

tion . . ." (i.e. taxon); ". . . third alternative . . ." — and the chapters are short. The bibliography is excellent; here Feduccia refuses to "talk down" to the reader and quotes every reference, not just "further reading". However, the illustrations although numerous are often disappointing. They include black and white photographs of specimens and localities, and a number of frankly mediocre original drawings by several hands, the low standard of which is emphasized by some of the splendid and



Reconstruction of *Archaeopteryx* by Rudolf Freund.

famous restorations by Heilmann, Charles Knight and others with which they appear. Many of these cry out for their original colours. Presumably the decision to exclude the use of colour was the publisher's rather than the author's; nevertheless I imagine that it will affect sales adversely. This is a pity as the book is otherwise well produced and certainly deserves an audience. □

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Gorillas on a tightrope

Alison Jolly

The Natural History of the Gorilla. By A. F. Dixon. Pp.202. ISBN 0-297-77895-1. (Weidenfeld & Nicolson: 1981.) £16.50. To be published in the USA by Columbia University Press.

IF YOU want to know about gorillas, you need this book. Alan Dixon has summarized the present state of knowledge about all aspects of gorillas' biology from anatomy to conservation. Furthermore, he writes in a lucid, factual style which presents the information clearly to anyone from fifth form to professorial status, without either talking down or jazzing up.

The drawings (by Dixon himself) add both clarity and charm.

The book has several strengths. First, it deals equally with the results of laboratory work and results from the field. Dixon's own studies range from laboratory analysis of primate hormones and sexual behaviour, through the testicular atrophy of several adult male silverbacks in zoos (including Guy at London), to making field censuses of gorilla populations. He is thus well placed to appreciate both sides of the story. A second strength is the balance achieved between generalization and data from individual studies. In the chapter "How Close to Man?", he manages to explain quickly many of the bases of primate classification, sum up the evidence which suggests man's close relationship to gorilla and chimpanzee and the more distant relationship of these three African species to orang-utans, and yet include the divergent studies which indicate Asiatic, rather than African, origins for man. Similarly, when he describes wild populations, he includes data showing differences between the three gorilla subspecies, and even between western and eastern Virunga Volcanoes, adding appropriate caution about sample size. In a popular book, it is unusual to avoid generalizations about "the gorilla" meaning ten or twenty individuals on Mount Visoke.

Finally, Dixon covers the whole scope of the literature from Hanno (fifth century BC) up to 1980. This enables him to deal fairly with such experiments as Yerkes' on Congo (1926–1928), which is still one of the most complete accounts of a gorilla's problem-solving, as well as Redshaw's (1978) splendid Piagetian study of the development of infant gorilla intelligence. The conservation account is also up to date, to the death of Digit and others who had their heads and hands chopped off for tourist souvenirs.

The main reservation I have is that Dixon does not pursue his synthesis of detail quite far enough for my taste. I looked for a discussion of the relation of gorilla leaf-eating to metabolism, ranging and social structure, and comparison with the frugivorous orang and chimp. All the pieces are there, but Dixon does not explicitly link them up; similarly, reproductive strategy is split into several different chapters. This is clearly his choice — he gives us the data without fashionable theorizing, but he is better placed than most of us to deal with such theories.

I could also do with slightly more drama in the final chapter on conservation — perhaps some of Dian Fossey's emotion over Digit, or Alan Goodall's encounters with poachers in *The Wandering Gorilla* (Collins, 1979). Instead, Dixon has chosen restraint. Perhaps he is right that estimates of the remaining wild populations and their possible or likely extinction are even more horrifying.

The whole question of how to balance

professional against popular appeal bedevils primate studies. In the circumstances Alan Dixon's summary of the natural history of the gorilla for such a wide audience is laudable. Scholarly balance may seem faint praise until you add that it is balance on a very thin tightrope indeed. □

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Lure of the shore

J. T. Enright

Intertidal Invertebrates of California. By Robert H. Morris, Donald P. Abbott and Eugene C. Haderlie with 31 contributors. Pp.920. ISBN 0-8047-1045-7. (Stanford University Press: 1980.) \$45 US only.

This is a book for those who find the California shoreline at low tide a place of beauty, wonder and interest, and who want information on the common animals that live there. [Preface].

THE west coast of North America has one of the most diverse temperate-latitude intertidal faunas in the world. In California that fauna provides research material for dozens of marine laboratories and learning material for hundreds of high schools, colleges and universities. *Intertidal Invertebrates of California* is aimed at that limited — some might say, provincial — audience, but it could conceivably also lure naturalists from the entire world to view and study this showplace of diversity. Whether or not it eventually has that sort of incidental success, there is no question about its value and importance for the intended audience: every biologist, professional or amateur, who ventures into the California intertidal zone for the first — or the ten-thousandth — time should have this volume available.

Thanks to a grant from The David and Lucille Packard Foundation, the price is such that most users will be able to purchase their own copies. Even a first glance at the 200 photographic plates — all but three of them in colour, most with four to six separate portraits of the animals — will persuade the prospective buyer that this book is a bargain. The majority of the photographs were taken by Morris, but nearly 50 other naturalists contributed to the handsome illustrations. This portion of the book will be particularly treasured by all who find the "shoreline . . . a place of beauty [and] wonder".

With the photographs as the bait, Abbott and Haderlie, together with 31 other contributors, have provided nearly 700 pages of text, bibliography and index for those "who want information". Some 750 species are treated in detail in the 24 chapters. For each of entry, the text provides the classification of the animal; a morphological description, including

typical size and the features which distinguish that species from those with which it might be confused; and notes on habitat and geographical distribution, often with qualitative comments on abundance. Usually there is additional information on what is known of the animal's natural history. Each entry closes with literature citations, sometimes only one or two, in other cases several dozen. Detailed references are then provided at the end of each chapter.

The introduction suggests that this book was intended as a primary guide for identifying the animals, but this emphasis is, I think, misplaced; it will simply not do as a field manual. Its unusual format and sheer weight (about six pounds) militate against carrying the book along to the shore. Beyond the problems of getting book and animal together (since the reader is, rightly, urged not to bring specimens home with him), there are none of the traditional "keys" for identification; and the coverage is intentionally restricted to the more common and conspicuous elements of the fauna, meaning that using the plates and text for primary identification would be not only time-consuming but often misleading.

For field identification, then, one should instead take along Smith and Carlton's revision of *Light's Manual* (University of California Press, 1980). Thereafter, *Intertidal Invertebrates of California* can be treated as something akin to a biographical dictionary. Knowing, or at least having a strong hunch about the name of the creature, the reader can here confirm that he has, indeed, probably seen this or that member of the community, and then learn some of what the experts know about it, as well as where to find further information.

A conspicuous contrast with a biographical dictionary is that no historian is ever likely, on the basis of some arbitrary legal point, to decide that henceforth Madame Curie will be known only as Marie Skłodowska. Many of my old friends in the intertidal zone, however, regardless of how well established their reputations were, are now assigned names different from those I learned 25 years ago. In some cases (e.g. *Mitella polymerus* and *Aletes squamigerus*) the older names are also included in the index to this volume; but for others (e.g. *Acmaea digitalis* and several congeners, and *Lepidopa myops*) there is no hint about former identity. This is, of

course, not so much a complaint about this book as about the problems inherent in nomenclature, and it can be argued that such changes represent "progress"; but I sometimes wonder. . . .

The neophyte will find the chapter introductions and the detailed text entries in this book most useful; the more advanced student will find the literature citations a good starting point for a research project; everyone will, I think, enormously appreciate the coloured plates. The professional biologist who knows some part of the literature on a particular group or species will no doubt note — as I did —

cases of mistaken conclusions, incomplete or outdated citations, and unevenness in coverage. But it would be petty to emphasize such deficiencies. The central point is that this book is an indispensable addition to the library of all who are interested in the common intertidal invertebrates of the California shoreline — and it contains a very attractive collection of colour portraits for those who will never get there. □

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Old twists to an old tale

Jerry Donohue

The Double Helix: Text, Commentary, Reviews, Original Papers. Edited by Gunther S. Stent. Pp.298. ISBN hbk 0-297-77899-4; ISBN pbk 0-393-95075-1. (Weidenfeld & Nicolson/W.W. Norton: 1981.) Hbk £10; pbk \$5.95.

AN OLD proverb, as given by Gibbon, tells us that "happy is the nation that has no history". If this applies to substances, then DNA, surely, is the unhappiest of molecules, for it is the subject of innumerable biographies.

This new book contains: the complete *The Double Helix*; reprints of 12 reviews of it from 1968 and discussions of these by Gunther Stent; reprints of three papers from *Nature* by James Watson, Francis Crick and Aaron Klug; three letters to *Science* from 1968 by Max Perutz, M.H.F. Wilkins and Watson (see below); reprints of six papers from 1953–54 describing the original DNA work done in Cambridge and King's; and a name index the usefulness of which is somewhat marred by careless inaccuracies.

Should the fact that only about 5% of the contents of this new edition is previously unpublished material be cause for discontent? Probably not, as it brings together *The Double Helix* and some of the important writings it spawned. There are, however, other causes for discontent which are hardly contentious. The original text of *The Double Helix*, including the photographs and diagrams, ran to 233 pages; in this reprint these occupy 135 pages. This drastic compression was accomplished by abandoning the elegant format of starting each chapter on a new page; by taking the plates of the first (Signet, 1969) paperback edition, which was itself a compression of the original, and compressing it still further by putting more lines per page; and by reducing the sizes of the photographs, some by more than 50%, so that the individuals in the group photographs are virtually unrecognizable. Also reduced in size is the photographic reproduction of an historic

letter of Watson to Delbrück which is legible only with great difficulty and, in some places, totally undecipherable, a circumstance not caused by Watson's crabbed hand. Surely a book as important as this deserves a better production.

Something very mysterious should also be pointed out. In the diagram on p.111 the enol structure for thymine incorrectly has an oxygen atom where there should be a hydrogen atom. The same diagram on p.191 of the hardback first edition of *The Double Helix* is correct, and identical in every other respect, right down to the pattern of dots inside the rings of the bases. Now, admittedly, some of the early difficulties in cracking the DNA structure concerned the keto-enol business, but what sinister force, in Alexander Haig's terminology, took it upon itself to change a correct structure to an erroneous one?

There are several misconceptions and misreportings that ought to be dispelled before remarking on a few of the reviews included in this new volume.

● *The Myth of the Invention of Base Pairing.* Throughout the reviews runs the thread of the notion that Watson and Crick would never have discovered their structure had it not been for "rules" of Erwin Chargaff that in DNA (molar amounts of) cytosine = guanine and thymine = adenine. However, Chargaff himself had not yet referred to this relationship as rules, and, indeed, his own published analytical data gave merely the merest hint of these regularities, and he himself averred the possibility that the regularities might be accidental. Stent (pp. 168–169) has more to say on this.

The fault for these misconceptions must be squarely on the shoulders of Watson. We find him writing (p.75) "The moment [Spring 1952] was thus appropriate to think seriously about some curious regularities in DNA chemistry first observed by Chargaff", and then subsequently cheerfully disregarding them, and building a like-with-like, non-complementary, model. In addition, he had been assured by his friend, the biochemist Markham, that if

Cold Spring Harbor Laboratory have recently published the proceedings of the symposium on viral oncogenes which was held last year. The two-volume set of proceedings, comprising Vol. XLIV in the series *Symposia on Quantitative Biology*, is available from CSHL, Fulfillment Department, PO Box 100, Cold Spring Harbor, NY 11724, or through booksellers, price \$130 (\$156 outside the USA).