quasi-stellar objects (QSO's) are detected by Einstein as luminous x-ray emitters and postulate that an extrapolation of the properties of those objects observed individually might well explain the entire diffuse background. Unfortunately the Einstein observations have involved preselected, radio-luminous QSO's, whose x-ray properties have been established to differ from those of the more common, radio-quiet QSO's. Thus supporters of this model must extrapolate considerably to obtain the x-ray luminosity of the "typical" QSO—a radio-quiet, high-redshift, optically luminous but not superluminous object. Einstein has not detected x-ray emission from even one such object directly, so such extrapolations are understandably complex. The x-ray spectra of the few QSO's and related active galactic nuclei (Seyfert galaxies, BL Lacertae objects) that are well observed are nicely described by Holt and do not agree well with the observed spectrum of the diffuse background, thus seemingly favoring the thermal interpretation of the radiation. On the other hand, these observations are available for only a small number of very-low-redshift objects, though the bulk of any isotropic radiation must come from high redshift. Again an uncertain extrapolation is necessary.

Are interesting constraints on neutron star structure available from limits or detections of thermal x-radiation? This is another question of 20 years' standing that has yet to be answered, although Fabbiano and Tsuruta provide updates in this volume. Are the compact, degenerate companions of Scorpius X-1 and Cygnus X-2, the two oldest and best-studied stellar x-ray sources, neutron stars or white dwarfs? Yet another two-decade-old question still unanswered; van den Heuvel describes how we at least have a consistent picture of how such objects fit the canonical concepts of binary star evolution. Is Cygnus X-1 a black hole? What is the origin of the hot, diffuse gas in rich clusters of galaxies? What is the nature of the bright x-ray sources clustered near the galactic center? These three questions are merely ten years old. Einstein has supplied many new details on the last two, but no obvious solutions.

Finally, the x-ray astronomer finds that data from Einstein are of sufficiently high quality to squarely confront him or her with questions already struggled with by non–x-ray astronomers. What energizes the coronae of normal stars? What is the "engine" in the center of active galactic nuclei? Discussions by Rossner and Vaiana on the former and by Bergeron and by Rees on the latter show that we have many clues but no firm answers.

It is surely demanding too much of one experiment to settle 20 years' worth of questions in x-ray astronomy. In this case, the Einstein observatory has been a spectacular success, and even if we are perplexed by this flood of data we should have no cause for complaint. This volume nicely portrays at least a sample of the contributions of Einstein on each of these questions and should be on the bookshelf of every serious worker in the field.

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Native Peoples of Florida

Florida Archaeology. JERALD T. MILANICH and CHARLES H. FAIRBANKS. Academic Press, New York, 1980. xviii, 290 pp., illus. $19.50. New World Archaeological Record.

A more accurate title for this book would be "Archaeology of the Florida Indians," for it is entirely devoted to the prehistory and history of the native Americans. The Europeans are introduced when their presence helps explain the archeological record of the Indians, but nowhere is their archeology considered—archeology that is perhaps foremost in the public mind with such great projects as colonial St. Augustine or the spectacular underwater archeology of sunken treasure ships. This omission, I hasten to emphasize, is by no means a fault. It is time that Indian archeology be given equal recognition.

Florida Archaeology attempts to review the total 12,000 years of aboriginal Indian occupation within the boundaries of the modern state of Florida. In accomplishing this ambitious goal the authors are generally very successful. They have done a fine job of pulling together and creating a coherent whole from the diversity found in the archeological record. Their tracing of economic and social developments through time and space, and very different environmental situations, offers a series of important human ecological reconstructions. In the process, they present a considerable quantity of new data and reveal the latest archeological thinking.

The most enduring impression of the cultures examined is one of isolation. Despite the strategic position of the peninsula, there is little indication of contact with the Caribbean islands or mainland shores of the Gulf of Mexico. Florida seems to have been culturally, as it is geographically, an appendage of southeastern North America and a cul-de-sac. Cultural influences were frequently received from other parts of the Southeast, but they became greatly attenuated toward the south and rarely reached the tip of the peninsula. Thus the greatest cultural complexities and changes are observable in the northern part of the state, contiguous to the Southeast proper, and the least are found in the south.

One of the few exceptions to the apparent passivity of Florida peoples on the North American scene seems to have been the Weeden Island culture. In the middle of the first millennium A.D. its influences were widely spread throughout the Southeast. Not surprisingly, because of this importance and the fact that it has been a focus of research by the principal author, Weeden Island receives the most lengthy treatment. Apparently the publication was perceived as an opportunity for summarizing the Weeden Island research, and in part it reads like a series of minireports. This emphasis does result in a slightly unbalanced and complicated account, but it is compensated for by the wealth of detail and the thoughtful restructuring of older archeological concepts. Overall, we have a definite advance in resurrecting the past.

The principal criticisms I have of the book pertain to matters of presentation. Some of the chapters are oriented temporally and others geographically or culturally. There is some overlap and redundancy and more than a little suggestion of cut and paste. Redundancy especially arises when, once the few diagnostics of a particular archeological unit have been displayed, an attempt is made to flesh out the broader cultural content with discussions of social organization, subsistence base, mortuary customs, "black drink" ceremonialism, and other putative details. These discussions really do not add content to the archeological structures, and only detract from their distinctiveness (which is not to deny that the speculations presented are probably valid). Tighter organization might have relieved this problem.

Also a problem in presentation is that there are too few tables: more could have substituted for some of the redundancy in the text. The illustrations are generally adequate, but unexciting, and the halftones are not of high quality. The lack of a listing of tables and illustrations is an inconvenience. But these are minor problems.

Florida Archaeology is the best gener-

al source book available on the archeology of the Florida Indians. It is a little too technical for most lay readers, perhaps, and is not always detailed enough for the serious student, but it is a cogent and valuable introduction to the subject. Most important (and gratifying) of all, the book clearly demonstrates how much has been learned since the last major attempts to synthesize Florida archeology just 30 years ago. The authors do an admirable job in bringing us up to date.

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Two Mathematicians

John von Neumann and Norbert Wiener. From Mathematics to the Technologies of Life and Death. STEVE J. HEIMS. MIT Press, Cambridge, Mass., 1980. xx, 548 pp. $19.95.

Steve Heims has undertaken an ambitious task in writing this book. In Wiener and von Neumann he has chosen subjects of prodigious intellect and versatility, well suited for dual biography because their activities and research brought them into frequent contact, while their attitudes toward politics and technology diverged.

Wiener is best known as the "exprodigy" (the title of the first volume of his autobiography), who capitalized on an intense and demanding early education in his later accomplishments. These included a mathematical treatment of Brownian motion, advances in probability theory, and the development of cybernetics, with its applications in the social and life sciences as well as in engineering. After education in Hungary and Germany, von Neumann applied his precise and rapid powers of reasoning to axiomatic quantum mechanics, game theory, electronic computing, and weapons technology. In their years at MIT and Princeton, respectively, the two men often had occasion to meet. They shared many interests, but pursued them in characteristically different ways.

In his impressionistic portraits of the two Heims weaves a variety of sources together, including correspondence, interviews (both his own and those conducted by others), reminiscences of colleagues, and his subjects' publications. But the ideal situation of equivalent sources for the two subjects does not obtain, since there is no von Neumann counterpart to Wiener's intimate self-portraits. This fact, combined with von Neumann's notably smooth adaptation to his social environment, may account in part for Heims's difficulty in grasping the human character of von Neumann. Wiener, with his penchant for self-analysis and eccentric behavior, presents no such difficulty.

Heims's ultimate intention, however, is less to examine Wiener and von Neumann as individuals than to appraise scientific activity itself. In this context, von Neumann stands as symbol and archetype, "a scientific man within all the major connotations of today" (p. 360). As a "paragon of science," von Neumann espoused "value neutrality" and faith in scientific and technological progress (*ibid.*). Much of this dual biographical essay is devoted to a critique of the scientific ethos, which Heims sees in fundamental "conflict with a wider, more comprehensive humanness" (p. 363). Particularly damnable is von Neumann's enthusiastic and lucid commitment to technological horrors. Heims provides a lengthy account of the politics and administration of superarmament. The reader might wish to learn more about von Neumann's participation in the decision-making process, but the necessary governmental documentation was evidently not open to Heims. For his purposes, however, it is enough to know that von Neumann participated, and did so willingly.

By contrast, Wiener, whose relations with society were often rocky, held implicitly "organismic" values infused with the concept of process, an outlook Heims characterizes as fundamentally ecological. Wiener's mode of cybernetic analysis "is particularly suited to exposing the inhuman use of human beings" (p. 303), and, unlike von Neumann's game-theoretical approach, helps the social steersman keep off a suicidal course. Wiener sought to construct a practical and painfully modern philosophy of technology. Its personal expression would be a refusal to put technological knowledge and tools in irresponsible hands and the erection of yet another barrier between Wiener and the amoral majority of the scientific and technical community. All this Heims finds laudable and, more to the point, congenial to his own point of view.

The genre of dual biography puts special demands on an author, and Heims occasionally succumbs to the natural temptation to force a contrast or parallel. The insistence on von Neumann as an "outsider," for example, seems forced or irrelevant at times. The author also passes up some promising opportunities for detailed comparison—for example, Wiener's and von Neumann's different approaches to long-range weather prediction. Heims does describe with care and finesse Wiener's concern with stochastic processes and von Neumann's formal, axiomatic method. If some topics—the early history of quantum mechanics, or prewar Hungarian society and politics—are better explained elsewhere, Heims's accomplishment in providing access to measure theory and game theory is still substantial. The appetite is whetted for intellectual biographies of both Wiener and von Neumann.

Heims entertains no such intent in this work. Instead, he uses Wiener and von Neumann to illustrate his contention that "the traditional ethos of the scientific community, dictated by the god of scientific and technological progress, needs modification so as to allow for the reemergence of suppressed human and cultural needs" (p. 159). It is debatable whether these two mathematicians are representative of the options facing the scientific community. For Heims, however, this question, and the tasks of the biographer, are made subordinate to a vehement conviction of the moral poverty of modern science.

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