Book Reviews

An Expedition

Looking Far North. The Harriman Expedition to Alaska, 1899. WILLIAM H. GOETZMANN and KAY SLOAN. Viking, New York, 1982. xxvi, 244 pp., illus. $17.95.

Surely the Harriman Expedition of 1899 marks one of the more extravagant episodes in the history of American science. The story of how the idea of the expedition hatched in the business-weary mind of railroad tycoon Edward Harriman, how biologist C. Hart Merriam assembled on short notice a complement of able scientists, and how a party of 46 passengers sailed aboard the luxury steamship *Elder* from Seattle to Siberia and back again in a period of two months is well told here.

The text provides a detailed account of the organization, conduct, and aftermath of the expedition. Scientific results are appraised in an epilogue, and members of the expedition are classified according to family connections or professional qualifications in the appendix. The roster of passengers lists 11 members of the Harriman family group, 23 scientists, three artists, two each of physicians, preparators, photographers, and stenographers, and a solitary chaplain.

Before members of the party had set foot on board, Harriman had appointed most of them to membership on various committees. In addition to the five committees for as many different branches of natural science, there were committees for big game, lectures, library, literature and art, and music and entertainment. For the benefit of the last, a piano and organ were loaded aboard at Seattle on 31 May, along with the cases of champagne. Between the numerous stops along the Canadian and Alaskan coasts for making collections and scientific observations, the *Elder* was a floating university.

Despite all frills, the authors conclude that the expedition was a serious scientific venture. Proof can be found in the handsome multivolume series of reports, edited by Merriam and published between 1904 and 1914. The seven volumes that treat of botany and zoology contain descriptions of hundreds of new species. Highest marks, however, are given to G. K. Gilbert for his account of glaciers and glacial processes.

A major objective of the authors has been to impart an understanding of the Victorian people who joined the expedition, and thus to help the reader experience Alaska as they did. To that end they have reproduced many photographs taken in the course of the journey, including some superb landscapes by E. S. Curtis. Also they have enlivened the text with quotations from private sources, some of which tell how the voyagers really felt about the way things were going. For example, one day on the long trip home a travel-weary Harriman refused to walk around the deck to view a rugged coast, declaring, "I don't give a damn if I never see any more scenery!" About the same time John Muir confided in his journal that the main aim of the expedition had been game-hunting and that whatever might come out of the effort would be "mere reconnaissance."

Reconnaissance, yes, but not mere. Aside from the published reports, the records show that members of the expedition perceived that there were already two Alaskas: one the majestic wilderness to be preserved, the other a treasure-laden frontier to be exploited along with its native inhabitants. As the authors point out, this troublesome double vision persists today, the oil rush having succeeded the gold rush. "History," they conclude, "does not always offer consolation."

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B. K. Emerson and Grove Karl Gilbert during the Harriman expedition. [From *Looking Far North*]

Evolution by Metaphor

The Extended Phenotype. The Gene as the Unit of Selection. RICHARD DAWKINS. Freeman, San Francisco, 1982. xii, 308 pp. $22.95.

One of the wonderful things about evolution is that there are so many different ways of looking at it. In this entertaining and thought-provoking book Richard Dawkins points out that Darwin himself could not decide. He quotes the historian R. M. Young's observation that by its later editions Darwin's book should have been entitled *On the Origin of Species by Means of Natural Selection and All Sorts of Other Things*. In-

deed, there are so many different ways of looking at this most important of biological processes that we are all in the position of the blind men in the fable, firmly grasping our own piece of the elephant. Perhaps nobody is capable of seeing the entire elephant any more. We are often reduced to employing metaphors and parables to get our points across. The perils and pleasures of this process are nowhere more apparent than in Dawkins's book.

Dawkins here takes the concept of the selfish gene developed in his 1976 book of that title one step further. The earlier book was written primarily for lay persons, although it caused considerable stir among evolutionary biologists. The new book is more technical and will appeal to (or perhaps annoy) a narrower audience. Dawkins's main argument is twofold: that the gene rather than the organism is the unit we should think of when we consider evolution, and that genes can exert their influence at a distance. The genes of a beaver can actually exert an influence directly on the environment several miles away as a result of the beaver's dam-building activities. Genes of a parasite can force alterations of the host's phenotype and ultimately its genotype that work to the detriment of the host's fitness while enhancing that of the parasite (sorry, I mean the host's genes' fitness, and the fitness of the parasite's genes). Genes confined to or only operating in one sex can greatly influence the behavioral or physiological evolution of the other sex. The examples Dawkins uses are commonplace in the evolutionary literature (and some have come from his own laboratory). Many are presented in the most entertaining terms, reflecting the high spirits of workers in the field. We find organisms falling victim to the Concorde and Ace of Spades fallacies and behaving altruistically because of the armpit effect. Dawkins emphasizes at the beginning that he is simply presenting a new way of looking at these phenomena, a way that may help us to quantify them more easily.

Throughout the book he is charmingly deprecatory about his metaphors, particularly that of the selfish gene, emphasizing again and again that they are only metaphors and that genes are not *really* behaving in an anthropomorphic fashion. This does not prevent him from being a trifle disingenuous about the birth of his most treasured metaphor. In the earlier book he had referred to the organisms that genes control as "robots," a term many people took exception to. He now says (p. 15), "The word robot has other associations, and rigid inflexibility was not the association I was thinking of." Perhaps not, but the term used in the previous book and not mentioned here was actually "gigantic lumbering robots" (p. 21). Metaphors have a way of attracting adjectives the way magnets do iron filings. Perhaps they should be demagnetized occasionally.

Such demagnetization may already be occurring with one important offshoot of the concept of the selfish gene, that of selfish DNA. Orgel, Crick, and Doolittle, in a note subsequent to their original papers dealing with the subject, suggest that a better term for these molecules that have hitched a ride in the nucleus would be "parasitic DNA." Perhaps some categories of DNA could be even more accurately described as commensal or mutualistic. I certainly feel much more comfortable with these terms than with the anthropomorphic "selfish."

Dawkins makes the point that it is often easier to think in terms of the advantage accruing to a gene than in terms of the advantage accruing to an organism. He considers that the gene makes a better unit of selection than the organism because the gene or copies of it may persist for very long periods of time and because different genes within the same organism may often be working at cross purposes with each other. Possibly so, but he has hold of only one part of the elephant (the left ear, perhaps). Thinking in terms of genes rather than organisms is just what population geneticists have been doing for years, and it has gotten them into some terrible jams. Population geneticists periodically nod their heads wisely and say, "Of course, we must never forget that it is *organisms* that are being selected, not genes." Then they go right back to their one-locus, two-allele models just as if they hadn't been listening. This kind of thinking led to such problems as Haldane's dilemma. Haldane showed, using genes rather than organisms, that the process of gene substitution in evolution had to be exquisitely slow, otherwise a terrible genetic load would be imposed on the population. But this problem can largely be made to disappear if organisms are considered as the units of selection, as many other workers subsequently pointed out.

In short, as I think Dawkins would agree, any model of evolution that treats genes or organisms exclusively as the units of selection will be found to be flawed. Indeed, at the end of the book, he resurrects the organism and has some penetrating things to say about why the organism, and especially its ontogeny, is important in evolution. It is exactly this lack of dogmatism about his ideas that ultimately disarms the reader.

Dawkins specifically claims nothing more for the book than that it is a device for stimulating thought about evolution by looking at it in a different way. It certainly does that. Leaving aside his central thesis, in which I think his metaphors tend to run away with themselves, there are some penetrating discussions of standard evolutionary topics. I especially enjoyed the chapter on fitness, one of the slipperiest concepts in evolution, and the discussion of why developmental alterations cannot be passed on to the next generation. This book is an excellent illustration of why the study of evolution is in such an exciting ferment these days.

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The Workings of Ecosystems

Ecology of Coastal Waters. A Systems Approach. K. H. MANN. University of California Press, Berkeley, 1982. x, 322 pp., illus. Cloth, $36; paper, $18. Studies in Ecology, vol. 8.

How do the prolific coastal ecosystems operate to produce their highly visible and valuable products such as kelp, clam, lobster, fish, bird, and seal? Mann suggests that the answer is to be found through elucidating ecological processes (fluxes and cycles of energy and materials) at the ecosystem level of integration, rather than through analyzing species structure at the population or organismic level. Yet Mann contends that many popular systems models are inadequate as quantitative predictors. He points out that most such models are assembled part by part. Ecosystems are often represented by flow diagrams, whose compartments are of functional groups of organisms or energy stores—plants, microbes, dissolved organic matter, detritus, detritivores, herbivores, carnivores, and so on—and whose transfers are of carbon or biomass between compartments. These static diagrams become dynamic simulation models by the addition of the biotic mechanisms of transfer (rate functions) and the abiotic mechanisms of environmental regulation (forcing functions). Compartments are filled and transfers estimated by observing particular organisms and measuring their biomass and metabolic rates. Thus