

With over 1200 pages, this is a book to dip into. Any scientist working in the subject will want to have a copy on the shelf, because it will provide an essential reference source. Others following this particular story, however, will find a wealth of new material, good science, well-argued points, and food for further thought when they grapple with the important ethical dilemmas. The format of a well-informed debate, which emerges from the 2nd World Congress, will lead to improvements in laboratory animal welfare by providing replacement alternatives, reduction alternatives and refinement alternatives.

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Living Biology in Schools

Edited by Michael Reiss (1996). Institute of Biology: London. 120pp. Paperback. Obtainable from the publishers, 20-22 Queensbury Place, London SW7 2DZ, UK (ISBN 0900490322). Price £12.50.

Overall, I found this to be a very useful guide to dealing with living organisms in school laboratory/classroom situations throughout the country. In fact it should find itself on the shelf of every secondary school prep room. I feel it is unlikely to be read by every science teacher, but as long as the Head of Science reads it from cover to cover, then valuable information can be passed on to colleagues and included in schemes of work.

The 'Introduction' makes the valuable point that probably the biggest constraint upon using living organisms as educational tools is the duty of care involved both during the school term and, most importantly, over holiday periods. Few teachers or technicians have the time for good husbandry, and many who have inherited animals from a previous teacher will not even have the inclination. Keeping living things in school requires some form of ongoing commitment built into work schedules.

The second chapter, on microbiology, is probably the most original and useful chapter for a teacher. Micro-organisms, their uses and dangers are an integral part of the *Life Processes and Living Things Attainment Target 2* of the Science National Curriculum. If understood properly, and used safely, microbes can play a part in a number of interesting and low-resource-demand experiments. Because this branch of biology is little understood, particularly by non-biologists, great care must be taken to give adequate safety instructions but not to scare people away from otherwise simple procedures. Box 2.4 - level 2 explains that body surfaces must not be used as an environment from which to supply microbes due to potential danger from human pathogens. Should this be read as including making thumbprints in an agar medium, a simple and often-used experiment? If not, it may be creating unnecessary worry. Similarly, possibilities for practical investigation into the production of food and drink should be encouraged, as in this book, but must also be accompanied by a warning not to allow tasting of the product. Box 2.5 provides an excellent summary of simple precautions. If it was all on one page it could easily be photocopied, enlarged and stuck up on the wall of the laboratory or prep room.

The interesting chapter on plants unfortunately emphasizes outdoor gardens which makes its suggestions unfeasible for most inner-city schools. These ideas will only be possible in a school with excess space, committed and cooperative pupils and excellent site security. Does such a school exist? Surprisingly, in the present conservation-minded environment, there is no mention of the value of maintaining an uncultivated 'wild' area. The areas of the

curriculum for which this could be used are numerous eg plant biology, animal biology and general conservation issues.

Invertebrates are often thought of as an 'easy option'. Although it is true that they generally require a lower level of husbandry than other living organisms, keeping such animals in captivity should not be taken for granted or given any less consideration. Therefore, more effort could have gone into explaining possible pitfalls of choosing, housing and handling invertebrates. Some exotic species mentioned (eg the ever-popular African Land Snail) are easily obtained but not so easy to dispose of if only wanted for a short period of time, as it is illegal to release exotics into the wild. It could, therefore, be further stressed in this section that when selecting an animal one must be fully aware of all the implications involved. When advising schools on methods of animal collection, suggesting the use of forceps for picking up insects is also to be discouraged due to the possibility of damaging animals. Many common invertebrates can be caught in the environment, however, some may be unsuitable school animals due to their lifestyle. Cockroaches, earwigs etc should not be captured in buildings and then used as display animals, particularly if children will be touching them, as they may often be carriers of harmful human pathogens.

The section on vertebrates seems very short, with little information on the most commonly kept species within each vertebrate class. This seems to be in contrast with their prevalence within schools. Lots of follow-up references are given, but it is unlikely that the majority of readers will ever have the time to look them up. I feel a great opportunity was missed in what is otherwise an extremely important and necessary area.

The section concerned with keeping fish made no mention of suitable tank shape or size, or the need to avoid circular bowls due to their small surface area:volume ratio for oxygen diffusion. Keeping most tropical species requires far too much in terms of effort and knowledge of good husbandry for most schools. Also, there is no mention that certain combinations of species or sexes can lead to aggression, as can overcrowding of territorial species. These factors must be considered when selecting fish for a display.

While it is good to see sensible advice for limiting frog spawn collection being given in the chapter on amphibians, it would be nice for the public to know the reasons why. A conservation message, encouraging the return of young frogs to the wild could then be included. However, successful reintroduction to the wild is more complicated than this section of the book suggests. The very brief treatment of this area leaves people with the wrong idea – it is not as simple as tipping a bowl into a pond! Providing unusual or interesting possibilities for further study has its place, however, suggesting injecting *Xenopus* with hormones seems a little unnecessary at the level of study with which this book is primarily concerned. It is also extremely doubtful that any school will have a member of staff competent enough to carry out this procedure humanely.

Although the section on reptiles does mention that terrapins are very difficult to maintain and can carry infectious diseases, schools should be discouraged from keeping them. Seeing such animals in captive situations in school may encourage children to purchase what are, essentially, unsuitable pets. If schools are encouraged to keep birds for behavioural studies the book should advise that many species of cage bird require company, to avoid development of unsuitable stereotypic behaviour.

The greatest omission from the section on keeping mammals is its failure to emphasize that *somebody* in the school must be able to identify the sexes at a young age, particularly with rodents. As most of the popular mammals kept in schools are rodents, able to breed many times a year at a young age, it must be stressed that sexes should be identified and kept separately. If random breeding is allowed, overcrowding becomes a threat and offspring will be eaten – not a particularly pleasant truth for children to learn. Also, if mammals are to be handled by pupils, this must be done routinely to allow the animals to become accustomed to handling. Ideally, this section should advocate using individual animals as the ‘study object’ on a rotation basis, to limit the amount of stress caused to each animal.

The remaining chapters of the book on, ‘Pupils as a resource’, ‘Legalities’, ‘Safety’ and ‘Moral and ethical issues’, cover their subjects adequately, especially the sensitive nature of using humans as a study resource. However, much of the material in chapter 7 (‘Safety’) should be incorporated, where relevant safety points arise, in earlier chapters – or these should at least contain references to this chapter. I feel that most teachers are only likely to read the chapters or sections whose content directly concern them at the time. As a result, consideration of many vital safety aspects will not come across. Areas of safety and welfare are of paramount importance when dealing with living organisms and should therefore form an integral part of explaining laboratory procedures, formulating educational possibilities etc.

Finally, page 80 (para 4) states: ‘It is still advisable to adopt the standard methods of *Human Killing*’! Surely this is an amusing, but unfortunate, copy-editing error?

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Birds of Prey, Medicine and Management

Manfred Heidenreich (1997). Blackwell Science: Oxford. 284pp. Hardback. Obtainable from the publishers, Osney Mead, Oxford OX2 0ER, UK; or, for North American orders, from Iowa State University Press, 212 S State Avenue, Ames, Iowa 50014-8300, USA (ISBN 0632041862). Price £89.50 or US\$194.95.

Manfred Heidenreich states in his preface that he is both a passionate falconer and a veterinarian. This is certainly reflected in the underlying essence of his book, which is the culmination of twenty years of experience. He describes how it has been written for a wide and diverse potential readership, which he hopes will include practising veterinarians, biologists, raptor breeders and falconers, ornithologists, public officials, government veterinarians and custom officials. He also aims to cover a broad range of subjects, so its title of ‘Medicine and Management’ is quite apt, since it could sit happily in both the veterinary medicine and the animal management sections of any library. However, as a result of these rather grand aims, I suggest that this book be considered as a ‘jack of all trades, but master of none’.

Birds of Prey, Medicine and Management was first published in German in 1995 and was then translated into this English language edition. When described as an ‘English language edition’, it would be more accurate to describe it as an English-American edition, with a significant amount of grammatical confusion. Examples include variable spellings of ‘moult’