nid involvement in the bone accumulation process" in the australopithecine-bearing breccias at all three sites. He concludes that the patterns of species and element representation, as well as damage patterns, in the other assemblages are more likely to have been the result of carnivore predation, especially by large cats.

These chapters, supported by exhaustive tabulations in appendixes, will stand as the central references on the three Sterkfontein Valley hominid sites and their faunal assemblages, which number well over 18,000 pieces in the macrofaunal component alone. Brain's painstaking descriptions make this volume an invaluable source for paleoanthropologists and Quaternary paleontologists, as well as a model of taphonomic exposition.

After a brief chapter on the sites of Taung and Makapansgat, Brain turns to the main question his work sought to address: Who were the hunters and who the hunted? Recapitulating his argument for large carnivores, specifically cats, as the main agents of accumulation, he revises his previously published "leopard hypothesis." Arguing from element and species representation, damage patterns, the large average body size of primates in the deposits, and modern baboon behavior in the region, Brain formulates two linked hypotheses to explain the preponderance of primates (australopithecines and baboons) in the fossil accumulations at Sterkfontein Member 4, and their unusual abundance relative to bovids at Swartkrans Member 1 and Kromdraai B. He contends that (i) very large extinct cats, capable of handling prey bigger than those regularly taken by leopards, may have specialized in preying on australopithecines and baboons, which (ii) sheltered in the limestone caves and fissures during the colder winter months, as do modern baboons in the region. Although he proposes no means of further testing these hypotheses, Brain's close evaluation of the evidence should dampen whatever enthusiasm remains for the "killer ape" interpretation of the fossil assemblages.

The text is clearly written and lavishly illustrated; though some photographs are less clear than one might wish, most are sufficient to illustrate the features discussed in the text. Beyond percentage histograms, Brain employs no statistical characterizations or tests of his data, nor does he devote much space to building a set of generalizations of broader applicability. However, he presents his data in such profusion and detail, in both the text and an extensive appendix, that others so inclined can readily use the book as a data source.

Such close documentation makes *The Hunters or the Hunted?* a worthwhile and not overpriced addition to vertebrate taphonomists' working libraries. It is also a readable and often entertaining book that can be read profitably by those interested in early hominids and in how prehistorians move from lesser to greater understanding of the materials that time and the forces of nature have left them.

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Prices of Books

Average per-volume prices of books reviewed in *Science* 1977–1981. Data are for hard-cover books except where books were available only in paperback; books priced only in foreign currencies were excluded from the calculations. The average prices per page of the technical books in the natural sciences for the years covered were 6.8¢, 7.8¢, 8.6¢, 9.0¢, and 11.3¢.

Category	Price (dollars)				
	1977	1978	1979	1980	1981
All books	27.85	29.65	30.33	35.52	42.22
Technical books in the natural sciences	32.70	36.04	39.18	42.61	52.76

Aerospace Technology

The Origins of the Turbojet Revolution. EDWARD W. CONSTANT II. Johns Hopkins University Press, Baltimore, 1981. xvi, 321 pp., illus. $22.50. Johns Hopkins Studies in the History of Technology, New Series, No. 5.

In this book, Constant addresses one of the most important and least examined issues in the history of aerospace development: the origins of the gas turbine aircraft propulsion system. The result is an impressive and solid work of scholarship, drawing on a wide range of published and unpublished sources, combining detailed research with insightful analysis. It is certain to become a standard reference work on the subject.

Constant painstakingly traces the evolution of the turbine, going back to water turbines and hydraulic technology and advancing through the development of the revolutionary steam turbine for maritime propulsion and the first attempts at internal combustion gas turbine power plants. It is his contention that the gas turbine power plant—the turbojet—was at once the logical outgrowth of over two centuries of turbine development and a radical system dependent on the creative engineering of a few individuals operating on the frontier of the science of aerodynamics. As with the invention of the airplane itself, there is no one figure who is the "father" of the technology; rather there was a community of individuals, and the turbojet, which appeared in the late 1930's, was a multiple and independently derived invention in two nations, Great Britain and Germany.

Constant prefaces his work by proposing a heuristic model of technological change and provides an excellent table listing the numerous technologies and science specialties that came to bear on those who developed the turbojet. The "driver," in Constant's view, was the rapid advance of high-speed aerodynamic theory in the 1920's and 1930's, which led a small number of key individuals to radically revise their assumptions about the potential speed of aircraft. This in turn led them to investigate more suitable propulsion systems than the piston-engine–plus–propeller combination that had worked so well up to the 1930's. They recognized that with vast improvements in the efficiency of gas turbines (improvements made possible in part by these very discoveries in high-speed aerodynamics) a jet propulsion scheme could be applied to aircraft, enabling the envisioned increase in flight speeds to be attained. Between the piston-engine–propeller combination and the pure jet engine lay some complex devices, especially the turbosupercharger. The turbosupercharger was at once a help and a hindrance to advocates of jet propulsion. It required many of the same technologies as the later turbojet, but it was designed as a boost system to improve the efficiency of the piston-engine–propeller combination, and its success engendered resistance to the more radical pure jet concept. Constant's skillful weaving of the story of all these influences and paradoxes makes for exciting reading.

Constant develops his subject with care—perhaps too much so. Fully 98 pages of text are devoted to predecessor technologies. Another 80 are consumed by a useful but at times overextensive discussion of currents within aeronautical research, including commercial air transportation, the revolution in aircraft structures, international competition in aeronautics, and the like. Finally, Constant begins his discussion of the turbojet revolution on p. 179, discussing the background and work of its four parents: Frank Whittle, Hans von Ohain, Herbert Wagner, and Helmut Schelp. Here one of Constant's most important conclusions is forcefully conveyed: the turbojet revolution was the product of men operating outside the traditional aeroengine community; yet they acted really as catalysts, for once they had demonstrated the principles with test-bed engines and rudimentary flight vehicles responsibility for their utilization returned to established industry. This reviewer was mildly disappointed by the rapid denouement of the book. The discussion of the first aircraft to benefit from the turbojet technology consumes only ten pages. Several tantalizing questions are left unanswered. For example, what was the feeling of military commanders with regard to the potential of turbojet aircraft? Was there reluctance on the part of high-level Allied leaders to develop and deploy turbojet aircraft? Only Britain among the Allied nations fielded jet aircraft in combat, and these were inferior to Germany's outstanding wartime jet fighter, the Me 262. The United States, a firm third in the turbojet race, drew level with European efforts only at the war's end. The reasons for the American failure to proceed with jet development are complex and to a significant degree shaped postwar American military attitudes toward America's scientific community, which was, rightly or wrongly, perceived to have "failed" in spotting the potential of the turbojet as a high-performance propulsion system. A section on these and similar questions would have rounded out the discussion nicely. As it is, readers can still examine Robert Schlaifer's *Development of Aircraft Engines* (Harvard University Press, 1950) for a cogent discussion of why the United States was last in the international turbojet sweepstakes. Alex Roland's forthcoming history of the National Advisory Committee for Aeronautics examines the impact of NACA's failure to forecast the significance of the turbojet engine on its postwar relationship with the military.

In sum, Constant has written an excellent work that suffers from some structural unevenness. Perhaps too exhaustive in its beginnings, the book ends abruptly, with the final thoughts hammered home quickly, and only briefly examined. But this is a minor flaw. Models of technological change have become so commonplace that one fears for the value of a text when one sees yet another, but Constant has developed a thoughtful model, letting his evidence take him where it will and not bending his interpretation to fit a schema. While not totally supplanting Schlaifer's work, Constant has given us what is unquestionably the finest examination of the turbojet revolution to date. He is to be commended not only for his selection of the topic but for his handling of it.

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Solar Physics

Solar Flare Magnetohydrodynamics. E. R. PRIEST, Ed. Gordon and Breach, New York, 1981. xii, 564 pp., illus. $89.50. The Fluid Mechanics of Astrophysics and Geophysics, vol. 1.

The solar flare is an extremely complex phenomenon that causes a transient change of a substantial fraction of the solar atmosphere. The change involves the conversion of roughly 10^{32} ergs, for a large flare, of supposedly magnetic free energy in approximately 100 to 1000 seconds spread over a volume of more than 10^{30} cubic centimeters. The flare plasma resulting from this rapid deposition of energy is a highly complex mix of quasithermal and nonthermal particle populations embedded in an exponential atmosphere whose transport properties, even without the ever-present magnetic fields, vary by orders of magnitude from the highly resistive temperature minimum to the almost perfectly conducting corona. The theoretical treatment of such a complex phenomenon results in highly controversial points of view. *Solar Flare Magnetohydrodynamics* represents one view of the subject.

The book consists of a collection of specialized papers devoted to topics of general interest in solar flare theory. Although the preface states that the book is aimed at first-year graduate students, it is not suitable for such an audience, for reasons to be discussed below. The book consists of eight chapters, including a 45-page introduction by the editor. The other chapters are "Flare observations" by Z. Švestka, "Current sheets" by Priest, "Simple-loop flares: magnetic instabilities" by G. van Hoven, "Simple-loop flares: thermal evolution" by I. J. D. Craig, "Two-ribbon flares: magnetostatic equilibria" by J. Birn and K. Schindler (with a section added by the editor describing his own work), "Two-ribbon flares: (post)-flare loops" by G. W. Pneuman, and "Particle acceleration in solar flares" by J. Heyvaerts.

The introduction clearly demonstrates the complexity of the flare phenomenon, as well as the "cartoon approximation" so prevalent in solar physics. Unfortunately Priest does not attempt to assess where solar flare theory is going and how to get there. In fact there is no discussion anywhere in the book of what a realistic theoretical approach to solar flares should encompass.

The review of solar flare observations by Švestka is well organized and compact. It is an excellent update of his highly praised book on the subject. The reader should read this chapter before attempting the others.

It is sometimes amusing to compare Švestka's review of the observations with the way the observations are convoluted to fit the pictures drawn by theoreticians. The review of current sheet theory by Priest leaves one with the impression that the solar flare as a phenomenon would be well understood if only the observationalists would get down to business and locate the reconnecting current sheet that will neatly explain all those misleading observations reviewed by Švestka. Though useful as an introduction to current sheet theory, the chapter is well out of date with respect to anomalous transport occurring in sheets, the effect of mode coupling between differing reconnecting sheets, and magnetic stochasticity caused by the coupling process. The chapter also suffers from the author's never citing references to the works of the many authors he invokes.

The chapter by van Hoven is more appropriate to a textbook reviewing the magnetohydrodynamic stability of tokamaks or reversed field pinches. The justification for devoting 56 pages to reviewing one-dimensional stability analyses of what are clearly three-dimensional structures, such as loops, and calling the analyses global (they are in fact local) is anyone's guess. The author apparently believes that flaring loops are half a symmetric tokamak or reversed field pinch embedded in the sun.

The chapter by Craig is clearly pre-