harmful properties; on the other hand, it is believed that wholemeal flour and raw sugar share similar beneficial properties. But raw sugar is already very much "refined" compared with the sugar cane from which it is made, whereas wholemeal flower really does contain the whole of the wheat berry. Much more importantly, white flour and even pure starch have metabolic properties very different from those of sugar (sucrose).

Denis Burkitt, who, probably more than anyone else, was responsible for the revival of the view that the lack of dietary fibre is the major cause of the ills with which Western countries are plagued, ends his chapter in the Plenum book thus:

> The attitude that decries change until a case is proven is both illogical and morally indefensible. Medical history is full of instances in which effective action was taken to reduce the incidence of a disease by avoiding situations known to be associated with it, long before the cause of the disease was known or the mechanisms involved in its causation understood.

Although they write in a somewhat different context, I much prefer the statement by the authors of another chapter in the same book, as a comment on the too-hasty acceptance of epidemiological evidence unsupported by experiment:

> Such an attitude does not seem justified in view of the past continuously preached emphasis on high-fat diet as a plausible risk factor in the etiology of coronary heart disease, which has kept research in preventive cardiology at a standstill for the past 20 years.

Let us by all means eat brown or wholemeal bread if we like it. But let us not delude ourselves that it will make us healthier or prolong our lives. □

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Incomplete expression of genes

Jay Greenberg

Cell Biology: A Comprehensive Treatise. Edited by L. Goldstein and D.M. Prescott. Vol. 3 *Gene Expression: The Production of RNAs*, pp. 684, ISBN 0-12-289503-7. Vol. 4 *Gene Expression: Translation and the Behavior of Proteins*, pp. 496, ISBN 0-12-289504-5. (Academic: 1980.) Vol. 3 $65, £36.40; Vol.4 $49, £27.60.

THESE volumes consist of a collection of articles by different authors on various aspects of gene expression. (Volumes 1 and 2 in the series dealt with cell inheritance and its molecular basis.) They represent a much-needed attempt to fill the gap between reports of original research and the conventional textbook, and they will be of greatest use to students and more advanced scientists who wish to broaden the scope of their knowledge. For the most part, the chapters are not (nor are they intended to be) in-depth, up-to-the-minute reviews for specialists. However, some of them contain detailed, well-referenced information, and they will no doubt be appreciated by experts as well as by less knowledgeable readers.

To a considerable extent these volumes succeed in fulfilling their purpose. However, they are not without shortcomings. Some of the articles are less complete, informative, scholarly and readable than others; furthermore, there is a good deal of overlap between contributions. To some extent, this is the unavoidable result of different authors writing independently of one another; however, the number of redundant passages could have been minimized by more extensive editing.

The chapters are logically organized around gene expression at the level of RNA transcription and processing (Vol. 3), and translation and post-translational behaviour of proteins (Vol. 4). Unfortunately, however, this arrangement precludes integrated discussions of systems in which gene expression has been investigated at multiple levels. Another problem is that the current rate of progress in cell biology is such that many of the chapters were out of date prior to publication. This is especially true of Vol. 3, which was published late in 1980. However, the references cited in many of the chapters do not go beyond 1978.

Probably the greatest fault (no doubt related to the preceding one) is that neither volume is truly comprehensive. Many aspects of gene expression currently of interest are barely touched. These include such general phenomena as introns, gene splicing and the cytoskeleton, as well as more specific topics such as *Drosophila* heat shock genes, immunoglobulin, globin and ovalbumin genes, and small nuclear RNAs. Control of translation in cell-free systems and virus-infected cells is discussed, as well as regulation of protein synthesis in embryogenesis (masked messengers). However, other phenomena in which translational control plays an important part are not mentioned, for example, mitosis and heat shock. There is little on gene expression in mitochondria and chloroplasts. Apparently, no additional volumes are planned even though the current series is far from complete in its treatment of cell biology. □

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Cosmology at school

Joseph Silk

Physical Cosmology: Les Houches 1979, Session XXXII. Edited by Roger Balian, Jean Audouze and David N. Schramm. Pp.665. ISBN 0-444-85433-9. (North-Holland: 1980.) $109.75, Dfl.225.

WHAT is the cosmos made of? For all that astronomers can tell, it could be puppy dogs' tails, or back issues of *Nature*, or a host of slightly less exotic possibilities that range from snowballs to giant planets or black holes. All suggestions are equally unproven. What we do know is that the preponderance of matter in the Universe, 90 per cent or more, consists of unknown stuff, for which the term "massonium" was coined at Les Houches by the cosmologist P.J.E. Peebles. Massonium resides in galaxy halos and in the depths of intergalactic space. We infer its presence from its gravitational effect on the observable regions of galaxies. To discover the mystery of massonium is the cosmologists' dream. That it seems destined to remain so is one of the messages that is brought out in *Physical Cosmology*, the report of the 32nd session of the Les Houches Summer School in 1979.

Another elusive cosmological goal is to decide whether the Universe is closed, destined to ultimately collapse to a fiery fate or is open, to expand indefinitely to a cold and ever bleaker future. Here, the evidence presented on the one hand by Peebles and on the other hand by Gustav Tamman, Amos Yahil and Alan Sandage appears to be in conflict. Peebles cites evidence that substantial mass is present in the outer regions of galaxies and galaxy clusters, concluding that within the experimental uncertainties the Universe could be closed. On the other hand, Tamman and his colleagues measure the expansion rate out to a distance from the Milky Way galaxy of some 20 megaparsecs, and find it to be remarkably uniform. This result favours an open Universe, in which the kinetic energy of expansion greatly exceeds the gravitational potential energy that could eventually cause a contraction.

Many of the other topics in *Physical Cosmology*, which span a vast range of astrophysics, are less controversial and provide a good review of the consensus viewpoint towards cosmological issues. As might be anticipated in a lecture course arranged by nuclear astrophysicists Audouze and Schramm, cosmological nucleosynthesis receives a thorough treatment in lectures by Robert Wagoner, Yves David and Hubert Reeves. Helium is the second most abundant element in the Universe, and can be observed in a variety of astronomical objects, from the Sun and nearby HII regions to distant galaxies and remote quasars. Remarkably, astronomers find one nucleus of helium for ten of hydrogen in practically every environment