The God Delusion. Richard Dawkins. Houghton Mifflin. Boston. 2006. 416 pp. Price: US$ 27.

What are the limits to scientific enterprise? There are on the one hand, technical limits which demand that scientific activity follows a progressive sequence of developments, each of which requires dedicated effort and which more often than not, spills far into the future. On the other hand, the scientific enterprise is also often restricted by its language and by the intrinsic difficulties of communicating scientific ideas, both within the scientific community and also to the rest of the society. It is the price that scientists pay for specialization. Quite naturally, the public understanding of science becomes an important issue in a society increasingly dominated by science and technology. And the limits to scientific activity are also set by the understanding and perception of scientific issues by the general public. Richard Dawkins is the Charles Simonyi Professor for the public understanding of science at Oxford University. The book under review cannot quite be classified as popular science, as perhaps some of his earlier books can be. It is in part a polemic against religion, but the core of the book is written more in the spirit of the philosophy of science. For, it is indeed the philosophy of science that deals with issues of the 'scientific method', and the more or less explicit purpose of the book is to extend the scientific method into the heart of religion and in particular, to provide scientific arguments for the non-existence of God.

Given the facts of authorship, it is easy to guess that the arguments given in the book rely on Darwin's theory of evolution based on natural selection. But before these arguments are detailed, the first three chapters are devoted to setting the stage. Various arguments for the existence of God are discussed and rejected. In particular, the author rejects the separate magisteries of science and religion, proposed by another well-known biologist, Stephen J. Gould (chapter 2, p. 55). In chapter 4, the author discusses the reasons according to which 'almost certainly God does not exist'. To reach this conclusion the author relies on the 'anthropic principle', according to (a planetary version of) which favourable physical conditions – in a statistical sense – exist for the creation of life on planets in a narrow band of orbits around stars called the 'Goldilocks zone' (pp. 136–137). This is to be seen in contrast to the argument based on intelligent design. The author's claim that 'skyhooks' or arguments invoking the existence of God do no 'bonafide explanatory work' seems doubtful, at least from a historical perspective: the idea of a 'deterministic universe' as embodied in Laplace's God (or even Maxwell's demon!) all arise as some version or the other, of an anthropocentric God. The Darwinian explanation for religion is detailed in chapter 5. Given the repeated emphasis that the author puts on the efficiency of natural selection (pp. 163–164), the 'by product theory' of religion comes as a surprise. Under the circumstances, one expects that religion and such other inessential 'by products' of evolution that natural selection throws up from time to time – if that is the correct interpretation of the view that the author takes – would also have been quickly eliminated, before it became a universal feature of human society? While the by-product theory attempts to explain the 'hard wired' or 'genetic' component of the evolution of religion, the author suggests that another replicator – the so called 'memes' or units of cultural inheritance – may be responsible for the more detailed historical aspects of the evolution of religion (p. 201). In chapter 6, the author discusses Darwinian reasons for moral behaviour. This is an elaboration of the 'by-product theory', explaining our innate moral behaviour (for example, expressions of love and compassion) as having evolved via natural selection from a primitive social environment based on kinship (p. 221). The author uses the term 'misfiring' (as in firing of neurons?) to describe the persistence (or irreversibility) of these moral tendencies in the modern world where, in contrast to kinship, impersonal relationships dominate.

Whatever may have been the original source of our moral behaviour, chapters 7 and 8 are powerful statements on the irrelevance of historical religions in many of the social problems faced by the modern world, while at the same time being the source of many of these problems. Chapter 9 discusses the vulnerability of children to religious indoctrination and makes a strong plea for their right to make independent moral choices based on reason rather than faith. Chapter 10 discusses the special role of religion in providing 'inspiration' and 'consolation' to the faithful and compares this with the role that science plays (or can play) in similar situations.

The issues discussed in the book and moreover, recent developments in science and technology, notably genetic engineering, bring into focus the question of the irreversibility of evolution under natural selection. By 'irreversibility' we mean that adaptations in a species to specific physical conditions may tend to persist well after the conditions that produced them have disappeared (as in the phenomenon of 'misfiring of moral behavior' mentioned above). Extinction is perhaps the ultimate expression of such 'irreversibility'. Both religion and science, in spite of their mutual incompatibility, are manifestations of collective and cooperative behaviour in *Homo sapiens*. Perhaps, the reason that religion continues to be a powerful influence is that cooperation is an equally irreversible condition of our evolution, whether it be due to group selection or any other form of natural selection?

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Birds of Prey of the Indian Subcontinent. Rishad Naoroji. Om Books International, New Delhi. 2007. 692 pp. Hardcover price £40.

With this book, raptorphiles in the subcontinent can safely consign volume 1 of *The Handbook* to their back shelves without any regret. The combination of an exhaustive literature review (with information compiled from diverse sources)

supplemented by the author's own comprehensive notes spanning decades, makes this book the definitive must-have reference on Indian raptors for both the ornithologist and the serious amateur, and the long period of gestation for this volume has been more than amply justified.

What stands out in each section of this book is the remarkable depth of research on every aspect of raptor biology and the breadth of the author's own experience with and contribution to the study of Indian birds of prey. In addition, the concise and intuitive style of writing and excellent editing deserve mention.

The introductory section is well ordered and comprehensive, and written in an easy, fluid, jargon-free manner that serves to simplify several technical concepts, including taxonomy, nomenclature and flight characters, with general tips and caveats on raptor identification. The chapter on raptors in Indian history and mythology chronicles sport falconry and the place of raptors in Indian culture through the ages, and draws from varied texts and historical accounts. Despite being similar in general content to accounts in other books belonging to this genre, it is an interesting read.

A section is devoted to biogeographical distribution, with a description of each biogeographic zone including extent, protected areas, habitat types, overall vegetative and faunal composition, and threats, and is accompanied by excellent colour photographs representative of the major habitat types. Although a tremendous amount of data are packed into relatively few pages, the text itself avoids the danger of tedium, and even standalone, the chapter is an exceptional broad introduction to India's biogeography, which will be of value to readers interested in Indian wildlife in general. For raptor lovers specifically, an analysis of species richness of birds of prey across the biogeographic zones and a sequential checklist of the raptors of each zone will be of special relevance.

'Locating, Observing and Photographing Raptors' deals with broad tips and guidelines on finding birds of prey, especially their nests, and the proper methods of observing species in their nests. Included also is a brief description of the applications and drawbacks of various methods of raptor study such as radio telemetry, as well as practical advice on raptor photography.

By far the most detailed and comprehensive part of the general section is the chapter dealing with raptor conservation and management. A highly detailed, well referenced and up-to-date account of vulture decline in South Asia (with specific reference to Indian white-backed, Indian long-billed and slender-billed vultures), chronologically tracks the vulture crisis and rationally weighs the role of diclofenac as the culprit against other possible causes. Also noteworthy is the section on threats to different raptor habitats and the identification of 'Raptors to Watch', which specifically deals with four poorly known species at high risk. Throughout, the author makes practical and well-balanced suggestions aimed at raptor conservation, including the regulation of trade in raptors, on which a substantial narrative is also presented.

The fifteen colour plates illustrated by N. John Schmitt are superb and exceptionally detailed, and are meant to complement the colour photographs included in the individual species accounts. All bear a white background (as opposed to all coloured backgrounds in the *Pictoral Guide* and some in the *Pocket Guide* by Grimett *et al.* (p. 59: kites, bazas and osprey; pp. 64, 65: harriers and pp. 72–74: falconets and falcons). The attention to detail is obvious, as is the faithfulness in rendering the colours of plumage and bare parts. A total of 277 (!) illustrations depict adult males and females, various colour phases and morphs, juveniles and immature birds, and subspecies (where relevant) of 44 species. Plate 3 is dedicated entirely to the various subspecies, morphs and stages of the Oriental honey buzzard. Also striking is the manner in which the artist has conveyed the 'jizz' or 'feel' of each species, both when perched as well as in flight. Illustrations of the fish eagles and hawk-eagles deserve special mention in this regard, over and above what is a highly consistent and superlative collection of paintings. It is evident that the illustrator has spent a considerable amount of time in the field observing raptors and is intimately familiar with his subjects. Plates 1 (Black-shouldered kite and bazas), 2 (Short-toed snake eagle and Indian black eagle) and 15 (Shikra, Nicobar sparrowhawk, Crested goshawk, Great Nicobar serpent eagle, Andaman serpent eagle and Crested serpent eagle) are especially well laid-out and appealing. In contrast, plates 3 (Oriental honey buzzard), 6 (vultures I) and 9 (Upland buzzard and Golden eagle) appear cramped and overwhelming. This is also true for plate 10 (Greater spotted, Lesser spotted and Tawny eagles), which depicts three similar species – navigating this plate may prove a little difficult! Also, the numbering of illustrations on plate 3 is confusing, although the basis for this in grouping birds in flight and those perched is evident. Plate 3 could possibly have been arranged more in the manner of plate 9.

The individual species accounts, as with the rest of this book, are incredibly well researched and informative, and include vernacular names, etymology of the Latin name and the vital measurements of each race. Superlative colour photographs (with pointers to identification) accompany the elegant text in a majority of the species accounts. A section on the identification of each species is split into two parts – the first a dry and exhaustive description of plumage and bare parts of the different sexes, morphs, phases, stages and subspecies of the species; the second devoted to field characters, describes well the 'jizz' of the species, with useful tips and diagnostic features to aid in identification. Potentially confusable species are adequately covered. There are, in addition to the text, a few tables that cover differences in confusable species such as Upland and Long-legged buzzards. Similar tables for accipiters and the peregrine and allied falcons would have been useful. Species accounts include the most detailed and up-to-date distribution maps ever for Indian raptors. Each map has its own legend that makes referring to the index page unnecessary, and vastly improves user-friendliness. Notes on status, distribution and habitat are again comprehensive and supplemented by the author's own extensive work in the field. In this regard, accounts on breeding biology deserve mention, for the author has filled many gaps in knowledge on this subject with his own impressive volume of observations and notes.

The overall layout of the book is well planned, user-friendly and easy to navigate. Some minor formatting errors have crept in (e.g. four words in the species account of the white-eyed buzzard from p. 400 have been carried over to p. 402, and the line drawings on p. 16 are not clearly labelled). A glossary would greatly enhance the scope of this book, making it useful even to beginners and amateurs with more than a passing inter-

est in raptors. The only real drawback with this book is that it cannot be carried into the field. Perhaps, by compiling the plates and photographs with some brief text and identification pointers, a truly invaluable and comprehensive field guide can be brought out.

The eight appendices deal largely with conservation issues and the global status of Indian raptors, and are informative. The bibliography is handily divided into 'General references' and 'Species references', and these together span 50 pages, representing a refreshingly thorough and in-depth quality of background research. The index combines both Latin and English names, and although dealing only with the matter within the individual species accounts, is easy to use.

Highly comprehensive and well written, with high-quality colour photographs and illustrations, this is a landmark contribution to Indian ornithological knowledge, and as an all-encompassing reference on Indian raptors, will almost certainly never be surpassed. A must for the serious amateur and field ornithologist.

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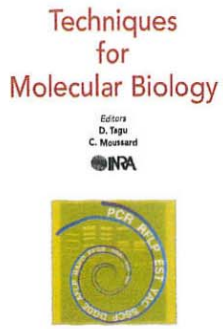

Techniques for Molecular Biology. D. Tagu and C. Moussard (eds). Science Publishers, An Imprint of Edenbridge Ltd., British Isles, P.O. Box 699, Enfield, New Hampshire 03748, USA. 2006. 277 pp. Price: US $45.

This is an unusual book, because I could not make out the target audience for whom it was written. The editors omitted the usual Preface and left us with no option except to make our own educated guess about those who might possibly benefit from this work.

There are 57 profiles covered under eight sections. These profiles are summaries of various techniques. We were not told on what basis these sections were created and various profiles grouped together. I could not figure out the scientific logic behind the groupings. The profiles are unclear and in many places totally wrong. For example, on p. 16, in the bottom panel (these are not labelled as figures for some reason), the legend says that the protruding ends are 3′-OH ends. But the line drawing shows protruding 5′-P.

In profile 11 we have the following statement: 'The Klenow fragment of DNA polymerase I isolated from *E. coli* is capable, using the complementary strand as template, of adding nucleotides to a 3′-OH end of DNA, which appears when one of the strands of a DNA molecule is cleaved'. This statement implies that every *E. coli* makes Klenow fragment of DNA polymerase. The same profile also has the following: 'This enzyme also has a 5′-exonuclease activity that eliminates nucleotides on the 5′-P side of the cleavage'. This is incorrect. Klenow fragment generated by subtilisin cleavage lacks the 5′-exonuclease activity of DNA polymerase I. Such mistakes are abundant in the book.

There are vague statements, such as the one given below, in several places. The vectors that could carry large inserts are called 'large vectors'.

I do not recommend this book for anyone, unless someone wants to test his/her capability to spot mistakes.

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MEETINGS/SYMPOSIA/SEMINARS

International Conference on Terrestrial Planets: Evolution through time

Date: 22–25 January 2008
Place: Ahmedabad, India

Physical Research Laboratory (PRL) will hold an international conference on the above theme to provide a forum for discussion on the present status and future perspectives in utilizing modern geochemical and isotope techniques to understand the origin and evolution of the solar system, the chronology and causes of major events on Earth, past climate, and dynamics of various reservoirs in Earth. The conference is organized as a part of PRL's Diamond Jubilee Celebrations.

For further information please refer to the conference website: http://www.prl.res.in/~djconf08

National Workshop on Rapid Aneuploidy Diagnosis by FISH

Date: 20–25 August 2007
Place: AIIMS, New Delhi

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