.

The two articles by the editor, on the formation of expopolysaccharides and the enzymic attack on surface polysaccharides, bring together interesting work not reviewed for some years.

The bias in this book is strongly towards Gram-negative species, so much so that the ultrastructure of the cell walls of all bacteria is defined in one chapter, solely as that present in these species—enough to make any honest streptococcus turn in its capsule! Moreover in the chapter entitled "Bacterial Polysaccharide Antigens", there is no mention of cell wall polysaccharides, or of the teichoic acid antigens in Gram-positive species. Incidentally the electron microscope picture of a section of *E. coli* that appears in this chapter is perhaps not the most enlightening that could have been chosen from the myriad available.

This book is not entirely satisfactory. Inspection of the dates in the bibliographies together with the addendum added to one article, makes it clear that the gestation time, once the original articles were to hand, was not less than about two years. This is simply not good enough and deprives the book of much value, a great pity as it contains three or four quite outstanding chapters. A little firmer editing and speedier publishing, might easily have eliminated many of its deficiencies. Libraries might still purchase it for the excellent articles already mentioned, as these genuinely contain much work that is not reviewed elsewhere.

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Metals in the liquid state

Liquid Metals: An Introduction to the Physics and Chemistry of Metals in the Liquid State. By Mitsuo Shimoji. Pp. 391. (Academic: London and New York, 1977.) £16.50.

Writing a book which goes into detail about the nature of liquid metals is not an easy task. To begin with, though much of the subject is understood in broad terms, matters of detail are still highly controversial. An author must therefore steer a delicate course between taking 'a point of view' and reproducing uncritically a mass of experimental data and speculative theory. A second problem is that there have appeared in recent years, several books on the liquid state in general and one book (Faber's *Theory of Liquid Metals*) on liquid metals in particular. This latter book, published in 1972, contains a comprehensive review of most of the outstanding problems; there have been (with two possible exceptions) essentially no new theoretical developments since then, although a good deal of useful consolidation has gone on. The two fields in which new developments have occurred are those of liquid transition metals and the general area of surface properties.

Given these problems, I believe that the author has succeeded in writing a comprehensive account of the subject at a level suitable for graduate students and beyond. In parts, the author, in an effort to be comprehensive, has failed to give the sort of critical appraisal of the topic under discussion one expects to find in a textbook at this level. On the other hand, there is a wealth of experimental data contained in the 400 or so pages and the busy researcher will find the book invaluable as a major source of important references.

The book contains nine chapters, all of comparable length. The structural and thermodynamic aspects are covered in the first four chapters. The emphasis here is on the statistical mechanics of simple liquids modified to include the effect of the electron gas. The treatment is standard, but brings out rather clearly the role of the uniform background and how this modifies a simple hard sphere approach. Chapters five and seven deal with electron states and electron transport. Most of the old puzzles are referred to (for example, the Hall coefficient of liquid lead), but nothing significantly new is said about them. The newer field of liquid transition metals receives a rather briefer treatment than I expected.

I enjoyed chapter six which deals with atomic transport and I was pleased to see the problem of collective motions in liquid metals put into proper context by reference to the Copley–Lovesey criterion. The two remaining chapters deal with the metallic to non-metallic transition and with heterogeneous phases and surface properties. The inclusion of metal–salt solutions in the discussion of the metal–non-metal transition is welcome in view of the theoretical and practical importance of such systems. The review of surface physics, though useful, suffers from the fact that this is a rapidly expanding subject and inevitably, very recent, but significant work has not been included.

The author has faced the challenges of writing a book on liquid metals and has, in the main, overcome them. I can recommend this book as a useful work of reference to those physicists, metallurgists and chemists who are working in the field of liquid and amorphous metals and alloys.

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