

## Book reviews

**The Biology of Xenopus (Symposium of the Zoological Society of London, 68).** R.C. Tinsley and H.R. Kobel (eds). Oxford University Press, Oxford. 1996. Pp. 464. Price £45.00, hardback. ISBN 1 19 854974 1.

Since its initial radiation from South Africa to laboratories around the world for pregnancy testing some fifty years ago, *Xenopus* has become even more widely distributed as a laboratory source of oocytes and embryos for many studies in cell, molecular and developmental biology. As one of those scientists brought up on a diet of developmental biology after this unnatural radiation, it came as a bit of a shock to learn that *Xenopus* really lives in the wild all over sub-Saharan Africa. The editors' aim in *The Biology of Xenopus* was to bring together aspects of the life of *Xenopus* to generate both a comprehensive reference source and an appraisal of a 'type example' in vertebrate zoology. This sounds a bit dry. Not only does the book achieve these aims, but I learnt much and enjoyed it. As Gurdon points out in the introduction, the life-style of these permanently aquatic animals is fascinating and, for those of us who worry about egg quality, and consequently the appropriateness of food and water supplies to laboratory colonies, knowledge of the ecology, behaviour, defence mechanisms, species differences and speciation is extremely valuable.

The articles are grouped in four sections covering: *Xenopus* species and ecology; behaviour, sensory perception and development; infections and defence; and phylogeny and speciation. Seventeen extant species are described, many of which have been identified only in the last twenty years. In addition five (possibly six) geographical sub-species of *X. laevis* are known, amongst which experimental hybrids are fully fertile. DNA content and karyotype analyses indicate that the species form a polyploid series. Remarkably, only one species (*X. tropicalis*,  $2n = 20$ ) seems to be truly diploid, based on comparisons with other members of the pipid family. *X. laevis* can be considered tetraploid because most of its 18 chromosome pairs can be grouped as quartets of chromosomes by specific replication patterns. On this basis five species are octoploid and two dodecaploid. The distribution of the *Xenopus* species in Africa is complex, in habitats from tropical rain forest to semi-desert, with extensive sympatry in some regions. The wide tolerance of environmental conditions by (particularly) *X. laevis* makes the occurrence of feral populations in Britain, Europe and the Americas hardly surprising. In addition, *X. laevis* seems adept at moving into waterbodies perturbed by human activity. In the unique, acidic, 'blackwater' ponds of Cape Province, incursion by *X. laevis* into the preserve of *X. gilli* has

produced natural hybrids without an increase in ploidy. However, experimental hybrid females of these species produce endoreduplicated 'big' eggs giving triploid backcross progeny which, with a further round of endoreduplication generate fertile tetraploids in the  $F_3$  backcross generation. This provides, with temporary loss of genetic control for environmental sex determination, a route for allopolyploid speciation — clearly the theme for *Xenopus*.

In picking my way through this book, I found the ecology and behaviour sections interesting and enjoyable. *Xenopus* is the only frog so far in which long-term memory has been shown. The information on parasites provides independent insight into *Xenopus* phylogeny through host-parasite co-speciation and is, at a mundane level, valuable for those keeping colonies. In the final section on phylogeny and speciation, I was left cold by the palaeontological evidence, primarily because of my lack of background. The chapters on molecular evolution, allopolyploid evolution and host-parasite co-speciation were much more digestible.

The book is successful in providing a broad biology of *Xenopus* with extensive source information. It draws attention to many questions that, through the relative paucity of field studies, still remain. The theme of allopolyploid speciation provides an intellectually satisfying case. And not least, the diversity of bio-active peptides produced by frog skin is only now being uncovered, although witches have known about it for centuries. Never again will I suggest anyone kisses a frog in the hope of finding the partner of their dreams!

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**Gene Structure and Expression (3rd edn).** John D. Hawkins. Cambridge University Press, Cambridge. 1996. Pp. 212. Price £32.50 (hardback), £11.95 (paperback). ISBN 0 521 56043 8.

Faced with the prospect of having to prepare lectures for first, second and third year undergraduates on gene expression, the opportunity of reviewing this book seemed timely. This slim and economically priced book covers an

enormous amount of ground, reviewing much of molecular genetics in its path. The subject matter ranges from DNA structure to genome evolution, RNA splicing to prenatal diagnosis. Unfortunately, it falls short of the depth and detail one would expect of a general genetics text book, while lacking the elegance of more specialized volumes such as Mark Ptashne's *Genetic Switch* or David Latchman's book on gene regulation. It is reminiscent of well written revision notes, continually providing factual information but essentially failing to provide the colour that, for me at least, makes science interesting. More problematically, the brevity of the text almost requires prior knowledge in order that one can appreciate what is being expressed, potentially making the text difficult for a student to follow. Perhaps the book would serve well if a course was crafted around it but it does not have enough depth for the disparate interests of most lecturers who would almost certainly wish to expand well beyond the text or include areas not covered.

Inevitably with any text, particularly one which presents a continuous stream of factual information, there are minor errors or over simplifications. For example, GAL80 is presented as actively binding with or dissociating from GAL4 in response to the inducer, which is now thought to be erroneous, and in an earlier section on the DNA binding domains of what I presume to be GAL4 and related fungal proteins, the well characterised zinc binuclear cluster, which involves six cysteine residues, is described as zinc finger involving two cysteinyl and two histidyl residues. Although much is covered it is interesting that striking omissions still remain, for example, prokaryotic gene regulation does not include bacteriophage  $\lambda$ , the SOS or the heat shock response. However, I was pleased to see that the *lac* operon merited no greater emphasis than the *gal*, *ara*, *mal* or *trp* operons. For this new edition the information on techniques has been reduced, two chapters having been condensed into one. Consequently, as the text does not show how techniques have answered questions, the result is that the limited information is probably too isolated to be useful. With this section in particular, but perhaps also for the text throughout, a greater emphasis on the conceptual would assist the reader in appreciating what is being described (e.g. why clone a gene, what questions can that answer and how can different types of information, combined with the power of molecular genetics, be used to develop viable cloning strategies, etc.).

Looking back I feel I have been a bit harsh, the book is far from bad, and much of the text is clearly and precisely written. Perhaps the saddest omission is that its concise nature precludes the reporting of any of the experimental adventures that have provided the myriad of facts, and there is no sense of a complexity that remains untold.

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**Aspects of the Genesis and Maintenance of Biological Diversity.** Michael E. Hochberg, Jean Clobert and Robert Barbault (eds). Oxford University Press, Oxford. 1996. Pp. 316. Price £60.00, hardback. ISBN 0 19 854884 2.

Carefully conceived and edited multi-authored volumes of interest to a wide readership succeed by taking one of several approaches and sticking to it. They can take a process, idea, concept, or hypothesis and explore it from a wide variety of angles, making clear what has been included and excluded. They can take a pattern, observation, or result and explore hypotheses that explain and predict. Or they can take a collection of similar but non-identical objects, ideas, concepts, observations, or results and evaluate the combination of processes and patterns displayed in the diversity of those collected things (stars, eighteenth century musical works, vertebrates, genes).

This well-edited volume is of the third type. Its collection of objects is the diversity of extant and fossil species, the genes they contain, and, to a lesser extent here, the interactions among them — what we call biodiversity. The editors made no attempt to hold authors to a single theme on biodiversity, or even a group of themes. In fact, they say explicitly in the Preface that they are offering a transect through some of the major questions and themes. That kind of approach may put off some readers, as it often does me. But in this case that would be a mistake, because what we are given here are the combined views of a wide range of biologists on some of the most interesting questions concerning biodiversity and approaches to answering those questions. The final chapters are on what John Lawton and several co-authors in an overview section call 'the problems faced by biologists in their role as curators of biodiversity'.

The sixteen chapters sweep across many of the current major themes: the interpretation of diversity patterns in the fossil record, methods for (and pitfalls in) inferring process from pattern using species trees and gene trees, the structure of food webs and trophic interactions, the effects of non-uniform population distributions on the genetic structure and dynamics of populations and the ecological dynamics of interspecific interactions, local through global gradients in species numbers, and some implications for conservation. Most of the chapters are too short to develop arguments in depth, but most are long enough to explain why the questions are interesting, how those questions can be approached, and what kinds of progress are being made in getting some answers.

What is missing from the book are two things. The first is continuity of argument among chapters. To some extent, that is inevitable in any edited volume. Some continuity, however, is established through Robert May's introduction, which nicely sutures at least some of the chapters, and three other useful overviews of sections of the book, written by teams of authors. The second missing aspect is some indication of, well, what is missing. It is difficult to know from this collection of chapters whether the editors and authors think that these are major issues and questions in biodiversity and we should therefore