

Germline Development (Ciba Foundation Symposium 182). J. Marsh and J. Goode (Eds). John Wiley and Sons, Chichester. 1994. Pp. 321. Price £47.50, hardback. ISBN 0 471 94264 2.

Reading this book, I was reminded of the diversity of biological interests which lead people to work with germ line cells. Its all here, from determination and differentiation to cell migration and immortalization. Clearly, from the geneticist's viewpoint, the germ line and its maintenance are of fundamental interest, but the baroque nature of germ cell origins in different embryos means they have become a fascinating model for the study of a wide range of problems in cell biology.

In this volume, the reader is treated to an overview of the origin of the germ line in organisms as diverse as *Volvox* and mice. As is often the case with a work of this type, many of the contributions contain little that is not available elsewhere, but the comprehensive introductions written by the majority of authors, together with the transcripts of the discussion sessions following each presentation, offer a useful source of information to the newcomer and a fascinating guide to current thinking in the field.

Surely the greatest hope for progress in understanding how germ cells become segregated and determined in development is the analysis of strains mutant for germ cell formation. As with so many areas of developmental biology, the fly and worm geneticists are blazing the trail in this area, characterizing grandchildless mutants in the hope that they will elucidate the fundamental biochemistry of the germ line. This hope has been fulfilled for flies, with current thinking on the genesis of the egg and its incorporated information forming the starting point for models of *Drosophila* development. The tools for analysis and the genes involved, however, are only now being characterized in worms.

It is just over 100 years since August Weismann formulated the germ plasm theory, some of the implications of which are still a major stimulus for germ cell studies today. This volume contains an up to date picture of the status of germ plasm in different organisms, from an advanced biochemical description of polar granules, their constituents and roles in *Drosophila*, to observations of nuage in *Xenopus*. However, it is now clear that germ plasm is not a simple germ cell determinant but rather has different roles in different organisms. One interesting attempt at unification is made by Dixon, who suggests that the different origins of the germ line in different groups might be a way of ensuring that the germ cell progenitors don't get caught up in the specification processes which determine the fate of the somatic cells. The germ plasm is postulated to take on a protective role; that is it doesn't specify germ cells, but saves them from a somatic fate. If only such an imaginative idea was easy to test!

The germ cells of multicellular organisms are described in the introduction to this book as the most interesting cells of all. Perhaps it is also fair to say that, at least in vertebrates, they are among the most frustrating. Despite numerous attempts, some documented here, it remains unclear just when the germ line is allocated, what starts the cells migrating to the gonad and how they are directed to their

goal. Some of these problems seemed on the verge of solution with the recent emergence of what appear to be genuine primordial germ cell-derived lines. However, it is all too clear from the contents of one of the discussion sessions that the germ line remains labile and that once in long-term culture, these cells appear to revert to an embryologically earlier phase, more closely resembling embryonic stem cells than migratory germ cells. As ever though, there are new approaches waiting in the wings and clearly no diminution in the enthusiasm of the participants of this symposium to further our understanding of the biology of germ line cells.

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Evolution in Age-Structured Populations (Second Edition). Cambridge Studies in Mathematical Biology. Brian Charlesworth. Cambridge University Press, Cambridge. 1994. Pp. 306. Price £19.95, paperback. ISBN 0 521 45967 2.

This is the second edition of a book which soon became indispensable after its first appearance in 1980. The analysis of age-structured populations was not new in population genetics. Haldane wrote about many issues involving overlapping generations, as he did about non-segregating phenotypes, and the subject was developed in the 1920s by H. T. J. Norton. Since then, we have got used to the Wrightian approach of genotypes within discrete generations. One of the reasons for the comparative lack of interest in non-overlapping generations may have been the discussion by R. A. Fisher of gene frequency change in terms of *average excess*. Fisher's gnomic treatment of subjects tended to create an air of finality, where in fact much more was left to be done. Another factor was the comparative complexity of the mathematical treatment required. Brian Charlesworth set out to develop the theoretical treatment of the subject, so as to make the results accessible to empirical biologists involved with population genetics and animal and plant breeding.

In this his book has been a notable success, provided the reader is prepared to do a little work. The chapters are arranged so that one can browse through the conclusions and skip back to the mathematical derivation as necessary. Chapters 1 and 2 cover some required mathematics, population dynamics, demography and basic population genetics without selection. Chapters 3 and 4 deal with change in gene frequency and equilibrium under selection, while the final chapter is concerned with the conclusions which can be drawn about life-history evolution.

Much has happened on the life-history front since 1980, and a new edition was required to deal with this material. There are getting on for 700 references, over a quarter of which were published since 1980. Among issues dealt with in Chapter 5 are the evolution of senescence and the evolution of iteroparity vs. semelparity. The theory of reproductive effort as a trade-off of reproduction against maintenance and

growth is considered in a long section. It is good to see the idea of constraint in evolution being treated seriously and systematically, something which population geneticists are sometimes reluctant to do. Kin selection and various aspects of sex allocation are discussed. The effect on all of these of living in temporally and/or spatially varying environments is given due attention, an area which has come to the fore in the years between the two editions. Twenty seven of the 78 pages of Chapter 5 cover tests of theories of life-history evolution. The challenge for the future is to assess more fully the effect of variable environments on life-history evolution. Charles-

worth's book is a lucid and rewarding introduction to these subjects. Buy it if you are interested in any of them. At £19.95 the paperback is reasonably priced; since the first edition the number of pages has gone up by 27 per cent and the price by a factor of 3.35, an increase per page of 7 per cent per year.

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