The fuzzy side of cytology

Michael Ashburner

Lampbrush Chromosomes. By Harold G. Callan. *Springer-Verlag: 1986. Pp.254. DM228.*

THE centenaries of two seminal discoveries passed unnoticed a few years ago. The first was that of Balbiani's discovery, in 1881, of the giant polytene chromosomes of flies. The second was the centenary of Flemming's discovery of lampbrush chromosomes, from the oocytes of *Ambystoma,* just one year later. Each of these remarkable structures has contributed enormously to our understanding of chromosome structure and function, and it is particularly timely to pause and take stock.

For the lampbrush chromosomes this is now done in a masterly monograph by "Mick" Callan. Callan is uniquely qualified for the task, for he and his school have been at the forefront of research in this area. But his claim goes further than that. It was work at the Stazione Zoologica in Naples, by Rückert in the 1890s, that established the chromosomal nature of the structures seen by Flemming; and it was in Naples that Callan himself first studied these chromosomes and met his wife, the daughter of Reinhard Dohrn, the director of that remarkable institution, who knew Rückert.

Lampbrush chromosomes are characteristic of the diplotene stage of meiosis in many oocytes. They are also known in the alga *Acetabularia* and in the spermatocytes of *Drosophila.* Their name comes from their characteristic paired loops, which are active in RNA synthesis. For a long time it was thought that these transcripts were of maternal messenger RNAs required for the subsequent development of the zygote. Several discoveries, well reviewed by Callan, make this an oversimplification. Were these RNAs simply to be messengers then the correlation between the sizes of the lampbrush loop transcription units (seen in the famous "Miller spreads") and the species' haploid DNA content would not make much sense. Nor would Gall's discovery of extensive transcription of satellite DNA sequences in the loops. Callan favours the idea that these transcripts are essentially a store of ribonucleotides to be reduced after fertilization and then used as precursors of DNA synthesis — an idea, he points out, that goes back to Brachet in the 1930s. It is interesting that Callan rather underplays the role in amphibia of "true" maternal messengers at a time when these are generating so much interest amongst *Drosophila* biologists.

The transcription of lampbrush loops is only one of the topics covered in this monograph, and other aspects of the chromosomes are likewise reviewed with great attention to the experimental evidence and their historical context. I must admit to being somewhat disappointed that Callan did not allow himself more room for speculation. Every now and again the reader glimpses behind the facts, but too fleetingly. This is a pity, because Callan is well known to be concerned about the deep theoretical issues that studies with lampbrush chromosomes have raised. His paper of 1960, co-written with Lloyd, which appeared in *Philosophical Transactions of The Royal Society,* was the first serious attempt to construct a genetic model of chromosomes that took account of molecular data. His "master–slave" model, published in a fuller form in 1967, was very influential, despite being based on the conclusion, now known to be incorrect, that the axes of the lampbrush loops move during transcription. Characteristically, Callan dismisses the "master–slave" model in a single line in this book. Nevertheless some of the problems that inspired it, especially the C-value paradox, have not gone away.

Lampbrush Chromosomes will be an essential work of reference for any biologist interested in the structure and function of chromosomes. It will also, I hope, be read as a source of inspiration by molecular biologists, not only as an example of the happiest of marriages between the old and the new, but also for the many puzzles it leaves open for future study. □

Michael Ashburner is Reader in the Department of Genetics, University of Cambridge, Downing Street, Cambridge CB2 3EH, UK.

Brought to book

Tony Wright

Water Hyacinth. By Brij Gopal. *Elsevier:1987. Pp.471. $122.25, Dfl.275.*

WATER hyacinth, *Eichhornia crassipes*, is an important weed of freshwaters of the tropics and subtropics. The scientific literature on it is large, growing rapidly and certainly warrants a book-length review. Considering the high price being asked for this book, one might assume that it is outstandingly good. It isn't. For this price, one should at least receive a closely argued and tightly edited book printed to the standard of Elsevier's journals. One doesn't.

Dr Gopal obviously put a lot of effort into collecting information: the book includes a very large bibliography. However referencing and organization of the text are sometimes well below par. In Table 29 (p.223), for example, the moth *Acigona infusella* is presented (correctly) as having been liberated in Australia in 1981 as a biological control agent of water hyacinth and the two references are provided. Two pages later (p.225) it is stated that the moth is expected to be released in Australia in the near future, and two other references are provided. In fact neither of the latter two references say anything of the sort. The first merely reports that host-testing is in progress, while the other gives the date of liberation.

In general the author has failed to bring together separate pieces of related information and comment informatively on them. Even when he does, his attempts can be misleading. The success of biological control of water hyacinth in many countries is well known, yet Dr Gopal states that The very foundation of biological control (that escape from naturally occurring 'enemies' results in weed growth) is shaken by the case of waterhyacinth as none of the organisms found in Amazonia has proved to be a biocontrol agent effective against waterhyacinth.

In the preface, Dr Gopal claims responsibility for all deficiencies and errors, but he is not being completely fair to himself. It is inevitable that an author will make some mistakes, but it is usual for an editor to find and correct the obvious ones. Clearly, that editing was ineffectual, as is evident right from the start; for example (p.3), "A much more deeper understanding is necessary . . .".

Missing page numbers in cross-referencing — ". . . is reproduced on p. " (p.18) and "see p. " (p.43) — are more than just unfortunate in a book costing over two hundred Australian dollars. And I cannot imagine why the usual convention for shortening scientific names was not followed consistently. Thus *Eichhornia crassipes* is shortened to *Eich. crassipes* as well as to *E. crassipes, Pontederia* to *Pont.* (p.18) and *Ancyloscelis* to *An.* (p.103). So much for the editing. The standard of printing too is poor. Crooked lines and broken letters abound, and word spacing and alignment are particularly erratic where italics (or rather the type used instead of italics) are used.

There are many more errors and imperfections, and most pages have one or the other. This is a great shame, because they mar a volume which could have been very good. Without a commitment to improving the quality of its books, Elsevier may find few authors willing to help complete the potentially worthwhile series, "Aquatic Plant Studies", in which this is the first title to appear. □

A.D. Wright is in the CSIRO Division of Entomology, Long Pocket Laboratories, PMB No. 3, Indooroopilly, Queensland 4068, Australia.