Strauss was frequently at odds with his fellow commissioners. Data security was an idée fixe with him. He remained far more wary than others about technical cooperation with the British, for example, and about shipment of radioisotopes to the Norwegian Defense Establishment. Strauss was also more aggressive in favor of arrangements to monitor radioactivity in the upper atmosphere. Pfau regards him as a major force in the eventual inauguration of a long-range detection system. Strauss also came early to the view that American security depended upon the super-bomb, and he was equally tenacious on that issue both before and after his resignation from the AEC in April 1950.

If Strauss had disappeared from public view at this point he would in all likelihood have escaped scholarly attention. But in 1953 Eisenhower appointed him AEC chairman, and the controversies that swirled around him in the next five years kept him in the headlines.

The Oppenheimer loyalty case was the first issue Strauss took up as chairman, and Pfau's detailed account of this episode is the most significant part of the book. Strauss disliked Oppenheimer for personal reasons, but Pfau argues that Strauss's position derived essentially from objective evaluation. Oppenheimer's opposition to the super-bomb program genuinely convinced Strauss that the scientist, "whether consciously or not," was working against the American interest.

According to the author, Strauss ultimately believed that Oppenheimer was a Soviet agent, and "several times in those December days . . . he wondered aloud whether Oppenheimer might flee behind the Iron Curtain" (p. 159). Pfau personally endorses the Security Board's majority finding against Oppenheimer, but he criticizes Strauss's conduct. "The FBI listened to [Oppenheimer's] telephone calls, followed his movements, and invaded the privacy of his relationship with his attorney, all with the approval and encouragement of Strauss" (p. 181).

What Pfau wants us to see in this behavior is patriotic defense of the national interest, not political paranoia, and certainly not personal vindictiveness. If Strauss erred, it was from excessive zeal on behalf of patriotic principle. (There is a symbolic message in the red, white, and blue book jacket.) Moreover, Pfau argues that Strauss paid a price for these excesses. The enemies he made in both the scientific community and the liberal press contributed to his downfall. In 1959 the Senate rejected his nomination as Secretary of Commerce, and Strauss was forced to make an ignominious retreat from public life. Pfau's basic theme is that Strauss sacrificed his own career in the cause of guarding U.S. security interest.

It is a pretentious argument. Even if we grant that liberals, eager to think the worst, unfairly maligned Strauss, even if we accept Pfau's interpretation of Strauss's motives, there is still no need to cast Strauss as a tragic hero. Moreover, the argument has little relevance to subsequent sections of the book where Strauss is shown creating additional "enemies" in struggles over commercial development of nuclear energy. These were essentially partisan, interest-group affairs in which Strauss, a conservative Republican, conducted himself with no more or less patriotic honor than anyone else. Moreover, as Pfau notes with some disappointment, Strauss proved disingenuous under critical questioning during these events and generally "vain, arrogant, and self-righteous in defense of his record" (p. 234). Strauss simply alienated a lot of senators and came up short on votes.

Pfau's inflated interpretative device gets in the way of a more critical evaluation of the evidence. It also pulls the analysis too often into moral categories. Pfau needed just a little more distance on his materials to write a fully satisfying biography.

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Ocolomotor Adaptation

Adaptive Mechanisms in Gaze Control. Facts and Theories. A. BERTHOZ and G. MELVILL JONES, Eds. Elsevier, New York, 1985. xxviii, 386 pp., illus. $109.25. Reviews of Oculomotor Research, vol. 1.

When the head rotates in one direction the eyes move in the opposite direction at the same speed, stabilizing vision. The circuitry of this vestibulo-ocular reflex is rather simple as neural systems go. The vestibular apparatus acts as a transducer and sends signals coding the angular velocity of head rotations to the brainstem via the vestibular nerve. Central neural pathways in the vestibular nucleus and reticular formation further process the movement signal and in turn project to the motor neurons innervating the eye muscles that move the eyes. The reflex is very rapid but is "open loop" with no direct feedback of performance for the reduction of error during its operation. However, the wearing of magnifying spectacles that double the size of the retinal image will in a matter of hours nearly double the size of the vestibulo-ocular reflex. An adaptive mechanism not in the main line of the reflex has monitored performance and in this case adjusted parameters within the direct reflex pathway to maintain a stable retinal image during head movements.

Since adaptive mechanisms often act on simple systems such as the vestibulo-ocular reflex, they are ideal models for understanding the neural mechanisms of learning in mammals. The recent explosion of work on these mechanisms and their relevance to learning makes this book a timely addition to the literature.

The first half of the book is devoted primarily to behavioral and psychophysical studies of adaptive processes in various gaze control systems. The diversity of topics covered indicates how universal adaptive mechanisms are to neural control systems. There are excellent chapters on adaptive processes for saccades, accommodation and vergence, the vestibulo-ocular reflex, head-eye coordination, and the integration of vestibular, optokinetic, and pursuit mechanisms. Several chapters consider the rapid compensation that occurs after disturbance of the vestibular input, either through lesion of the vestibular apparatus or nerve or through experimental plugging of the semicircular canals. Zee and Optican point out that deficits that occur following lesions to oculomotor systems are generally transient, the result of adaptive repair. On the other hand, longer-lasting disorders can occur from lesions remote from the direct eye movement pathways when the lesions involve structures concerned with accomplishing adaptation such as the cerebellum. What emerges from this collection of reviews, then, is that adaptive mechanisms play an important role in recalibrating neural systems during growth, after muscle or neural damage resulting from disease, trauma, or aging, or in response to changes in the environment that may range from the mundane (such as small changes in magnification with a new pair of prescription glasses) to the unusual (such as weightlessness during space flight).

The second half of the book explores neural mechanisms underlying adaptation. It includes sections on neural recordings and newer theoretical models of adaptive processes. Several of the chapters present evidence that the cerebellum plays a key role in adaptation. Adaptation implies a change in synaptic trans-

mission at some point within the involved neural system. It is not known whether this modification is confined to the cerebellum or brainstem or is more distributed, involving changes at many locations in the circuit. It has been variously proposed that the cerebellum contains the engrams for motor learning, processes the error signals used for modification, or plays a role in coordinate transformations for sensory-to-motor integration. The editors have chosen not to include the cerebellar recording studies of Miles and Lisberger and of Ito because other reviews of the work have appeared, although the omission leaves a gap for readers not familiar with this cornerstone research. Two of the four theoretical chapters and the introductory chapter, by Simpson and Graf, discuss the coordinate transformations that are required in processing sensory signals for motor outputs.

As the editors point out, the morphological and biochemical changes involved in adaptive mechanisms are currently unknown. The book transmits the excitement of a field on the verge of major discovery. Parts of it require some knowledge of control systems analysis. The book will be an important addition for researchers and clinicians interested in the vestibular system, eye movements, motor systems in general, and central nervous system correlates of learning.

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Old World Archeology

Prehistoric Europe. TIMOTHY CHAMPION, CLIVE GAMBLE, STEPHEN SHENNAN, and ALASDAIR WHITTLE. Academic Press, Orlando, Fla., 1984. x, 359 pp., illus. $45.

The writing of a general textbook on the prehistory of Europe is indeed an ambitious task. The prospective authors must confront an extraordinarily rich and varied archeological record, a literature that is vast and linguistically fragmented, and interpretative frameworks reflecting diverse regional histories. *Prehistoric Europe* represents a successful confrontation.

Given the diversity of archeological materials to be covered, any textbook must generalize about regional patterns and temporal trends. There is an attendant risk, however, that local variation, which may have significant implications, will be ignored and that the account will be so divorced from specific archeological finds that it provides little understanding of the basis for interpretations. This book achieves a balance between detail and generalization. The chapters, generally covering a particular time period, each include an overall summary and a more detailed discussion of different regions (for example the west and central Mediterranean), with descriptions of key sites or studies and their significance. The descriptions are brief but are often supported by illustrations and are sufficient to acquaint readers with the kinds of evidence available. Pertinent references are also given, so that readers can investigate further. Moreover, the authors emphasize variation and exceptions to their generalizations, avoiding the creation of overly neat scenarios of the past.

The authors also achieve remarkable geographic and chronological balance. Previous textbooks have tended to emphasize the most intensively studied regions and periods, those with the most dramatic finds, or those most familiar to the authors. Consequently, students have tended to learn the Paleolithic of southwestern France, the Mesolithic of Scandinavia and England, the Neolithic of the Balkans, and the Bronze and Iron Age of central Europe. This book is much more uniform in that respect. Particular areas, such as Neolithic Wessex or the Bronze Age Aegean, are emphasized as befits their rich archeological materials, but the authors address the question of the uneven evidence. Thus, they attribute their telling little about the late Middle Paleolithic of central Europe and the Neolithic of much of Iberia to the paucity of occupation in the former case, to a lack of investigation in the latter. More than other such books, this one gives the reader an appreciation of the texture of both prehistoric developments and archeological research across the continent.

Another kind of balance is achieved among levels of archeological interpretation. Beyond the description of material objects, archeologists seek to reconstruct prehistoric behavior within sites and across regions and, ultimately, to explain this behavior, its distribution and changes in space and time. The authors include both reconstruction and explanation. For the former they draw heavily upon recent ethnoarcheological studies of living peoples, physical studies of soils and raw material composition, and quantitative studies of distribution patterns. For the latter they incorporate work in cultural anthropology and investigations of settlement patterning and burial furnishings. They are careful in their reconstructions to point out weaknesses in data or methods and to distinguish between data and interpretation. Although they do not dwell upon questions of the origins of practices such as food storage and plow agriculture, they emphasize their economic, social, and political implications in relation to their adoption and spread.

Finally, the authors attempt to balance the explanations they offer. In their explanations of sociopolitical change, for example, they emphasize subsistence and population density, but they frequently point out the inadequacies of such materialist approaches and discuss alternatives. In explaining changes in material culture, although they often reject both large-scale migrations and independent local developments, favoring models of interregional exchange and interaction, they discuss all these possibilities, providing references for the various points of view.

As in other textbooks, all the high points of European prehistory—cave paintings, Stonehenge, and Mycenae, to name a few—are discussed here. What is unique about this presentation is its balance and coherence.

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Books Received

Arms Control and the Arms Race. Readings from *Scientific American*. Introductions by Bruce Russett and Fred Chernoff. Freeman, New York, 1985. 229 pp., illus. Paper, $14.95.

Astronomy and the Imagination. A New Approach to Man's Experience of the Stars. Norman Davidson. Routledge and Kegan Paul, Boston, 1985. xviii, 238 pp., illus. $25.

Astrophysics of Active Galaxies and Quasi-Stellar Objects. Joseph S. Miller, Ed. University Science Books, Mill Valley, Calif., 1985. viii, 519 pp., illus. $30. From a workshop, Santa Cruz, Calif., July 1984.

Atlas of Dinoflagellates. A Scanning Electron Microscope Survey. John D. Dodge. Farrand Press, London, 1985. viii, 119 pp. $24.50.

Autoionization. Recent Developments and Applications. Aaron Temkin, Ed. Plenum, New York, 1985. xiv, 261 pp. $45.

Automation and Robotisation in Welding and Allied Processes. Published on behalf of the International Institute of Welding by Pergamon, New York, 1985. xii, 417 pp., illus. $75. From a conference, Strasbourg, France, Sept. 1985.

Basic and Applied Mutagenesis. With Special Reference to Agricultural Chemicals in Developing Countries. Amir Muhammed and R.C. von Borstel, Eds. Plenum, New York, 1985. xii, 441 pp., illus. $55. Basic Life Sciences, vol. 34. From a symposium, Islamabad, Pakistan, Oct. 1982.

Bellamy's New World. A Botanical History of America. David Bellamy. British Broadcasting Corporation, London, and Parkwest, New York, 1985. 192 pp., illus. $24.95.

Bioactive Polymeric Systems. An Overview. Charles G. Gebelein and Charles E. Carraher, Jr., Eds. Plenum, New York, 1985. xxiv, 689 pp., illus. $95.

Biochemical Pharmacology and Toxicology. Vol. 1,

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