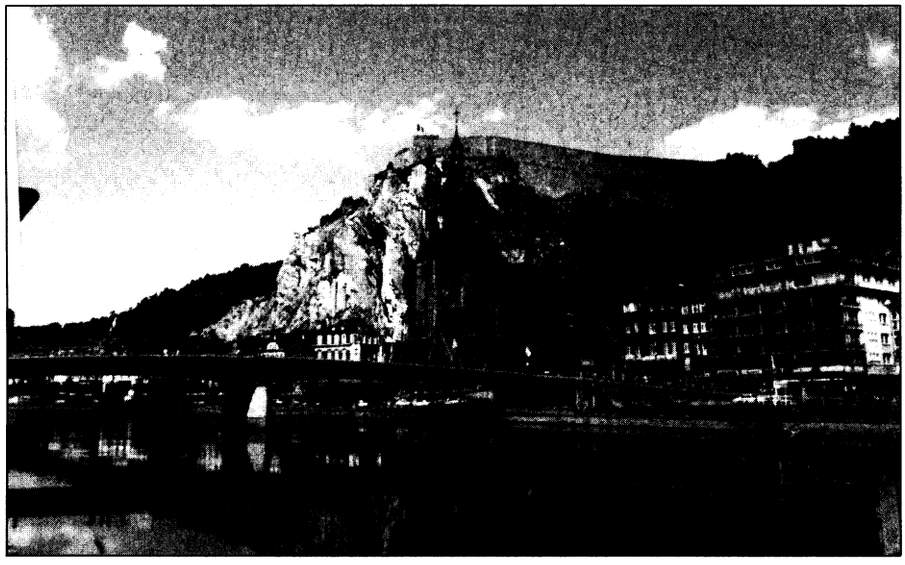

Limestone cliff above the River Meuse at Dinant, Belgium, the "type section" of Dinantian (Lower Carboniferous) deposits such as are found also in the Grand Canyon, the Canadian Rockies, and the uplands of England and Wales. "For many years I have pointed out how, at certain times in earth history, carbonate deposition was remarkably widespread around the world. . . . I suggest that [such episodes] were related to the availability of carbon dioxide in the atmosphere. This may have resulted from a slow build-up of this gas . . . such as we see going on today, coupled with the increase in global temperatures due to the 'green-house effect' about which we now hear so much. We may therefore expect, in the near geological future, a rise in sea-level and another spread of carbonate deposition on the continents. . . . I do not necessarily blame all this on mankind." [From *The New Catastrophism*]

by the eminence of its author and the straightforwardness of its tone this volume may mark the arrival of catastrophism at the status quo.

What this book represents, however, is probably more important than what it contains. As engaging as Ager's examples are, they are much less than complete. Although he gives a very cogent general summary of the incompleteness of the record, several important topics, notably the effects of storms on sedimentation and of episodic deposition on the accumulation of fossil deposits, receive only cursory treatment. As an introduction to uniformitarianism/catastrophism the book should be read in conjunction with other works (which Ager cites); a convinced gradualist would not be convinced by this book alone.

Most surprisingly, Ager retreats from perhaps the most obvious recent catastrophist theory—the impact theory of mass extinction—in favor of Earth-based causes. This chapter, the last in the book, is unsatisfying, if only because Ager is less firmly in control here of actual observations. He oversimplifies impact arguments and recites many now-discounted objections as though they were conclusive refutations. But perhaps it is the most interesting chapter in the book, for even in his neo-catastrophism Ager demonstrates that he too is bound by the adage that he cites at least twice: "To find a thing you have to believe it to be possible" (p. 191). Geology will perhaps forever remain gripped in the tug of war between seeing and theorizing.

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The Birth of Stars

Star Formation in Stellar Systems. G. TENORIO-TAGLE, M. PRIETO, and F. SÁNCHEZ, Eds. Cambridge University Press, New York, 1992. xiv, 573 pp., illus. $69.95 or £45. From a school, Tenerife, Spain, Dec. 1991.

According to the standard hot big bang cosmological model, the baryons that made up "normal" matter in the early universe were contained in an evenly distributed ionized gas that produced the 2.7 K cosmic background radiation. Yet in the present epoch most of the visible baryonic matter is locked in stars, which in turn are strongly clustered within galaxies. The dual processes of galaxy formation and star formation thus have played a central role in shaping the nearby visible universe and in creating the heavy elements of which we and our planet are mainly composed.

Star Formation in Stellar Systems is a collection of papers by leading researchers on the astrophysically critical stellar birth process. Originating as a series of lectures given at the third Canary Islands Winter School, the volume emphasizes the large-scale features of star formation within galaxies. The papers are reasonably accessible, introducing their topics at an advanced undergraduate level and carrying them forward to the frontiers of the field. The book contains many useful illustrations drawn from the current literature.

The observationally oriented contributions to the book emphasize the products of recent star formation. Thus, for example, there is considerable discussion from a variety of perspectives of the features and implications of the concentrations of young stars associated with HII regions. The topics range from the application of HII regions to determine galactic star formation rates, discussed by Kennicutt, to the specifics of spectacular individual young stellar complexes such as the core of the Tarantula Nebula and violent star formation in galaxy nuclei, explored by Melnick.

Two papers focus on the critical connection between interstellar clouds and the birth of stars in very different settings. Hunter considers the normal star formation process within galactic disks by following the main stages of this process from molecular clouds to young stars. Mirabel jumps up four orders of magnitude in scale to deal with the largest star formation events, the "starbursts" associated with mergers of galaxies. He also discusses the role of multiple phases of the interstellar medium—from cold molecular gas to million-degree plasmas—within such events.

The book is rounded out by four theoretical papers that build a physical foundation for the subject while also serving to link together the observational discussions. Bodenheimer tours the main features of the birth of individual stars, Larson gives an overview of star formation processes on galactic scales, Elmegreen presents our current understanding of the triggering of star formation by spiral arms and other processes, and Franco deals with issues relating to the propagation of star formation. The basic physical background provided by these theorists enables the reader to appreciate as yet unsolved problems such as the formation of binary stars or the potential role of star formation propagation in igniting intense bursts of star formation on galactic scales.

Star Formation in Stellar Systems will give advanced astronomy students a broad perspective of this complex subject; readers interested in pursuing specific topics in detail will have to consult other sources, many of which appear in the book's extensive reference lists. There is some overlap

among the contributions, although it can be interesting to see the range of opinions that exists in this active field. Despite its minor flaws, the book succeeds in summarizing a significant component of our current knowledge about star formation and its consequences on galactic scales. It is important reading for anyone interested in the astrophysics of star formation.

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Worthy Animals

A Functional Biology of Parasitism. Ecological and Evolutionary Implications. GERALD W. ESCH and JACQUELINE C. FERNÁNDEZ. Chapman and Hall, New York, 1993. xiv, 337 pp., illus. $59.95 or £37.50. Functional Biology Series.

For most of us, a walk through the woods or along the creekside reveals the living world as we commonly think about it—the flash of a colorful bird, all the shades of photosynthesis, the near-frantic activity of insects as the day warms up. Through the good graces of biology texts and the Public Broadcasting System, we know that these organisms compete, that their population levels are by no means fixed, and that they are in a continuing adaptive process with a changing environment.

Gerald Esch and Jacqueline Fernández ask us to look again. Dwelling inside (and on) most of these organisms are other populations, other communities. Esch and Fernández write about how the parasites of free-living organisms compete with one another, adapt to their living environments, and endure the predictable insults of immune systems and the vicissitudes of passage from host to host.

Although ecological questions have been asked by parasitologists for decades, their findings have been published in the parasitological literature, where they were largely ignored by ecologists. In recent years, motivated by Peter Price's *Evolutionary Biology of Parasites* (Princeton University Press, 1980), evolutionary ecologists have become excited about the possible impact of parasites on host evolution and ecology, and there has been a noticeable increase in books on host-parasite interactions. Parasites themselves also hold delightful potential as objects of ecological scrutiny—the possibility of replicating entire populations and communities in the field or the laboratory, for instance—and *A Functional Biology of Parasitism* is unique among recently published volumes in broadly addressing that aspect of parasite ecology.

Esch and Fernández fulfill their stated purpose, that the book be useful as a textbook and as a reference. They are careful to introduce parasites clearly in the beginning of the book. The emphasis is on helminths, for these animals have figured prominently in ecological studies. The authors define a number of terms but also challenge some widely held ideas about the inevitable harm associated with parasitism and about parasites' "degeneracy." This is the pattern that can be found throughout the book—instruction, good review, and, sprinkled throughout, questions and observations. Students will find much to think about: Do parasites and hosts transfer genes? What can parasites tell us about host dispersal, now and in times past? Genetically, what constitutes a parasite population? How does the presence of a host as habitat alter our consideration of ecological influences?

Chapter by chapter the authors introduce ecological ideas pertinent to parasite ecology. The choice chapters in this regard, especially from a pedagogic point of view, are the ones in which general concepts of host and parasite population biology are introduced. The authors emphasize the work of Crofton, May, and Anderson and follow their account of it with case histories. The entire book is rich in examples, but in the pages on populations their linkage to theory is especially clear.

In places, the book presents somewhat elementary information for students with ecological or parasitological backgrounds. For instance, fitness and competition are defined (the latter in at least two different chapters), and some life cycles are described in great detail. In other areas, more background is assumed. What this means is that students who have had either ecology or parasitology will feel somewhat challenged at times and comfortable at others—not a bad mix.

Parasite ecology has implications for human health and economics, and the authors do not ignore this. Unfortunately, they often substitute "man" for "human"—a convention that needs to be discarded.

As reference material, the book will also be useful. The chapters on biogeography and communities provide especially thorough reviews of the parasitological literature in these areas. This book does not break a great deal of new ground, nor do the authors claim to do so. It does cover existing ground in a way that will be useful to advanced students and scholars alike.

Early in the book (p. 34), I read, "On being digested from the dragonfly in the frog's stomach, the immature parasites crawl back into the frog's mouth" (where, by the way, they live as adults under the tongue). This is a memorable image, and I wondered briefly if it might not epitomize why many biologists, even now, are more eager to learn about birds than about worms. If so, more's the pity, for an animal that disperses in a swirl of frog feces, asexually multiplies in the hepatopancreas and later the gonads of a snail, then develops sequentially in an aquatic crustacean and its dragonfly predator, and finally executes that remarkable journey to the nether regions of the tongue of *Rana clamitans*—such an animal is worthy of our liveliest curiosity, if not our frank admiration.

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Other Books of Interest

Centennial History of the Geological Society of Washington, 1893–1993. EUGENE C. ROBERTSON, Ed. Geological Society of Washington, Washington, DC, 1993. x, 165 pp., illus. Paper, $10.

In the late 19th century, as was recounted in a paper presented by Philip Pauly at last year's History of Science Society meeting in Washington, the federal workday was short, leaving much time for the development of a vigorous after-hours social and intellectual life among the scientists then congregating to pursue their profession in the capital city. One manifestation of this was the Geological Society of Washington, founded in 1893, 14 years after the U.S. Geological Survey, with the survey's Charles Doolittle Walcott as its first president. As the society has always been principally a discussion forum, leaving few formal publications to document its doings, its current leaders have been moved to produce a centennial volume drawing on the society's own records to offset the lack.

The volume opens with a 30-page general history of the society. Along with a thorough account of the procedures by which the society was established, its rationale is discussed, one motivation apparently having been to "restore morale to members of the Geological Survey," which had recently suffered setbacks. The remaining narrative gives information about the character and content of the society's meetings and its relations with other local organizations, most notably the Geological Survey, the Carnegie Institution of Washington, and the Cosmos Club but also including the Pick and