Book Reviews

Pattern Formation: Ciliate Studies and Models. By JOSEPH FRANKEL. Oxford University Press. 1989. 314 pages. Hardback £52.00. ISBN 0 19 504890 3.

Ciliate protozoa differ from all other organisms in a number of ways, and notably in the extraordinary complexity of their surfaces. Cilia are arranged in longitudinal rows and arise from the basal bodies, which are often interspersed with other structures, such as trichocysts in *Paramecium*. In addition the feeding system or oral apparatus involves a cavity containing special cilia and membranelles. All these are precisely arranged in intricate patterns. If one could understand the mechanism controlling the development and arrangement of these structures, it is possible that our understanding of cellular differentiation in multicellular organisms might also increase.

The subject was first raised forty years ago in a little book by André Lwoff (Lwoff, 1950) though the technical facilities then available were primitive in comparison with those we have today. A central theme was the supposedly determinative role of the kinetosomes (basal bodies) which were considered – in Lwoff's words – to be 'endowed with genetic continuity'. This notion is no longer taken seriously, though perhaps the matter is not entirely closed, in view of the recent startling report by Hall *et al.* (1989) that basal bodies in the alga *Chlamydomonas* are apparently controlled by supernumerary (extra nuclear) pieces of DNA.

In 1965 Beisson and Sonneborn showed that inverted ciliary rows in *Paramecium* were inherited autonomously, thus reinforcing the oft-expressed view of Sonneborn that there was more to genetics than the standard system of chromosomal genes made of DNA.

Now J. Frankel surveys a mass of data bearing on these questions using modern technical methods, especially electron microscopy, on a number of ciliate genera, such as *Paramecium*, *Tetrahymena*, *Euplotes* and *Stentor*. He describes the normal surface structures of these organisms, as well as various abnormal arrangements produced by microsurgery, spontaneous accidents during growth and – less commonly – by gene mutations. On the whole the description is clear and readers unfamiliar with these little animals should have no difficulty in following the story.

Fascinating though it may be to become aware of these amazingly complex micro-patterns, it has to be admitted that no new general principles emerge. In the author's words: 'no persuasive generalizations can be made', and he hints that a possible explanation of this lack is that the molecular analysis of cytoskeletal components of single cells is still in its infancy – or perhaps it has not begun.

This is not to say that the contents of this book are unimportant. To this reviewer they are very important, but perhaps their importance lies in the realization that current biological theory, especially that of molecular biology, gives us so little help in understanding what controls the surface structures of cells. This is a serious gap in our knowledge and Frankel has done a very worth while job in bringing it to the attention of such unprejudiced students of biology as may exist.

References

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Molecular Genetics in Diseases of Brain, Nerve, and Muscle. Edited by L. P. ROLLAND, D. S. WOOD, E. A. SCHON and S. DIMAURO. Oxford University Press. 1989. 481 pages. Price £45.00. ISBN 0 195 051 637.

High technology medicine has always been attractive to clinicians if not to hospital Finance Departments. Despite this, the 'new genetics' has been less accessible to many clinicians than other types of technological advance because of a serious communication barrier between molecular genetics and clinical medicine. In 1985, only 18% of United States Medical Schools had courses in genetics and the situation was little better in many famous British Medical Schools. This book is