

VIEWS AND REVIEWS¹**Where evil lies****Where the Truth Lies: Franz Moewus and the Origins of Molecular Biology**

Jan Sapp. 1990 (October). Cambridge Univ. Press. ix + 340 pp. Apparently acid paper. ISBN 0-521-36550-3 hardbound, \$60.00 (minus 50 cents); -36751-4 softbound, \$19.00 (minus 5 cents).

This is an evil book. The word isn't fashionable nowadays, other than on Sunday mornings, perhaps to avoid seeming better-than-thou, but the phenomenon obviously exists. Its manifestation here is in a relatively new but not uncommon form.

The main interest of Moewus is that most or all of his work was fraudulent. Sapp rather defends this and claims that it is the usual practice in science. He thinks that science, like the loonier kinds of lit crit, isn't about the real world but about power struggles among the participants. That such exist doesn't mean that there is nothing more beneath them. Here all is form, with no substance. Do we know anything at all with reasonable likelihood? If so, just how? Asking such questions immediately leads us into science, because science is the direct extension of everyday experience. Sapp seems to think that we should believe him, but from his own perspective the arguments that he makes have no validity beyond trying to bully his readers.

This perspective has various names because it has infected several disciplines. Its advocates in the history of science are often known as the Edinburgh school, with apologies to the former outstanding Institute of Animal Genetics there. Shapere (1991, *Philosophy of Science* 58: 655-677) can be consulted for a general antidote. It is sad that Sapp's apparently good account of the history *per se* is embedded in an intellectual sociopathy. Evil can be superficially persuasive, as many politicians demonstrate and as Milton beautifully wove through the mutually contradictory speeches of the prideful angels in *Paradise Lost*. Without suitable background it is difficult for someone outside to see what's wrong. Science corrects itself mostly by evidence, mathematics by logic, and philosophy by rational argument. Uncertainties often remain, but the universe of all possibilities is greatly narrowed, as Sapp actually admits in one paragraph. Everyone knows this in their daily lives, and to implicitly claim otherwise for the rest of the book is an act of dishonesty comparable to the mental partitioning of Sunday mornings from the rest of the week.

-L.M. Van Valen

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Gray's Manual of Botany. Edition 8.

Rewritten by Merritt Lyndon Fernald. 1987 (15 December) reprint of 1950 edition, with corrections to 1973. Dioscorides Press, 9999 SW Wilshire, Portland, Ore. 97225. lxiv + 1632 pp. Apparently acid paper. ISBN 0-931146-09-7. Hardbound. \$60.00 (minus 5 cents).

In case you don't know this standard work, it deals with the vascular plants of the northeastern United States (through Virginia, Missouri, and Minnesota) and Canada to that longitude. It's done at a fully professional level, with sometimes formidable keys, diagnoses, habitats, distributions, and often figures and brief comments. Invaluable, despite the existence of Gleason & Cronquist, and good to have back.

-L.M. Van Valen

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¹Contribution 110, Lothlorien Laboratory of Evolutionary Biology. *Evolutionary Theory* 10: 111-127 (December, 1991).

Horns (New scientific term)

Horns, Pronghorns, and Antlers.

Edited by **George A. Bubenik** and **Anthony B. Bubenik**. 1990.
Springer-Verlag. xii + 562 pp. Apparently acid paper. ISBN
0-387-97176-9. Hardbound. \$89.00.

What, no ossicones? Actually they're here too, and all this just highlights the lack of a general term in proper scientific English for all these structures. (And did you realize there isn't a general term in colloquial English for a single individual of *Bos taurus* without specifying its current or former sex?) I suggest we bow to everyday usage and use "horn" for all such appendages. "Cornus" (Latin for horn; the plural is "cornua") can then be used for cornified horns, with modifiers as appropriate. After all, rhinoceros horns don't have the same structure as bovid horns.

This book doesn't mention rhinoceros horns, not to mention uintathere or mylagaulid horns or (perish the thought) horns of passalid beetles, except some in passing in a wide-ranging and imaginative chapter by Janis. Just ruminant horns. It's a big enough subject, though, big enough for the second editor to fall on his face in a long first chapter by, among other things, denying that horns are used mostly for fighting. (Would you believe that they're there to waft odors to the breezes, and originated, I suppose à Lamarck, as nonadaptive overresponse to injury?)

Even that first chapter has useful information, and the rest of the book is pretty good. There are reviews of most of the relevant families, and half the book is on horn growth from diverse perspectives. More heterozygous deer are larger and have bigger antlers, and are thereby more fit.

-L.M. Van Valen

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The Invertebrates.

Richard C. Brusca and **Gary J. Brusca**. 1990. Sinauer. xviii + 922 pp. Acid-free paper. ISBN 0-87893-098-1. Hardbound. \$47.50.

Quite a slew of good general books on the invertebrates recently. This one should at least hold its own. It's packed with information, evaluated rather than just compiled, presented well (including good figures) and with some emphasis on phylogeny. There are in fact a lot of original cladograms here, mostly well done with respect to information available at the time of writing. (Some major changes since then.) Another emphasis is on functional aspects, treated for each major group separately and with some consideration of major aspects of life-history strategies. There is some comparison but it's not central. Bibliographies are by taxa and are pretty inclusive. Extinct groups are slighted, usually omitted although there are several pages on trilobites. The authors seem uncomfortable with fossils; not even the remarkable Cambrian radiation of priapulids gets mentioned. They retain the Pentastomida as a separate phylum although they realize that it is an exgroup from well within the Crustacea; surely it's less modified than the Rhizocephala, which they keep as barnacles. A longish footnote discusses whimsical names, including a New Record for the longest. A good, big book.

-L.M. Van Valen

Land of Pangloss

Darwin without Malthus: The Struggle for Existence in Russian Evolutionary Thought.

Daniel P. Todes. 1989 (13 July). Oxford Univ. Press. (vii) + 221 pp. Apparently acid paper. ISBN 0-19-505830-5. Hardbound. \$45.00.

A scholarly account of how a culture inimical to Malthus accepted, but transformed, Darwinism. In a land of great space, rather thinly populated, it was easy to think that more just produce more, so no crunch comes. This was reinforced by the harsh climate; death in nature seems to come by physical means. The viewpoint culminated in the Panglossian theory of mutual aid developed by Kessler and Kropotkin.

Nevertheless the Russian empire gave us Gause and Dobzhansky (a Ukrainian), among others. Earlier Severtsov, from a morphological perspective outside academia, Timiryazev, from an energetic one (but later abandoned), Kovalevskii, from a paleontological perspective and also outside academia, and some others had seen their cultural flaw. Natural selection includes differential resistance to physical stress, and moreover regulation of densities must operate at some level and time scale in any self-perpetuating ecosystem. Even mutualism evolves by selection of incipiently mutualistic complexes. Pangloss would be nice but can be imposed only from above, as by a benevolent deity.

-L.M. Van Valen

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On popularizing science

Human Evolution: An Illustrated Introduction. Edition 2.

Roger Lewin. 1989. Blackwell Scientific. vi + 153 pp. Apparently acid paper. ISBN 0-86542-066-1 hardbound, \$34.00 (minus 5 cents); -067-X softbound, \$17.00 (minus 5 cents).

Popular writers, and even writers of textbooks, often expound on matters of which they have only superficial understanding. This was apparent in many of Lewin's current-events reviews in *Science*, and it is apparent in this book. Does it matter? Sometimes it does, but for the present book, aimed at the general reader, it is only a minor irritation. I don't mean that nonspecialists should be fed pseudo-science, or even misleading concepts, but rather that a superficial approach may not do much harm if it's combined with an interesting presentation of a lot of real information. The reader won't understand it as well as could be, even at the introductory level, but some real science will have been transferred and some interest may have been sparked. This book goes from evolutionary theory to paleontology, mitochondrial DNA, and cultural evolution. It's a good read, with lots of informative pictures and an attempt to give opposing viewpoints, and I learned some things I didn't know before. That's assuming Lewin got his facts right, which isn't always the case in areas I could evaluate, but then I didn't find any major factual errors. If one is to write about a broad area, one needs to cover topics that one doesn't know well, but this doesn't mean that they can't be adequately understood at the conceptual level. It does take some effort, but if the author doesn't understand all of what is covered the reader won't either.

-L.M. Van Valen

An Introduction to Evolutionary Ecology.

Andrew Cockburn. 1991 (15 September). Blackwell Scientific. xii + 370 pp. Apparently acid paper. ISBN 0-632-02729-0. Softbound. \$39.00 (minus 5 cents).

Evolutionary ecology isn't a subject but a state of mind. Well, almost. The author is an Australian who studies life-history evolution and behavior, particularly on a small marsupial, and who apparently thinks that genetics is the center of evolutionary biology. After an initial orientation there is an introduction to population genetics, oddly with quantitative genetics retracted to heritability. Natural selection receives an extended treatment. The nature of environments is analyzed, and life-history evolution is unified by reproductive effort. Aspects of the evolution of sex, and speciation, receive a chapter each; the relation of either to ecology, beyond adaptation, escapes me. Species diversity is real ecology, though, even though only species numbers are discussed, and so is conservation; each gets a chapter. The book concludes with a brief treatment of some general challenges.

It's a fine book, for what it does, clearly presented, and with small topics often included for variety. The author has an understanding of natural history and its real problems at all scales, and it shows. There are lots of examples, diverse in several ways although microorganisms are hardly mentioned. Even evolution in geological time is integrated throughout.

I expect that the major advances in evolutionary ecology will come to an appreciable extent from consideration of biotal evolution and energy flow. That the latter isn't even mentioned reflects the common genetics-centered approach to evolution which is still with us. It needn't be that way.

-L.M. Van Valen

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Island Africa: The Evolution of Africa's Rare Animals and Plants.

Jonathan Kingdon. 1990 (May). Princeton Univ. Press (in Britain by Collins). 0 + 287 pp. Apparently acid paper. ISBN 0-691-08560-9. Hardbound. \$40.00 (minus 50 cents).

A book by Kingdon is something of an event. His superb multivolume *East African Mammals* set a standard of original drawings, observation, data, and interpretation which will be hard to equal, ever. He hasn't, quite, but the comparison is invidious. This is a book on conservation, on islands and endangered habitats on the continent. The drawings (and colored paintings) are here - real Kingdons - and the text is as succinct, incisive, and fascinating as before. The emphasis is on endangered organisms and their biology, within each of the habitats discussed. These are quite diverse and span the continent south of the Sahara. Kingdon knows Africa, he knows natural history, he knows evolutionary biology, and he can think. He also knows conservation from the inside, and it shows. There is sensitivity to the real problems here, and yet some hope. I suspect that anyone, from layman to professional biologist, who even sees the book will find it hard to put down. It's addictive. Maybe it can be reprinted on alkaline paper? It's the best book on conservation I have ever seen.

-L.M. Van Valen

Fundamentals of Molecular Evolution.

Wen-Hsiung Li and Dan Graur. 1991. Sinauer. xv + 284 pp.
Apparently acid paper. ISBN 0-87893-452-9. Softbound. \$23.00
(minus 5 cents).

I like this little book, mostly. It deals with the usual areas of molecular evolution, except for the origin of life and the like, clearly and at an introductory level. Chapters on the nature and mutation of genes and basic population genetics lead into the estimation of distance and of phylogenies, rates, gene evolution, and the evolution of genome size and organization. There are some rather extended examples.

There are also a few difficulties. The authors take the overall correctness of the neutralist viewpoint for granted. Yes, directional selection does exist, but it's supposed to be exceptional. Surely the nature of the perennial controversy at the center of the subject deserves clarification for the uninitiated.

From another perspective, the authors advocate the relative-rate test without warning readers of its great loss of power by its including the same segment of the phylogeny twice. Similarly, all nucleotide and amino-acid sites are treated as independent and even equivalent. RNA pairing is an obvious counterexample to the former, and catalytic regions do the same for the latter, which at this level is less important. At the next level, though, it isn't, and Fitch's covarions, which don't even stay put, don't get a mention. That's part of a complex but important subject, important even for beginners: how many trees are consistent with the data? It isn't enough, as is commonly done even in research papers, to get a single estimate which is best by some criterion. It would have been instructive, from this perspective, to compare the trees which have been inferred for the same groups from all available kinds of data. In all cases I know there are appreciable differences.

-L.M. Van Valen

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The Fauna of the Kiskunság National Park.

Edited by **S. Mahunka.** Akadémiai Kiadó, P.O.Box 24, H-1363 Budapest, Hungary. Apparently acid paper. Hardbound.
Volume 1. 1986. 0 + 491 pp. ISBN 963-05-3875-X. \$49.00.
Volume 2. 1987. 0 + 479 pp. ISBN 963-05-4352-4. \$55.00.

The park is a set of several disjoint but nearby areas on the Hungarian Plain, about 39,000 ha altogether including related nature areas. The habitats are rather diverse. After a description of the kinds of vegetation present, the books survey many groups of animals with respect to large collections made in the park. This is done to the species level, and most species have brief annotations on habitat, abundance, and the like. Most groups treated are from the insects, but there are also all vertebrate groups and their parasitic worms, plus mites, branchiopods, myriapods, tardigrades, mollusks, and free-living nematodes. Some new taxa are described. The data are mostly undigested, but that's not an adverse comment for volumes like these. They can be mined in various ways, and the more areas that are surveyed like this around the world the more valuable each survey will be.

-L.M. Van Valen

Traité de Zoologie. Edited by **Pierre-P. Grassé.**

Tome V, Fascicule 4. **Céphalopodes.** Edited by **Katharina Mangold.**
 1989. Masson éditeur, 120 bd Saint-Germain, 75280 Paris 06,
 France. (viii) + 804 pp. Apparently acid paper. ISBN
 2-225-80419-2. Hardbound. 1100 F (about \$215).

Volumes of the **Traité** are usually authoritative at the time when they are written and usually provide the best reference on the group covered. They are always packed with information, especially anatomical and functional (in a comparative way) but by no means restricted to that. There is always an appreciable systematic survey, ordinarily with some attention to the fossil record. These generalizations apply to the cephalopod volume, which will be a standard reference for many years. It has a bit on descriptive ecology (parasites and such), but somehow the central aspect of what it means to be a cephalopod is never even made clear, much less emerging from the trees to define the forest. Cephalopods are getters-and-spenders, like mammals, growing rapidly and living rapidly. Both groups evolve rapidly too, with high variation, although in different ways. Is this somehow a causal relationship between the levels? (Don't sic birds on me; bats have been comparatively constant since the Eocene too, so making a living by flight may just be constraining.) The cephalopod volume in the American treatise **The Mollusca** has a different emphasis, and that volume is usefully complementary to the one reviewed here. Neither substitutes for the other.

-L.M. Van Valen

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Bryozoan Evolution.

Frank K. McKinney and **Jeremy B.C. Jackson.** xiii + 238 pp.
 Hardbound: 1989. Unwin Hyman. Apparently acid paper. ISBN
 0-04-560012-0. \$50.00.
 Softbound: 1991. Univ. Chicago Press. Acid-free paper. ISBN
 0-226-56047-3. \$16.00 (minus 5 cents).

Like corals, bryozoans were once regarded as plants because of their usually arborescent growth and modular construction. (And possibly we ourselves are descended from such colonoids among the hemichordates.) Such a habitus brings with it many opportunities and constraints which may seem strange to those of us who aren't botanists.

This is the first unified book on the evolution of animal colonoids as such, and it sets a pretty high standard. Bryozoans are among the best-known fossil groups, and knowledge of their fossil record is perhaps comparable to that of the recent fauna. After a review of bryozoan modularity and diversity, the authors discuss in detail the various growth forms of bryozoan colonoids from the viewpoints of adaptive diversity and evolution. Bryozoans are adaptively quite diverse, and there has been much homoplasy at the colonoid level because of what are from one perspective constructional constraints and from another perspective local functional quasi-optima in morphospace. Several kinds of overall trends are nevertheless detectable, even in the degree of integration among the modular individuoids. As they note in other language, such trends are probably mostly caused by some form of group selection.

-L.M. Van Valen

A Theory of Human and Primate Evolution.

Colin P. Groves. 1989. Oxford Univ. Press. xii + 375 pp.
Apparently acid paper. ISBN 0-19-857629-3. Hardbound. \$75.00.

Most of Groves's book is valuable. He gives a detailed review of the taxa of fossil and fleshy primates, often to the level of subspecies, with various new taxonomic proposals. Groves is a good mammalogist, and it shows. His emphasis is greater on forms closer to humans; most early primates have sketchy and superficial treatment. While half the space devoted to taxonomy is on hominids. I mean hominids in the usual sense; as a born-again cladist, even if more sensible than most, Groves includes the great apes in this family too. He emphasizes phylogenies and the evidence for their estimation, and I think he proceeds properly, if rather unconventionally, in his detailed treatment of human fossils, considering the small sample sizes. This isn't to say that I agree with all his unusual results, assuming accuracy of the data. For instance, because of 7 autapomorphies, *Homo habilis* is debarred from ancestry to *H. erectus* and *H. sapiens*. However, in his comparisons he restricts *H. habilis* to specimens from Olduvai. One would like to know whether the common ancestor elsewhere, without autapomorphies, would also be referable to *H. habilis*; as he mentions in another context, cladistic "species" need not be reproductively isolated units. As many cladists do, Groves reinterprets synthetic classifications as cladistic, with predictably nonsensical results (e.g., treating Simpson's explicitly paraphyletic and useful Prosimii as holophyletic).

There is even a detailed, partly original, and useful allometric treatment of hominid brain sizes. However, here and elsewhere the interpretation seems biased by his idiosyncratic view of evolutionary mechanisms. For instance, here visibly intermediate sets of specimens are interpreted as an aspect of punctuation. Groves revives, in a modified form, Berg's old theory of nomogenesis, where most evolution is internally directed. He thinks that most mutations must be directed and that they are of relatively large effect. Natural selection has "mainly a 'fine-tuning' role" after the fact. Roll a die, or invent a mysterious force, and adaptation miraculously appears. A bit like Gaia, perhaps.

-L.M. Van Valen

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Fossils as Information: New Recording and Stratigraphic Information Techniques.

Norman F. Hughes. 1989 (November). Cambridge Univ. Press. vii + 136 pp. Apparently acid paper. ISBN 0-521-36656-9 hardbound, \$47.50; ISBN unknown, softbound, \$13.00 (minus 5 cents).

Hughes thinks that taxa should be abolished for fossils. This isn't because, like many cladists, he regards the present as somehow an ontologically preferred slice of time. He rather objects to the treatment by some biologically ignorant taxonomists of treating (nomenclatorially) type specimens as being morphologically typical. (Why he thinks such people are unique to paleontology escapes me.) Therefore the baby should go out with the bathwater and every specimen should be treated by itself! Hughes is a micropaleontologist, and indeed taxa of microfossils are notoriously typological. Why not just try to do better taxonomy?

-L.M. Van Valen

Paleoecology: Concepts and Applications. Edition 2.

J. Robert Dodd and Robert J. Stanton, Jr. 1990 (7 March). Wiley.
xvi + 502 pp. Apparently acid paper. ISBN 0-471-856711-4.
Hardbound. \$80.00 (minus 5 cents).

Paleoecology means quite different things to different people. It used to be more or less restricted to the reconstruction of past environments, a mind-numbing if useful topic which is actually absent, as such, from this book, although it impinges peripherally. There are even a hundred pages here of what ecologists call ecology. The rest is, for the most part, a discussion of the problems the fossil record brings and how, if at all, one can alleviate them. The context is almost entirely marine, which is odd because a fair proportion of original work in paleoecology has been in terrestrial environments, where there are partly different problems. What is treated is pretty well done.

The aim of the book, though, seems to be to facilitate paleontologists' doing work like that of neoecologists and similar people, just on earlier biotas and ordinarily in a derivative way. There are at least two real advantages to working with fossils over working with extant organisms, and neither is discussed here. As I noted 20 years ago, one is the averaging effect of sedimentation — also deleterious for some purposes. The other is change over time. Succession is indeed mentioned, and neoecologists should pay more attention to paleoecology (including paleolimnology) in this, but a lot that is of interest has happened over the Phanerozoic and beyond. That's where paleoecology can come into its own. —L.M. Van Valen

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Human Origins.

Edited by **John R. Durant.** 1989 (7 September). Oxford Univ. Press.
xi + 147 pp. Apparently acid paper. ISBN 0-19-857612-9.
Hardbound. \$50.00 (minus 5 cents).

This excellent set of lectures on humans origins is marred only by the long delay between deliverance (1984) and publication. Most of the contributions, however, have a timeless element that make them well worth reading. The articles are overviews of important topics that range from molecular evidence for the timing and pattern of hominid evolution to behavioral inferences derived from archaeological remains and our closest living relatives. As a whole the articles not only provide a cogent synthesis of a topic by leading workers in their field but tend toward the provocative in raising more questions than providing answers. —V.C. Maiorana

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Evolution of the Vertebrates: A History of the Backboned Animals Through Time. Edition 4.

Edwin H. Colbert and Michael Morales. 1991 (March). Wiley-Liss.
xvii + 470 pp. Apparently acid paper. ISBN 0-471-85074-8.
Hardbound. \$50.00 (minus 5 cents).

The standard nontechnical introduction to vertebrate history is still going strong. It's rather fully revised, with lots of new figures, and it's still an easy and mostly authoritative read. (The half of the book on mammals is a bit less sure, as is the Cenozoic correlation chart, but then I know these best.) May it go on forever. —L.M. Van Valen

—L.M. Van Valen

The Roots of Thinking.

Maxine Sheets-Johnstone. 1990 (15 December). Temple Univ. Press.
ix + 389 pp. Acid-free paper. ISBN 0-87722-711-X hardbound,
\$50.00 (minus 5 cents); -769-1 softbound, \$20.00 (minus 5 cents).

Sheets-Johnstone proposes that new mental states, which are at the root of the origins of all new behaviors, are generated or awakened by the living body in the course of everyday actions such as chewing, urinating, standing, breathing, etc. These mundane activities are proposed to lead to a growing awareness of our physical capabilities that is prerequisite to some novel behavior arising. For example, a speaker had to be aware of itself as a being capable of making distinct sounds at will before language could prevail. 'Felt correspondences' of a preverbal mode of thinking, as Sheets-Johnstone expresses it, are essential to 'counting' whereas numbers are not. The ability to transfer conceptually the 'felt sharpness' of teeth to rocks that can be made equivalently sharp by chipping is proposed to lie at the root of tool-making. The body is a 'semantic template' for the forging of new concepts. We often forget about this nonverbal realm of our creative 'thinking' because of the current dominance of language in communicating ideas. The 'origins' in hominid history to which she applies her thesis are tool-making, counting, bipedality, nonverbal signalling, language, concept of death, and Paleolithic cave art. Wending one's way through her arguments is extremely rough going, but some interesting ideas can be found.

Sheets-Johnstone's thesis on the origin of distinct human traits feels plausible in a tangible way until one asks why it should apply to hominids only and not to chimps or even gorillas. Certainly chimps feel the world in much the same way as any human and yet they have not achieved anywhere near the number of conceptual advances as their brainy cousin. Necessity is not the same as sufficiency. I share her belief that nonverbal modes of thinking are central to conceptual advances (e.g., *Evolutionary Theory* 10: 59), but this is not sufficient to explain human uniqueness because other animals do show evidence of conceptual thought. Human uniqueness has to be embedded in something unique in their history or structure. Sheets-Johnstone does not identify what this source of uniqueness is and thus fails in her quest to find the origins of unique human traits. However, her emphasis on the sensory-kinesthetic body at the roots of thinking, whether human or not, has considerable plausibility. Our bodies may be nearly as important as our minds in the creation of new concepts. It makes one wonder about the common fictional portraiture of future humans as nearly bodiless minds or the concept of consciousness as pure energy or interacting information, with no unique material body at all. If Sheets-Johnstone is correct, such an evolutionary trend in humans would be ridiculous and a bodiless state of consciousness would be impossible.

-V.C. Maiorana

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Sewall Wright and Evolutionary Biology.

William B. Provine. Softbound reprint, 1989. Univ. Chicago Press.
xvi + 545 pp. Apparently acid paper. ISBN 0-226-68473-3. \$19.00
(minus 5 cents)

This superb book, previously reviewed, is now available more cheaply.

Early Hominid Activities at Olduvai.

Richard Potts. 1988. Aldine de Gruyter. xi + 396 pp. Apparently acid paper. ISBN 0-202-01176-3. Hardbound. \$50.00 (minus 5 cents).

The daily lives of our ancestors that lived before or beyond the influence of the written word can be reconstructed only from the remnants they left behind. Before the advent of permanent dwelling places, and particularly before the controlled use of fire, the evidence is very slim indeed. However, it exists in patterns that can reveal aspects of the daily lives of early hominids if only it is correctly read. The more scanty the pieces, the more imagination needs to be input to create a picture that makes sense. The last two decades have provided a uniquely broad array of techniques for piecing together coherent stories from fragmentary remnants of hominid activities. Paleoanthropology can now draw on the results and techniques of many disciplines, including behavioral and environmental sciences to attack the problem of reconstructing the lives of our distant ancestors.

Potts nicely presents a model example of this approach here, using one of the most important and romantically-charged localities in paleoanthropology, that of Olduvai Gorge and its inhabitants of 1 to 2 million years ago. What type of lives did the earliest tool-makers lead? We don't really know for sure, but it is unlikely to have been the living style of extant hunter/gatherers that is often assumed in stories of human origins. Potts shows how the same pattern of remains can be interpreted in very different ways depending on what models of living human and primate behavior one inputs into the analysis. More fascinating is how much one can extract from the few clues left after so many years. Unlike the famous detectives who finally get the culprit of the crime, we can never be sure we have the right answer to what our ancestors did. Perhaps it doesn't matter if we can never really know precisely. The challenge is formulating a better model, one more consistent with the evidence and one that makes specific predictions which may indicate what type of evidence to look for next. Any scientist can benefit from reading this well-written book; it's a nice example of detective literature, on how to piece together an entity (such as a way of life, a long-extinct organism, an alien culture by using a single shipwreck, or the how and why of a crime) from a tiny fraction of the whole.

-V.C. Maiorana

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Plant Taxonomy: The Systematic Evaluation of Comparative Data.

Tod F. Stuessy. 1990 (1 May). Columbia Univ. Press. xvii + 514 pp. Acid-free paper. ISBN 0-231-06784-4. Hardbound. \$60.00.

A superb treatment, and I don't say this primarily because I largely agree with what is said. Stuessy presents his views, but almost uniquely he also presents other views in as unbiased a manner as one could hope for. About half the book is conceptual, on the diverse approaches to systematics and on the taxonomic hierarchy, and about half is on the various kinds of relevant data and their use, with many examples. A flow chart for the recognition of species would seem to put ecotypes and polymorphs into different species. Stuessy does know better, and I warmly recommend the book to more than botanists.

-L.M. Van Valen

The Archaeology of Human Origins: Papers by Glynn Isaac.

Edited by **Barbara Isaac**. 1990 (January; stated 1989 in book).

Cambridge Univ. Press. xxv + 447 pp. Apparently acid paper. ISBN 0-521-36573-2. Hardbound. \$60.00 (minus 50 cents).

Because Glynn Isaac published over half of his papers in edited volumes that are not likely to be available in most libraries, this collection of 18 of his most important contributions (10 of which are from edited volumes) is a boon to students and anyone interested in the field of paleoarchaeology. The articles are clustered around five topics: the archaeology of human origins, site location and the use of land, diet and foodsharing, technology, and approaches to archaeology. Isaac revolutionized the study of human origins by showing that we can obtain and interpret the artefacts made and used by early hominids in a rigorous scientific manner. The two decades of his active work were times of ferment in this expanding field of inquiry, as it began to borrow more tools and information from other disciplines to piece together the probable history of the long, preliterate past of tool-making hominids. This representative sampling of his papers captures the spirit of his work, which is as relevant and stimulating today as it was 10 to 20 ybp.

-V.C. Maiorana

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The Human Career: Human Biological and Cultural Origins.

Richard C. Klein. 1989 (6 December). Univ. Chicago Press. xxi + 524 pp. Acid-free paper. ISBN 0-226-43962-3 Hardbound. \$40.00 (minus 5 cents).

As knowledge accumulates, texts must either increase in size and become almost unwieldy and often unreadable compendia, cover the same breadth less thoroughly, or cover adequately a more narrowly defined field of study. Klein chose the third course in this text, which focuses strictly on human biological and cultural origins. Discussions of human genetics and current diversity are omitted, as well as any discussion of human evolution after the latest glaciation. The book is a good blend of paleoanthropology and paleoarchaeology, giving approximately equal doses to each. It also divides the available space about equally between presentation of the facts and interpretation of what they meant to the course of human evolution. As an eminent practitioner in the field of paleoarchaeology of the late Pleistocene, Klein shows a bias in the direction of his own research interests, which makes this section of the book perhaps the best. It is not a text in the sense of an impartial presentation of information on the topic, but rather an interpretation of that body of material with bias in emphasis and the selection of material. It's enjoyable to read and does stimulate one to raise objections - what more could a text desire?

-V.C. Maiorana

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Darwin and the Emergence of Evolutionary Theories of Mind and Behavior.

Robert J. Richards. Softbound reprint, 1989. Univ. Chicago Press. xvii + 700 pp. Apparently acid paper. ISBN 0-226-71199-4. \$18.00 (minus 5 cents).

A fine and subtle book, previously reviewed, available more cheaply.

On Biomineralization .

Heinz A. Lowenstam and Stephen Weiner. 1989. Oxford Univ. Press.
ix + 324 pp. Apparently acid paper. ISBN 0-19-504977-2.
Hardbound. \$60.00 (minus 5 cents).

The book is a fully comparative account of the nature and deposition of the hard parts of organisms. As might be expected from the authors, it is very well done. Most of the better-studied groups receive coverage in some depth, while the other groups are at least accounted for in tables. Thus sulfides are restricted to the Thiopneutes (sulfur bacteria), as far as is known, and elemental sulfur (oddly called a metal, as astrophysicists do) to the Pogonophora. The brief discussion of opal phytoliths is at best misleading, however.

Biomineralization is a subject obviously suited to paleontology, and several topics get brief but original discussion. A detailed table of the ostensible times of appearance of different kinds of skeletons in taxa (including many specific problematica) around the base of the Cambrian is valuable. Aragonite-depositing organisms have to some extent supplanted calcite-depositing ones over the Phanerozoic, as documented here, but the authors don't consider the possibility that this may be merely a random correlated response to the success of the relevant taxa for other reasons; the pattern itself is relatively weak. Most arguments, though, are incisive if not always coming to an answer. One vignette gives evidence for the late expansion of diatoms reducing both radiolarians and siliceous sponges by outcompeting them for silica in seawater. — L.M. Van Valen

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Human Ethology.

Irenaus Eibl-Eibesfeldt. 1989 (June). Aldine de Gruyter. xv + 848 pp. Apparently acid paper. ISBN 0-202-02030-4. Hardbound. \$70.00 (minus 5 cents).

Encyclopedic books are fantastic sources to pick up the terminology, the techniques of study, the scope, and many of the findings about a field of study, but all suffer from a lack of depth on any particular topic. Eibl-Eibesfeldt has not succeeded over the failures of others in producing this large, detailed treatise on human behavior. I know of no other single source with the richness of coverage or the extensive use of photographic documentation, which says so much more than words. Its scope is as impressive as its weight (2 kg) but its treatment of most topics fails to convey the controversies and differing opinions that surround each topic. Matters that are highly conjectural are presented as accepted fact. The author's personal perspective and philosophy colors the whole in a way to make this encyclopedia an enjoyable read, however. Ignorant readers will not easily pick up which areas are the most currently researched, which ones are controversial, which ones are based mostly on conjecture rather than fact. Nevertheless, the book is no mean achievement and is a great introduction to a topic of wide interest. It is hardly the final word on any of the many topics covered, but it is an excellent entre into each. —V.C. Maiorana

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From Apes to Angels: Essays in Anthropology in Honor of Philip V. Tobias.

Edited by **Geoffrey H. Sperber**. 1990 (3 November). Wiley-Liss. xv + 347 pp. Apparently acid paper. ISBN 0-471-56837-6. Hardbound. \$60.00 (minus 5 cents).

Do you feel like an angel? (I guess they mean us.)

Like most *Festschriften*, the quality of the contents of the volume doesn't honor the honoree. There is one good paper here among the potboilers (mostly) and humdrum work. This is by Holloway on sexual dimorphism of several components of the human brain. He finds some, extending previous results. A perhaps useful comparative study by another author on parts of the thalamus, a region of the brain, is marred by the author assuming a *scala naturae*. And so on. The epitome of silliness is the longest paper included, which is in the spirit of the half-understood biological analogies beloved by part of the lit-crit world. This paper takes the standard somatotype classification, complete with photographs of extreme "types", and applies it to architecture. Thus we have ectomorphic columns ("legs"), a mesomorphic superstructure ("torso"), and an endomorphic vault (not called a head) in one building. The pyramids at Gizeh are fully mesomorphic, though. That's really what it says.

There is a bibliography of Tobias's publications to date.

-L.M. Van Valen

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Olduvai Gorge. Vol. 4. The Skulls, Endocasts and Teeth of *Homo habilis*.

P.V. Tobias. 1991 (August). Cambridge Univ. Press. xxxv + 921 pp. plus 104 plates. 2 volumes, boxed. Apparently acid paper. ISBN 0-521-20072-5. Hardbound. \$175.00.

Wow. And it's a good treatment. Several specimens are described individually in great detail, with treatment also of others less complete. There is even a little on postcranial elements. The photographs are beautiful but none are stereoscopic. There is about as much still undescribed material from the Koobi Fora Formation in Kenya, so even more can be said eventually. One set of tables compares 344 characters in five hominid species. There is some discussion of phylogeny, and Tobias believes that *H. habilis* was able to speak. A "new taphonomic hypothesis," that upper jaws and teeth are less likely than lower ones to be preserved except in situations of gentle burial, is common knowledge among paleomammalogists. Who's for a monograph this size on a species of fossil fish, or even a rat? They can be published now without difficulty, although elsewhere.

-L.M. Van Valen

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A World List of Mammalian Species. Edition 3.

G.B. Corbet and J.E. Hill. 1991 (4 April). Oxford Univ. Press. viii + 243 pp. Apparently acid paper. ISBN 0-19-854017-5. Hardbound. \$72.00.

The standard list of historically extant species, updated. Some attractive drawings (their legends apparently not proofread) and a good bibliography, by regions and taxa, as well as the partly annotated list itself.

-L.M. Van Valen

Paleopalynology.

Alfred Traverse. 1988 (August). Unwin Hyman. xxiii + 600 pp.
Acid-free paper. ISBN 0-04-561001-0 hardbound, \$60.00; -561002-9
softbound, \$35.00 (minus 5 cents).

In practice, the subject is more than the study of fossil spores and pollen, since other organic-walled microfossils end up in this department too. The book is a solid introduction, although indeed mostly to spores and pollen. There is, of course, an initial overview of the organisms and parts involved, supplemented later for some groups. An annotated general bibliography there is an unusual feature, accompanying a lively history of the subject. Most of the book is divided stratigraphically; samples come from geological formations and aren't sorted by taxa while they are deposited. There are appreciable differences in the floras over geological time, and the book digresses occasionally to discuss major aspects of this (and other things). It concludes with rather lengthy accounts of palynomorph sedimentation and of laboratory techniques, and a full glossary. The main treatment is oriented toward identification and stratigraphic ranges. The photographs do reflect what one sees, with luck, in a light microscope, but their small size is nevertheless awkward. The author says that with a course from this book and a little supervised research a student can be a professional. He's probably right, in a narrow way. He has written the only integrated book with its scope, and it's a success.

-L.M. Van Valen

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Soil Biology Guide.

Edited by **Daniel L. Dindal.** 1990 (15 January). Wiley. xviii + 1349
pp. + 3-page erratum sheet. Apparently acid paper. ISBN
0-471-04551-9. Hardbound. \$100.00 (minus 50 cents).

If you want to identify Nearctic organisms of the soil or litter, this is the place to start. Each group has an illustrated key, with a little introductory information about the group as a whole. The keys go to species, genera, or occasionally higher taxa or even adaptive groups. It's not surprising that soil mammals or plant roots are omitted, but so are a number of groups of insects (and a few others). The book was obviously long in the making (at least one author died years ago), and presumably what could be included was. A major problem with doing soil ecology is identification of the organisms. It still is, but it's a lot easier than it was before this book.

-L.M. Van Valen

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The Diatoms: Biology and Morphology of the Genera.

F.E. Round, R.M. Crawford, and D.G. Mann. 1990. Cambridge Univ.
Press. (viii) + 747 pp. Apparently acid paper. ISBN
0-521-36318-7. Hardbound. \$250.00.

The meat of the book is one column of diagnosis and discussion, and three columns of gorgeous photographs, mostly SEM at different magnifications and showing different things, for about 256 extant genera, mostly the more important ones. 19 genera and various higher taxa are new, as are other taxonomic changes. There is an initial review, itself over a hundred pages, of diatom structure and life cycle, with a little on their basic ecology. The book is magnificent and is needed.

-L.M. Van Valen

Human Osteology.

Tim D. White (text) and **Pieter A. Folkens** (illustrations). 1991.
Academic Press. xix + 455 pp. Apparently acid paper. ISBN
0-12-746610-X. Hardbound. \$60.00 (minus 5 cents).

This book is officially for identifying human bones and teeth. Because it is done so well, it is also useful as a detailed osteology of a single mammalian species. There is only a perfunctory bow to function, but a good part of the book is devoted to the collection and analysis of bones in various contexts, and even to taphonomic effects. Variation, pathology, and sometimes growth are depicted, but the common polymorphism in the number of phalanges of the little toe, which may possibly affect identification, isn't included. Lots of beautiful photographs, I suppose depending on one's aesthetic preconceptions. Some of the differences in human terminology from that used in comparative work are given, enough perhaps to cause a bit of confusion over those that are missing (jugal, premaxilla, etc.) I don't mean to be snide - it really is a good treatment.

-L.M. Van Valen

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Invertebrate Relationships: Patterns in Animal Evolution.

Pat Wilmer. 1990 (February). Cambridge Univ. Press. xiii + 400 pp.
Apparently acid paper. ISBN 0-521-33064-5 hardbound, \$50.00 (minus
50 cents); -33712-7 softbound, \$23.00 (minus 5 cents).

Not quite the best time to write a book on invertebrate phylogeny, now that we realize how much modern methods can contribute but before they have actually done very much. The author is a rather extreme advocate of polyphyly wherever possible, with no less than 19 phyla or groups of phyla coming independently from flatworms. If it wasn't clear when the book was written that this is incorrect, it surely is now. I nevertheless like Wilmer's emphasis on functional aspects. She does a good job of relating them to phyletic considerations; characters evolve for functional reasons and aren't arbitrary markers. In a few years it will be possible to reverse the procedure, by having a good estimate of the major phylogeny and superposing adaptive changes on it. That is the way I think Willmer's talent lies.

-L.M. Van Valen

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Patterns of Life: Biogeography of a Changing World.

Howard M. Mielke. 1989. Unwin Hyman. xiv + 370 pp. Acid-free
paper. ISBN 0-04-574032-1 hardbound, \$50.00; -574033-X softbound,
\$20.00 (minus 5 cents).

This ought to be a book on ecological biogeography, and mostly it is. There are chapters on historical biogeography, but the author's unfamiliarity with this set of approaches is sometimes painfully obvious, as in a discussion of what he thinks is a relation of extinction to geomagnetic reversals. The ecological aspects covered are mostly pretty standard but well done; there is an occasional

surprise, like a longish section on soils. But the author comes into his own in a hundred pages on humans as an ecological factor. This is an excellent and wide-ranging discussion, with population growth, cultural evolution, urbanization, pollutions, and so on not only presented but thoughtfully integrated. "Future generations will realize the wisdom (or lack thereof) of our age by noting the failures and successes we have had in sustaining the quality of life on the Earth."

-L.M. Van Valen

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Soil Microbiology and Biochemistry.

E.A. Paul and F.E. Clark. 1989. Academic Press. xii + 273 pp. Acid-free paper. ISBN 0-12-546805-9. Hardbound. \$40.00 (minus 5 cents).

In a world where mites are giants, accurate work on natural communities presents problems which should be more daunting than this book admits. We now know (from imaginative use of the polymerase chain reaction, more recent than the book's writing) that culturing samples on more or less standard media gives only a small proportion of the kinds of bacteria present, and, anyway, routine identification of fungi, amoebae, nematodes, and even mites isn't something to trust to a field guide. One may therefore choose to study phenomena at the ecosystem level, and fortunately that is the focus of the book. What are the rates of decomposition under different circumstances? How does inorganic phosphorus become available? What do mycorrhizae give and take? Such questions support the book, useful for ecologists but not as helpful as it could have been because some causally central processes are overlooked. Death of roots and rootlets, in particular, provides a major source of energy and nutrients, perhaps the largest overall, but it doesn't even get mentioned. Neither do predation or regulation of density or diversity. One shouldn't expect biochemical physiologists to do ecology, though; the book is just mistitled.

-L.M. Van Valen

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The Families and Genera of Vascular Plants.

Edited by **K. Kubitzki.**

Volume 1. **Pteridophytes and Gymnosperms.** Edited by **K.U. Kramer and P.S. Green.** 1990. Springer-Verlag. xiii + 404 pp. Acid-free paper. ISBN 0-387-51794-4. Hardbound. \$175.00.

Engler and Prantl up to date, and then some, although for vascular plants only. This magnificent treatise deals with extant taxa down to subgenus, with all genera and higher taxa receiving a moderate to extended treatment. Identification-style keys are included, as are a little discussion of phyletic relationships and other things, but mostly the treatment is appropriately technical, with diagnoses and generic synonymies. The number of species for each genus is given, as is its geographic and habitat distribution. Paleontology gets mentioned only with the good reference lists, one per family. Most genera have one to several figures, usually of diagnostic parts (including spores) but occasionally of habit. They are drawings or photographs, a few new and all well chosen and informative. Authoritative and valuable, probably the standard work for the next century.

-L.M. Van Valen

Handbook of North American Birds.

Edited by **Ralph S. Palmer**. 1988. Yale Univ. Press. Acid-free paper. Hardbound. ISBN 0-300-04062-8 (for both volumes). \$80.00.
Volume 4. vii + 433 pp.
Volume 5. v + 465 pp.

These two volumes are a unit, covering the diurnal raptors, the order Falconiformes in former (and unfortunately, still some current) usage. The series is the standard treatment of the natural history of the birds of North America, comparable to those available or in process for most continents. As usual in such series, some information is new here. If you want general to fairly specific information on our birds, this is where to start; the average coverage is about 20 pages per species. At least, it's where to start if your species has been covered yet. The series started in 1962, and I have heard that Yale has discontinued its sponsorship in addition to letting the first three volumes go out of print. Finding another publisher won't be hard, but finding one with the combination of the quality and reasonable cost that Yale has provided may be. These are indeed wonderful books (how about 20 pages a species for mites?), but isn't there some way to increase the rate of getting them put together? A committee would probably smother them, but how about a group of editors responsible for different taxa? There would be less uniformity, but is that such a high price? Of course somebody would actually have to do it.

-L.M. Van Valen