Euplotes, which uses the standard code.It seems that the ciliates have been playing about with different coding systems for a very long time indeed.

Another fascinating cellular system in *Paramecium*, involving nuclear genes and macronuclear and cytoplasmic factors, is that determining the mating types, whose discovery by Sonneborn in 1937 opened up the possibility of doing genetic work with ciliate protozoa. The current position on mating types of *Paramecium* is reviewed by the late A. Kitamura and by Y. Tsukii. Unfortunately, the presumed mating type substances of *Paramecium* have so far not been dissociated from the cilia, and analysis of this system, which has implications for our understanding of self- and non-self recognition phenomena found throughout biology, has been more successfully pursued with other ciliates, especially *Euplotes*.

In some respects, it must be admitted, ciliates stand out as being clearly different from all other eukaryotic organisms. One is the possession of two kinds of nuclei – diploid micronuclei and polygenomic macronuclei. Another is the extraordinarily complex pattern of surface structures. Study of these unique features has produced some very novel findings, which may or may not have a general applicability to other organisms. The beautifully elaborate patterns of surface structure of *Paramecium*, here discussed by J. Cohen and J. Beisson, have been shown to be controlled to some extent by the pre-existing pattern, and to be relatively uninfluenced by the nuclear genome. The molecular basis of this extra-nuclear control is largely unknown, however.

Thus the antigen, mating-type and surface pattern systems of *Paramecium* each offer the researcher abundant material for new discoveries of fundamental importance, as well as innumerable fascinating biological minutiae.

Many other subjects – aging, electrophysiology, species concepts, mitochondria, etc. – are described in the book by Görtz, but space does not permit their discussion here. It seems to this reviewer that for an unprejudiced research worker who is guaranteed a secure position and is free of the necessity to apply for market-oriented research grants, the ciliates – and in particular *Paramecium* – would be the material of choice for a profitable and enjoyable scientific career.

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Antisense RNA and DNA: Current Communications in Molecular Biology. Edited by Douglas A. Melton New York: Cold Spring Harbor Laboratory. 1988. 126 pages. Paper $20·00. ISBN 0-87969-311-8.

The control of gene expression by the highly specific targeting of anti-sense oligonucleotides has been an attractive theoretical model for some time. Unfortunately in practice the introduction of antisense RNA and DNA has often proved ineffective in controlling gene expression. Often it has been the case that once antisense DNA or RNA, whether synthetic or plasmid encoded, has been introduced into the cell little or nothing happens to the levels of the gene products which were supposed to be controlled. Indeed so often is this the case that some have been led to dismiss the idea as impractical, this book is therefore a timely reminder that in some cases theory is borne out by experiment; that in some cases antisense nucleotide regulation of gene expression can and does occur.

The width and variety of the fields in which this technique is being applied is growing constantly. This set of papers from the 1987 Cold Spring Harbor meeting on antisense RNA and DNA constitute a useful set of example systems in which antisense nucleotides are being successfully used to explore genetic controls, RNA processing and gene expression.

Starting with an exploration of IS10 function the papers work up the complexity ladder to experiments on drosophila, mammalian cells and mice. Inevitably as the systems described become more complex the level of understanding of the mechanisms underlying the phenomena seen decreases. In general the review style articles which form the book are readable and clear, though as is so often the case in this sort of compendium little or no room is given over to the experimental details underlying the results discussed; however the references are adequate enough for the diligent reader to sort out much of this for him/herself.

The improving chemistry of oligonucleotide synthesis has led to the availability of a range of modified structures, such as methylphosphonates, phosphorothioates and derivatized oligonucleotides; and the application of some of these newer structures to antisense experiments is introduced. It is, however, in this area where so much has been done recently that the book is at its weakest.

Inevitably the book is out of date, but that does not really detract from its utility as an introductory overview of the field and of the main areas being studied. This alone makes it work a second look.

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