case for stress- or glucocorticoid-induced hippocampal neurotoxicity in animals, Sapolsky proceeds to address with alarm the widespread clinical use of glucocorticoids in humans. Although he has concluded that these drugs probably cause irreversible brain damage, the available evidence suggests that the Food and Drug Administration need not halt the clinical use of glucocorticoids immediately. Millions of patients have been treated with large doses of glucocorticoids for decades without evidence of short-term memory impairment. If glucocorticoids were damaging the hippocampus, sustained memory loss would be an expected clinical consequence. That memory loss has not been seen over many years in many patients suggests that hippocampal damage is probably not occurring.

Although Sapolsky may ultimately be proved correct, his hypothesis has so far garnered little experimental support or attention from beyond a small circle of true believers. Given the possibly disastrous long-term consequences to millions of patients receiving glucocorticoids, and to more hundreds of millions of stressed and aging lovers of alcohol, perhaps it is time for previously uninvolved members of the larger neuroscience and medical communities to address the experimental basis for this provocative and alarming hypothesis.

Despite these critical comments, I highly recommend this book for its lucid and meticulously documented presentation of a compelling subject. Those of us who refrain from such bold theorizing should be grateful that the author has presented his testable hypothesis in such a clear and provocative way.

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Vignettes: Biology for the Populace

"Unobtrusive, quiet and retiring, without being shy, humble and homely in its deportment and habits, sober and unpretending in its dress, while still neat and graceful, the dunnock exhibits a pattern which many of a higher grade might imitate, with advantage to themselves and benefit to others through an improved example." With these carefully chosen words, the Reverend F. O. Morris (1856) encouraged his parishioners to emulate the humble life of the dunnock, or hedge sparrow *Prunella modularis*. . . . The Reverend Morris's recommendation turns out to be unfortunate: we now know that the dunnock belies its dull appearance, having bizarre sexual behavior and an extraordinarily variable mating system. Had his congregation followed suit, there would have been chaos in the parish.

—*N. B. Davies*, in *Dunnock Behaviour and Social Evolution* (Oxford University Press)

Recently, while driving home, I switched on the car radio just in time to hear a man declare "I have made an estimate of the cost of sex . . ." This is a long-standing problem in evolutionary theory, of course, so I wondered which of my distinguished academic colleagues was speaking. The voice went on ". . . and it works out at forty pence a go, spreading the cost of a double bed over fifteen years. And I think it is worth it."

—*J. P. W. Young*, in *Genetic Interactions among Microorganisms in the Natural Environment* (Elizabeth M. H. Wellington and Jan D. van Elsas, Eds.; Pergamon Presss)

Botanical Defenses

Plant Resistance to Herbivores and Pathogens. Ecology, Evolution, and Genetics. ROBERT S. FRITZ and ELLEN L. SIMMS, Eds. University of Chicago Press, Chicago, 1992. x, 590 pp., illus. $75; paper, $29.95.

Plant breeders have capitalized on the defenses of plants since the beginning of modern agriculture. To this end, they have explored the genetics of particular resistances, their effectiveness in deterring attack, and the pleiotropic effects of carrying resistance genes. Pick up any volume of *Crop Science* and you will find dozens of papers describing the performance of resistant cultivars; these field trials offer a virtually untapped resource for biologists interested in the ecology and evolution of plant resistance. *Plant Resistance to Herbivores and Pathogens* attempts to meld the approaches and perspectives of agriculturalists and evolutionary ecologists to present a synthetic view of the dynamics of plant-enemy interactions.

Certainly agricultural plots are much simpler than natural systems. The question is, do they differ in too many ways to be of use to the evolutionary ecologist? Kennedy and Barbour's chapter surveys the genetics of crop resistance and raises the possibility that the simple genetics underlying many resistance traits in crops may not be representative of those in natural systems. Without careful genetic analysis, however, it is imprudent to make assumptions about the number of genes contributing to a trait (for a recent review see Orr and Coyne, *Am. Nat.* **140**, 725 [1992]). Agricultural systems are also more homogenous in spatial distribution, phenology, and genotype, and, as is explored in parts 2 and 3 of this book, heterogeneity may play a key role in the ecological and evolutionary dynamics of plant-enemy systems. Unfortunately, we know so little about the genetics and population biology of resistance in natural systems that we can do little more than wonder whether our inferences from crops would be relevant. This presents an obvious dilemma: for agricultural systems to inform us about natural populations, we must first know more about the relevant factors in natural systems. Chapters by Simms and Rausher, by Berenbaum and Zangerl, and by Via provide us with some of the tools necessary to obtain rigorous information on natural systems, and most of the chapters do an excellent job highlighting the gaps in our knowledge. Experimentalists must now explore the differences and similarities between the roles of resistance in managed and natural systems.

Most of the book is devoted to theories and case studies focusing almost exclusively on natural systems. The span of topics includes evolutionary responses of herbivores and pathogens to plant resistance and changes in higher-level trophic interactions. Not surprisingly, emphasis is placed on issues of more concern with respect to natural than to agricultural systems: What is the level of genetic variation for resistance in natural populations? How important are genotype-environment interactions in determining evolutionary responses? Is resistance costly when natural enemies are absent? A few pioneering studies, such as those by Berenbaum *et al.* on wild parsnip (*Evolution* **40**, 1215 [1986]) and Simms and Rausher on morning glory (*Evolution* **43**, 573 [1989]), feature prominently in many chapters, but it is clear that on most issues the theory has far outstripped the data. This is understandable given the difficulties of quantifying resistance, characterizing its genetics, and documenting evolutionary change. As Antonovics states in his concluding chapter, "The obvious but impressive

message of this volume is that genetic variation at the intraspecific level can be critically important to ecological processes. But equally this volume impresses upon us the fact that our knowledge is at best fragmentary."

Nevertheless, the book leaves us with an optimistic vision of the future. As several authors point out, the development of molecular techniques makes the study of plant-enemy interactions ripe for accelerated progress. Whereas it has previously been difficult to track resistance genes in natural populations, we can now make use of restriction fragment length polymorphisms. And whereas it has previously been difficult to disentangle the effects of resistance genes from other linked traits, it is now possible to manipulate levels of resistance through genetic engineering. These and other techniques open new avenues for examining how plant resistance influences the ecology and evolution of species assemblages, and it is certainly hoped that evolutionary ecologists will exploit these techniques fully. As our ability to detect and manipulate genetic variation becomes more sophisticated, it should be possible to explore how genetic changes alter interspecific, and even community, dynamics. Antonovics dubs this new pursuit "community genetics" and in his concluding comments meets the organizers' second stated goal, which is to "show how research in these fields, by integrating genetic with evolutionary and ecological methods, can contribute to a new evolutionary synthesis."

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Altamira and Environs

Iberia before the Iberians. The Stone Age Prehistory of Cantabrian Spain. LAWRENCE GUY STRAUS. University of New Mexico Press, Albuquerque, 1992. xiv, 336 pp., illus. $40.

Cantabrian Spain is that narrow band of mountainous north coastal Spain that faces the Bay of Biscay, also known as the Cantabrian Sea. Since the 19th century, this rugged, magnificently beautiful region has played a critical role in archeology's struggle to construct an understanding of human life in the Upper Paleolithic. Straus has attempted in this book to redress what he considers to be an undue scientific and journalistic emphasis on the overpowering French Paleolithic record just to the north.

One of the more important contributions of the book for English-speaking readers is Straus's sensitive treatment of the history of Paleolithic research in Cantabrian Spain. He reminds us that Paleolithic cave art was first recognized in Cantabria, at Altamira, and that prior to the Spanish Civil War the level of research activity in Spain equaled that in France. A particularly interesting aspect of Straus's historical treatment is his discussion of American involvement in Cantabrian Paleolithic research both before and after that war. With this history in mind, Straus notes that his synthetic treatment of Cantabrian prehistory is the first in English since the 1924 translation of Obermaier's *Fossil Man in Spain.* Rather than an encyclopedic work documenting discoveries and stratigraphic complexities brought to light in the past 70 years, however, he has provided us with a work most suitable and effective as an introduction for the nonspecialist.

The poverty of illustrated artifacts, stratigraphies, features, and sites in the book means that for encyclopedic coverage of Paleolithic archeology in Cantabrian Spain scholars will still have to turn (with the aid of Straus's comprehensive bibliography) to Spanish works by Barandiaran, Jordá, Bernaldo de Quirós, and Utrilla. This is not to underestimate the importance of the 47 pages of appendixes containing site-specific data on lithic artifacts, faunal remains, organic tools, and radiometric dates, which provide a precious and enduring research resource for American scholars.

This book deals overwhelmingly with the Upper Paleolithic, the complex sequence of cultural innovation and change that began with the first appearance of *Homo sapiens sapiens* in Europe (about 40,000 years ago) and ended at the close of the last glaciation (about 10,000 years ago). It focuses on Cantabrian Spain and does not address the entire Paleolithic sequence of Iberia as a whole, as one might expect from the title. This geographic and temporal unevenness in coverage reflects Straus's own research specialty, and to some extent the patchiness of the known archeological sequence. Anyone interested in periods other than the Upper Paleolithic and places other than north coastal Spain should look elsewhere.

Straus is committed to the view that we must understand the developments of prehistory from an ecological perspective, that is, as a series of readjustments to changing environmental circumstances. To that end, he has provided perhaps the best environmental and paleoenvironmental overview of Cantabrian Spain available in any language. The waxing and waning of various archeological cultures are clearly situated in their paleoenvironmental contexts, although we remain far from having a thorough understanding of the place of humans in these ancient ecosystems.

Straus's interpretative style, conservative by the standards of American archeology, reflects both the best and, from a European perspective, the worst of Paleolithic archeology as practiced by Americans. Its strength is that Straus asks questions about human behavior (settlement patterns, subsistence practices, mortuary behavior) and adaptation in a field in which European practitioners often glorify the artifacts as such. But many Europeans will see it as exemplifying an American tendency to pursue broad generalizations based on too few cases.

Many Europeans and Americans will also disagree with the strictly functionalist interpretative stance. In a time when so-called positivist research strategies in archeology are under attack, it is refreshing to see a commitment to and optimism about the ability to gain access to the past using the tools and research strategies of a "scientific" archeology. But I believe that Straus's embracing of a view of Cantabrian cave art that sees it as a sort of primer for educating young hunters, which he prefers to "grand interpretive schemes that somehow want us to enter into the minds of long-dead people," makes insufficient use of anthropological archeology's great strength: its ability to juggle simultaneously a diversity of theoretical perspectives from the natural sciences, the social sciences, and the humanities. In ignoring the degree to which the content of people's minds conditions what goes into their stomachs, Straus's view of graphic representation as merely a system "for gathering, storing and transmitting important survival information" is as extreme as the speculative approaches he seeks to avoid.

In the end, Straus has done for the Cantabrian Paleolithic what Richard Klein achieved for the Paleolithic of Russia: He has rendered it more visible, immediate, and accessible to a broad American scholarly and lay audience. Not only does this move us away from the traditional Francocentric view of Paleolithic Europe, it is likely to stimulate considerable interest among a new generation of English-speaking researchers.

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Aeronautical Entrepreneur

The Universal Man. Theodore von Kármán's Life in Aeronautics. MICHAEL H. GORN. Smithsonian Institution Press, Washington, DC, 1992. xiv, 202 pp. + plates. $24.95. Smithsonian History of Aviation Series.

Theodore von Kármán, the great Budapest-born aerodynamicist, was one of the earliest representatives of the Central European diaspora that infused American science in the