reviews

Ribosomes

R. A. Cox

Ribosomes. By M. Nomura, A. Tissèires and P. Lengyel. Pp. x+930. (Cold Spring Harbor Laboratory Press: Cold Spring Harbor, New York, 1974.) $32.00.

RIBOSOMES are subcellular organelles that are found mainly in the cytoplasm. They are important because they are the site of protein biosynthesis, where the linear nucleotide sequence of messenger RNA is translated into the linear amino acid sequence of a particular protein. They may be regarded as multifunctional multisubunit enzymes and they are unusual because they contain RNA as a major component.

Ribosomes were first isolated and studied about 25 years ago. James Watson and Alfred Tissières began the study of the bacterial ribosome in the late 1950s and the complexity of the particle (at least 3 RNA species and at least 55 different protein species) began to emerge. For a time, during the period when the amino acid code was being solved, it was convenient to regard the ribosome as a black box. Around 1968 several developments took place that allowed a study of the black box itself. These developments included: the isolation of individual ribosomal proteins; the reassembly of functional subribosomal particles from their RNA and protein components; the preparation of antibodies to individual proteins and the invention of other techniques for analysing complicated protein mixtures; the emergence of nucleotide sequencing techniques; and the choice throughout the world of *Escherichia coli* ribosomes as the preferred system for study—this concentration on a single species has proved specially important—not least in promoting collaborative research.

This book arises from a meeting on ribosomes held in Cold Spring Harbor in September 1973 and fixes the view of the bacterial ribosome (particularly the *E. coli* ribosome) as it appeared at the meeting. The book has many admirable features. The first part comprises a series of general reviews. The editors have carefully chosen the contributors from those invited to the meeting, and a few who were themselves the pioneers responsible for some of the most recent advances were asked to provide more general surveys of topics such as RNA-protein interactions in the ribosome, the protein topography of ribosomal subunits, and the reconstitution of ribosomes, as well as reviews of physical properties of ribosomes, and of the isolation and properties of RNA and proteins. The process of translation, ribosome genetics and ribosome biosynthesis are also reviewed. The reviewers generally produced more than a factual survey and have emphasised where possible the relationship between structure and function. By no means all of the progress achieved in ribosome research has a chemical basis but a major impression remains that a chemical approach has proved to be fruitful for probing ribosome structure and eroding the 'black box' concept. For example, it can now be said "that the fidelity with which messenger RNA can be translated depends critically on the amino acid residues at positions 42 and 87 of protein S12". Bifunctional cross-linking agents have proved useful in identifying those proteins that are neighbours in the ribosome, and affinity labelling methods have been used increasingly to identify functionally active groups.

The second part of the book is made up of a series of carefully selected "Specific Reviews" of topics such as electron microscopy, affinity labelling techniques, immunochemical analysis, fluorescence studies, ribosome genetics, "magic spot", RNA synthesis *in vivo* and *in vitro* and particular aspects of ribosome function. There are three specialist reports on antibiotics and the ribosome but no general review of this topic although widespread use is made of these substances as probes of ribosome structure.

The glory belongs to the *E. coli* ribosome but about a fifth of the book is devoted to ribosomes of eukaryotes. There is one chapter and one specific report devoted to eukaryotic ribosome structure. This emphasis is, however, a fair reflection of the field as a whole.

The book comprises 930 pages and a comprehensive index. It provides a very, clear picture of the *E. coli* ribosome as it was seen in late 1973 with the proteins preeminent and the RNA moiety in the shadows; and it also reveals and documents the remarkable progress made over a five-year period. It is a monumental effort that does justice to the subject—indeed, it is the most ambitious publication in the field so far—and the standard of precision and clarity it achieves in giving shape to so many diverse facts is very high. This book has much to offer those who are interested in nucleoproteins and it is compelling reading for those who are actively interested in ribosomes.

Aromaticity

A. W. Johnson

Facts and Theories of Aromaticity. By David Lewis and David Peters. Pp. viii+109. (Macmillan: London and Basingstoke, April 1975.) £10.00.

THE concept of aromaticity in organic molecules, which has done so much to inspire experimental work in both mechanistic and preparative areas, is still the subject of much debate and controversy. The present volume sets out to present the varied aspects of aromaticity in a critical and concise manner and the result is a very readable account of the present status of the subject. What is lost in detail in the text is compensated for by an extensive list of references so that the reader will have no difficulty in following up any particular aspect. After a brief historical introduction, chapters are given on experimental evidence, theoretical ideas and simple examples of aromaticity and a variety of non-benzenoid structures: for example, quinoids, pyrones and porphyrins are also considered. Finally, ideas on homoaromaticity and antiaromaticity are summarised and some general conclusions are advanced. It is an interesting text on a topic of interest to all organic chemists and it is well written and produced in an attractive format, as indeed would be expected for about 10 pence a page.