As Bruce fully explains, Charleston and the South as a whole lagged considerably behind the Northeast in scientific advancement before the Civil War. Yet it is stretching the point to call that region "scientifically benighted." Certainly Bruce understands the barriers to scientific advancement in the South, and he provides an enlightening analysis of the problems in that region. He also understands and effectively explains how the Civil War virtually wrecked the scientific enterprise in the South and made recovery impossible for several decades to come. His omissions and errors about science in the South do not significantly detract from the overall quality of this splendid book.

The Launching of Science in Modern America fills a gap in our knowledge of the history of science in the United States and deserves the attention of everyone who desires to know when and how modern science fledged in America.

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Theories of Human Diversity

Victorian Anthropology. GEORGE W. STOCKING, JR. Free Press (Macmillan), New York, and Collier Macmillan, London, 1987. xviii, 429 pp., illus. $27.50.

This long-awaited work by America's leading historian of anthropology forges expansive overviews and detailed vignettes into an episodic account of 19th-century British theories of human nature and diversity. Its central concern is with the imperfectly consolidated ideas of sociocultural evolutionism formulated during what Stocking calls the "age of equipoise" by such key social thinkers as John Lubbock, Henry Maine, John McLennan, Herbert Spencer, and E. B. Tylor, among them the founders of professional anthropology in Britain. This tradition, also called by Stocking a "cynosure," never quite became a paradigm with normal science attached; its links with different forms of Darwinism remained complex and often inconsistent.

Stocking begins by tracing various forerunners of "classical evolutionism," which he declares a "kind of cosmic genealogy for middle-class civilization" (p. 233). In addition he pursues the aftermath of antievolutionary reactions and resistance to positivism, particularly in American anthropology, and provides in closing a "frankly sketchy panorama" of the discipline since 1880, accentuating developments in Boasian culturalism, British functionalism, and French structuralism based on shared assumptions of biological and psychic unity that had been doubted in an earlier polygenist racialism. Though the book occasionally alludes to sociobiology, its primary concern is with theories of social, cultural, linguistic, and physical diversity within the human species, the fundamental topic of mainstream modern anthropology.

Antecedents of Victorian anthropology delineated by Stocking in his opening chapter include Enlightenment notions of reason and progress, French comparative anatomy and attention to civilization's externals, German comparative philology and emphasis on inward culture, and British political economy in tune with Locke's natural harmony of human egoisms rather then Filmer's ideology of patriarchalism. Stocking clarifies important anticipations of Marxism among Scottish progressivists and the peculiar integration of evangelical and utilitarian impulses in pre-Darwinian Britain that accompanied the resurgence of Biblical traditions as a "kind of paradigmatic status" (p. 44).

A commitment to multiple contextualizations is apparent in the treatment of J. C. Prichard's ethnology, to which Stocking then turns. Taking shape on the eve of evolutionism and a dramatic reassessment of geological time, the Prichard school brought together Anglo-Saxonism and physical anthropology "founded on the Bible, conceptualized as a history of racial movements, and buttressed largely by the evidence of comparative philology" (p. 75). Its hereditarian racialism eroded Enlightenment assumptions of human uniformity yet resisted polygenism and managed to assimilate Max Müller's Indology and British antiquarianism. Stocking neatly encapsulates Prichard's biography: "Following a then well-traveled path from Quakerism to the Anglican church, Prichard had been touched by the Evangelical Revival while studying at Cambridge and Oxford after leaving Edinburgh, and his religious commitment would no more allow him to accept Kames' primitive polytheism than his aboriginal polygenism. . . . in defending both primitive revelation and human unity, he was in fact defending the principle that all mankind had once been and were rightfully subject to a single ethical dispensation" (p. 49). More might have been made of the relation of Prichardian ethnology to the popular movement of natural history and natural theology, a virtual cult of Linnean classification that pervaded scientific exhibitions, bourgeois parlor displays, and best-selling books of the period. Classifying and collecting according to what Michel Foucault has called the purely "visible" was displaced not just by intellectual Darwinism but by an overall shift of attention to subsurface order, the general "hidden."

Stocking provides provocative sketches of central figures and marginal ones, often grouped in threes: not just Lubbock, Tylor, and McLennan, but George Grey (benevolent colonial despot of New Zealand and South Africa), Thomas Williams (Methodist missionary to Fiji), and traveler-Darwinist Francis Galton. Although Stocking plots a history of influences and transmission of theories, he is alert to shortcomings in monolithic models of disciplinary advance. Thus in considering evidence accumulated on non-Western populations by administrators, travelers, and missionaries between 1838 and 1850 he characterizes the views he finds only as "attitudinal postures"—"ranging from a post-Enlightenment imperialist progressivism, to an evangelical monogenetic assimilationism, to a pessimistic racialist eugenicism, to a paradoxical polygenistic primitivism" (p. 80). Still, the book's continual cataloguing of competing isms suggests that description and explanation progressed in primarily doctrinal fashion, that ideas were basically partisan and polarized rather than dispersed. Stocking's strategy of looking backwards and forwards from classical evolutionism reinforces a centralizing tendency. His history remains canonical, although elaborately qualified.

Even familiar subjects are given a fresh look through this strategy: Darwin, of course, but also, more inventively, the Crystal Palace Exhibition of 1851, presented as a festival of colonialist representations and demarcations of peoples subject to British control. In taking the Crystal Palace as a focal point and closing his account with an emblematic story of the eradication of Tasmanians, Stocking situates both racial and cultural theories of human varieties in political and economic contexts, without necessarily reducing them to direct reflexes of policies of domination. Stereotypes of the "savage" and the "primitive" as counter, pawn, proxy, and foil are traced across transformations in ideology without sacrificing attention to institutional specifics. This is a rare achievement in the history of anthropological ideas.

The book has a generally chronological progression, yet it includes turns into "tangled interrelations" (p. 9). For example, not content simply to compare McLennan's influential "tracing up" of exogamous marriage practices and religious ideas to rival schemes of development, Stocking mentions the Matrimonial Causes Act, Book of Common Prayer rites, and other issues that gave the familiar debates relevance to contemporary affairs. Equally lively is a section on the

political and scientific disputes of the professional societies of "ethnologicals" and "anthropologicals" divided by Darwinian issues. Less attention is paid to various styles of presenting and interpreting evidence of human diversity, the textual and documentary conventions that altered over the course of the period, and to many scholars and researchers difficult to nail with prevalent doctrinal pegs. In the case of John Crawfurd, for example, Stocking eventually acknowledges that this ethnological "polygenist," who argued a diversity of human races on linguistic grounds, was nevertheless a staunch opponent of slavery (p. 252).

Victorian Anthropology is not just a period history of anthropology but an anthropologically informed history of broader aspects of the Victorian period. Those "other Victorians" must be understood by way of their own understandings of others. This volume is a stately summing up, and it establishes a compelling new point of departure for the history of anthropology among the human sciences.

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Planetary Moons

Satellites. JOSEPH A. BURNS and MILDRED SHAPLEY MATTHEWS, Eds. University of Arizona Press, Tucson, 1986. xii, 1021 pp., illus. $55. Space Science Series. Based on a conference, Ithaca, NY, July 1983.

Our solar system contains only nine planets; indeed, some critics of little Pluto would have us reduce that number to eight. Unfortunately, theoretical models for the origin of the solar system tend to contain more than eight free parameters, and unique cosmogonic models cannot be crafted to account for the planets at hand. This situation has led to the common lament of planetary scientists that there are "too few planets." The situation is not readily remedied. The two most promising paths are to search for planets about nearby stars and to explore the larger satellites in our own planetary system. *Satellites* brings us nicely up-to-date on the latter effort.

Observations of the satellites of the Jovian planets by the Voyager 1 and 2 spacecraft (1979–1986), of the Martian moons Phobos and Deimos by Mariner 9 (1971) and the two Viking Orbiters (1976), and of Pluto and Charon by Earth-based observers (1980–1986) are distilled in this massive and fascinating book. An up-to-date review of thinking about Earth's moon is also included, showing that the cessation of American lunar spacecraft missions in 1972 and Soviet missions in 1976 has not fully prevented scientists from *thinking* about the subject.

Although small satellites and planetary rings undeniably have a certain charm and are attended by their own peculiar and interesting problems, the strongest incentive to most prospective readers of *Satellites* is the opportunity to learn more about the large, evolved, complex, planet-sized satellites (the moon; Jupiter's four Galilean satellites, Io, Europa, Ganymede, and Callisto; Saturn's largest moon, Titan; and Neptune's oddly situated Triton). The last five of these all contain substantial quantities of ices and hence can exhibit melting and volcanism even at temperatures far below 0°C. All of these satellites exhibit a clear trend toward higher contents of volatile materials at greater distances from the sun, as do the solid planets themselves.

To aficionados of satellites, however, the intermediate-sized bodies are a treasure trove of information on planetary evolution: bodies with radii less than about 100 km cannot melt and differentiate by density as a consequence of the decay of long-lived radioisotopes within them. Conversely, ice-rich bodies with radii larger than a few hundred kilometers cannot avoid at least partial differentiation and internal tectonic activity. Thus these mid-sized models (and the largest few dozen asteroids) provide valuable tests of our theories of planetary thermal evolution. Obviously, then, the smallest satellites should generally be very ancient, primitive, undifferentiated samples of the raw solid materials out of which the planets and larger satellites were formed. Thus planetologists are led naturally to the comparative study of planets with all the many varieties of satellites they possess.

The account of the satellites presented here is truly mind-stretching: lava flows of aqueous ammonia solution at −100°C; volcanic plumes of sulfur dioxide and sulfur vapor 250 km high; surfaces that seem to be collages of fragments from three or more radically different types of bodies; oceans of liquid nitrogen, methane, and ethane; a planet-sized body stained brown by organic polymers; holes "bitten" out of radiation belts by tiny satellites; donuts of hydrogen, sodium, and potassium circling planets near the orbits of large moons; extremely narrow, well-disciplined planetary rings "shepherded" by small nearby satellites; a planet-sized moon in a retrograde orbit about its primary body. Of necessity, research on these phenomena involves a host of scientists from widely diverse disciplines.

The organization and authorship of this book reflect that interdisciplinary character. The 45 authors are drawn from the ranks of astronomy, geology, chemistry, physics, aeronomy, geophysics, and geochemistry. The editors have, following the tradition of the series in which this volume appears, invited from two to five authors with very different disciplinary backgrounds to collaborate on each of the 18 chapters. These "arranged marriages" have for the most part parented chapters that can be read by scientifically literate nonspecialists. Planning this endeavor must have been challenging.

Satellites joins a distinguished family of over a dozen books in the Space Science Series of the University of Arizona, which boasts a 13-year history of excellence. This volume is not only technically meritorious and current, it is written (considering its very diverse authorship) in a surprisingly even and readable style. Planetary scientists are obliged to read it. Denizens of the more classical "parent disciplines" of the planetary sciences should find it a stimulating and accessible survey of one important aspect of the study of our solar system. And anyone who thinks that we can truly understand planet Earth without paying diligent attention to the study of other planetary bodies should find this book enlightening.

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Transmitters and Receptors

Excitatory Amino Acid Transmission. T. PHILIP HICKS, DAVID LODGE, and HUGH MCLENNAN, Eds. Liss, New York, 1987. xxvi, 426 pp., illus. $69.50. Neurology and Neurobiology, vol. 24. From a symposium, Banff, Alberta, July 1986.

The purpose of the meeting whose proceedings constitute this volume was to discuss the role of excitatory amino acids and their associated receptors in synaptic transmission within the vertebrate central nervous system. As one is reminded frequently throughout the book, there are at least three pharmacologically distinguishable postsynaptic receptors for excitatory amino acids—the *N*-methyl-D-aspartate (NMDA), kainate, and quisqualate receptors—with the possibility of additional receptor subclasses at presynaptic sites. Each of these receptors can be found throughout the central nervous system. Their distributions are heterogeneous and their physiological and behavioral effects variable.

More than 100 authors contributed 74 papers covering diverse facets of their re-