the contributors to this volume testify eloquently, albeit unconsciously, to this fact (for example: historians "know history and dates and authorships wonderfully," "you get all the little things you can dig up, little obscure publications that there is no evidence anyone ever saw," "the underbrush, all this difficulty of dates, sources, priorities, is straightened out"—a common misapprehension, here voiced by three different physicists). Certainly the failure of the physicists to understand the historians' aims and concerns had much to do with the failure of the conference to produce any effective interchange between the physicists and the historians; the discussion, under the eyes of video cameras, remained almost entirely among the physicists, who rather misunderstood the few questions from historians.

But if nuclear physicists are to be held responsible for the failure of the history of nuclear physics to be constituted as a scholarly field, it is not because they have failed qua historians or qua historical informants, but qua physicists. In contrast with the clarity, simplicity, and completeness of the physics of the extranuclear structure of the atom, a scientific development with a well-defined terminus ad quem and forming a well-established subject of historical scholarship, in the physics of the nucleus there is even to this day no specifiable nuclear force. There is no definitive solution of the problem of nuclear structure and processes, but only a variety of partial, more or less comprehensive, points of view. Because the physicists have not completed their task, the historians remain reluctant to enter upon theirs.

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Gravitational Waves

Sources of Gravitational Radiation. Proceedings of a workshop, Seattle, July 1978. LARRY L. SMARR, Ed. Cambridge University Press, New York, 1979. xiv, 506 pp., illus. $19.95.

Gravitational waves are propagating ripples of tidal gravitational stress. In Einstein's theory of general relativity (and nearly all other plausible theories of relativistic gravity) the waves are generated by rapidly changing accelerations of massive bodies. Asymmetrically imploding and exploding supernovae will do the job nicely. The waves traverse empty space at the speed of light, their energy becoming diluted by the normal inverse-square law. Gravitational waves, even as weak as they are when they reach the earth, can in principle be detected by the small accelerations that they give to one free mass relative to another that is separated by some distance or by the small stresses that they induce in elastic solids.

There is a certain genteel omission in the title of this fascinating and important book of symposium proceedings. The subject of *detecting* gravitational radiation is one of the book's main concerns. But that subject, some people think, is still slightly disreputable after the much publicized—alas, erroneous—"detection" of gravitational waves a decade ago. The book ought to do much to dispel such notions of disreputability. It is crammed full of hard laboratory information and (albeit not so hard) theoretical calculations. Theorists and experimentalists in this field are learning to speak the same language, and they are plotting their results (best estimates of source strengths from astrophysical sources and best estimates of achievable sensitivities in detectors, respectively) on the same graphs. Today the sources are below the sensitivities, but the gap is rapidly narrowing.

There is a growing consensus that two sorts of gravitational wave experiments are worth pushing hard. The first (and the longer recognized) is to detect kilohertz signals from collapsing supernovae in galaxies out to the Virgo cluster. The event rate ought to be on the order of one a month. The techniques of choice are ground-based (read "NSF-supported"), either with large monocrystal bars of sapphire or silicon or with multipass and high-power laser interferometry. The second experiment is to detect waves of much lower frequency, millihertz, which may have been produced by the collapse of massive black holes in the centers of quasars. One might "see" these collapses out to cosmological distances and therefore back in time to nearly the beginning of the universe. This frequency band and required sensitivity can only be obtained with a space-based (read "NASA-supported") development program. The techniques under consideration are precision Doppler tracking of already planned spacecraft, but with two-frequency up- and down-link telemetry and a dedicated mission with an onboard hydrogen maser clock.

A broad and interesting mix of physics and astronomy goes into the theoretical calculations of wave sources, and this variety is ably represented in the volume. Arnett's review of gravitational collapse in evolved stars does a particularly good job of demythologizing a subject that is usually adrift in a sea of numerical simulation, and (on the other hand) Wilson gives a clear exposition of how relativistic numerical hydrodynamics is actually done. At least half a dozen other papers could be singled out for their high quality and general interest. Two papers are edited transcripts of discussion sessions. Far from the dry pontification that usually dominates such sessions, these discussions—at least as edited by Epstein and Clark—read as free-wheeling brainstorming sessions that stand as remarkable portraits of an evolving and eclectic subject.

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Island Study

The Terrestrial Ecology of Aldabra. Papers from a meeting, March 1977. Royal Society, London, 1979. 264 pp., illus. + index. £21.65. First published in *Philosophical Transactions* of the Royal Society of London, series B, vol. 286.

Aldabra is an atoll in the Indian Ocean and the home of giant tortoises. About 15 years ago the British Ministry of Defence planned to build a military air base in an area of the atoll now known to support 60 percent of the tortoise population. The plan encountered serious opposition from conservation groups, and the Royal Society of London, while pressing for the abandonment of the air base scheme, sent a major scientific expedition to the atoll in 1967. Before the end of the year the scheme was indeed abandoned, and the Royal Society then switched its plans from short-term fact-finding to more comprehensive studies. Ten years later the Society held a two-day discussion of research progress. This book is a collection of the 23 papers presented at the discussion.

The major shortcoming of the volume is a lack of integration, which reflects the rather fragmented and uncoordinated nature of some of the research it reports. Nevertheless, there is no better source of information about Aldabra and its inhabitants. There are papers on geological and recent history, rainfall, soils and soil organisms, vegetation, seed dispersal, insects, crabs, land and sea birds, and turtles and tortoises. Of particular interest from the point of view of equilibrium island biogeography theory, which is frequently referred to, is the discovery of