Bicentennial Considerations

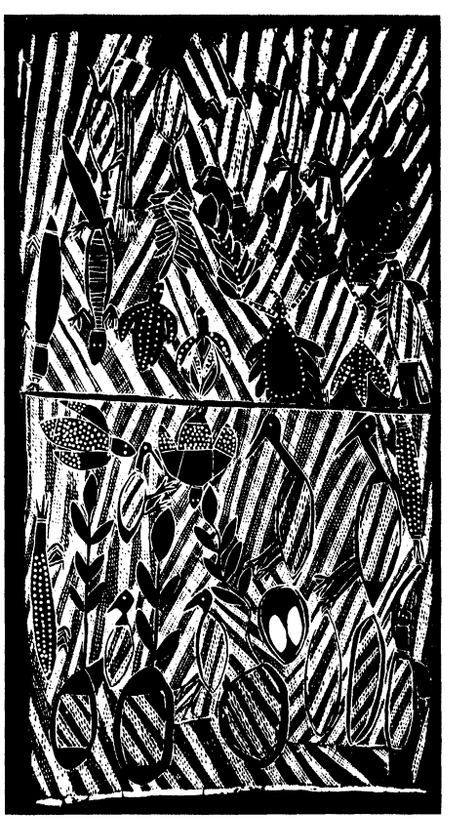
Australian Science in the Making. R. W. Home, Ed. Published in association with the Australian Academy of Science by Cambridge University Press, New York, 1988. xxx, 413 pp., illus. $65.

This year marks the bicentennial of British settlement on the Australian continent. Historians and scientists have joined the retrospective celebrations by reviewing the history of science and technology, particularly natural sciences in the 19th century and physical and medical sciences in the 20th. Contributors to *Australian Science in the Making* are keenly aware of issues of authority and independence for scientists located far from established centers in the Northern Hemisphere—more aware, perhaps, than some of the historical figures they study. One theme that pulls these essays together is the significance of when (and perhaps even whether) Australian scientists gained autonomous institutions and distinctive research agendas in particular fields of study. Some factors almost inevitably sustained a degree of dependence, particularly the political and economic bonds of empire, personal connections and imported traditions, and limited economic resources. Others facilitated a degree of autonomy, namely geographic distance from Britain and Europe, the mixture of nationalities, and the unique Australian species and environment.

Appropriately, the volume begins with an overview of aboriginal conceptions of the workings of nature. In a thoughtful synthesis of archeological evidence, L. R. Hiatt and Rhys Jones indicate the diffusion of early peoples throughout the Australian continent and their use of the land and its resources over the past 25,000 to 40,000 years. This information is then linked to ethnobiological research among contemporary Gidjingarli-speaking people in Arnhem Land. Their language reveals an extensive and systematic understanding of plants and animals, organized in taxonomic systems that include male and female, stages of the life cycle, ecological habits and location, and economic value—detailed characterizations that extend to species not yet "scientifically described." Just why Europeans have been so slow to recognize aboriginal knowledge becomes more clear in Miranda Hughes's discussion of the interaction between French explorers and Tasmanians in the late 18th century. The Tasmanians, though generally friendly, were not particularly interested in the explorers or their trinkets. Even more significant, perhaps, the preconceptions and preoccupations of naturalist François Peron, burdened with flawed experimental devices (such as the dynamometer) and contemporary anthropological theories about primitive peoples, obscured actual Tasmanian beliefs and behavior. Peron's account is less revealing, Hughes suggests, than the observations of Captain Nicolas Baudin; Baudin made fewer judgments on a people who, under duress from white occupation, would eventually become extinct.

The rest of the volume is concerned with the individuals and institutions that put Australia squarely in the Western traditions of science and technology. Sybil Jack's essay "Cultural transmissions to 1850" stresses the early constraints on the development of science in the convict-settled colonies. By the middle of the 19th century, however, some British civil servants and scientists took an active interest in the colonies. Robert Stafford's fine essay on Sir Roderick Murchison adds a geological dimension to the already known international networks of anatomist Richard Owen and botanists William and Joseph Hooker. Murchison, as president of the Royal Geographical Society and director-general of the Geological Survey of Great Britain, shaped data-gathering, classification and presentation of results, and career opportunities for a generation of geologists who described topography and mineral resources in the Australian colonies and elsewhere. In this volume such center-periphery interactions are generally discussed in terms of reciprocal relations where mutual arrangements are negotiated; there is nothing here of simplistic imperialism. Thus Baron Von Mueller of the Melbourne Botanic Gardens established a subsidiary international network by using his virtual monopoly over the identification and export of rare and unusual Australian plants. As A. M. Lucas points out, Mueller traded upon the need of his overseas correspondents for exchange to advance his Australian collectors and patrons into foreign scientific societies. Distance nonetheless created intellectual isolation. George B. Halford, medical professor at Melbourne, challenged Thomas H. Huxley's assertions regarding the similarities between gorillas and humans. As Barry Butcher points out, the public debate took on a moral and social tone, although it utilized physiological evidence (relating to the muscles of the hind limb of "monkeys" and of the human foot). Encouraged by Victorians opposed to Darwin, Halford pursued a debate with the absent Huxley that gained him accolades in Melbourne society but ultimately undermined career aspirations back in England. This presumptuous scientist at the periphery could be dismissed by the powerful Huxley as an "eccentric professor of medicine."

Increasingly, as Ian Inkster and Jan Todd argue in an important essay, the naturalists and other scientists in Australia expanded and altered ideas and techniques imported from Europe, although they seldom revolutionized them. Distinctive developments in Australia required, fundamentally, a socio-economic base of support such as became possible in Victoria and New South Wales by the 1850s. During the last half of the century a group of foreign-born civic professionals helped build an infrastructure of local voluntary societies and government agencies. Ultimately, the cultural and institutional foundation and intellectual resources were sufficient for Australians to



Australian aboriginal bark painting representing bandicoots (top right section) and "archetypes of various other species." [From L. R. Hiatt and Rhys Jones, "Aboriginal conceptions of the workings of nature," in *Australian Science in the Making*; courtesy of the Australian Institute of Aboriginal Studies]

pursue conventionally described science. Examples of the cyanide process for gold extraction and of uses of microbiology link the scientific work to particular economic, geographical, and demographic characteristics of the southern continent. By the 1880s Australian scientists produced results that were recognized abroad and gained institutional and public support at home. A somewhat similar case is made for technology by George Bindon and David Philip Miller. Their paper "Sweetness and light" discusses the ways in which the Colonial Sugar Refining Company, using experienced chemists from Scotland and Germany, adapted milling and refining processes to Australian conditions. In this instance, experts established technical control over floor control, which the authors argue represents one evidence of an industrial research orientation.

The third and last section, entitled Passage to Modernity, moves toward and emphasizes science since the 1940s, with the exception of the paper by H. Hamersley on the Sydney Cancer Research Committee in the 1920s. Home describes the rapid advancement of the physical sciences, and the simultaneous shift away from agriculture, during World War II. Australians were brought into British work on radar and established facilities that could be used after the war as well. Woodruff T. Sullivan's excellent essay on Australian radio astronomy documents the value of Australian work as well as the problems facing those who tried to collaborate with scientists on the other side of the world. Sullivan also points out the difficulties faced by women, such as Ruby Payne-Scott, who had to keep her marriage a secret from 1944 to 1950 because the Commonwealth Scientific and Industrial Research Organization forbade married women on permanent staff. S. C. B. Gascoigne documents in detail the way postwar astronomy benefited from the equipment, staff, and facilities that, in turn, allowed Australians to take advantage of their location in the Southern Hemisphere and collaborate with scientists elsewhere in the world. According to Ron Johnston and Jean Buckley, in the period since 1945 sponsorship by government agencies has undergirded unprecedented growth and status for science. The price for that support has been a process more bureaucratized and, increasingly in recent years, politicized as well.

Geographical location influenced the work of plant and medical scientists just as it had the research of some astronomers. R. L. Burt and W. T. Williams review the extraordinary problems and possibilities opened by the acclimatization of plants on their long-isolated continent and observe with regret how slowly (only since the 1930s) botanists have been able to gain reasonable oversight of plant imports and exports. The in many ways unique environment provided unusual opportunities in the medical sciences as well. F. C. Courtice argues that the scientists who earned international recognition were often those who concentrated on indigenous species or local problems and could thus produce results distinct from those of foreign scientists. His examples include Charles James Martin, whose work on snake venom led to antitoxins, to an international reputation for the young Sydney physiologist, and to subsequent research on the toxic components of venoms at the Walter and Eliza Hall Institute in Melbourne.

Taken together, these essays reflect the range and level of current work on the history of biological and physical sciences in Australia. Historians are still mapping terrain and prominent features. No one here, for example, explores in any detail the pervasive and persistent public concern for the resources and ecology of the continent, the role of women and amateurs in a population at once highly urbanized yet widely dispersed, and the impact of the difficult transition years after federation in 1901.

Like the United States a century earlier, Australians have sought independence from British and European (and recently even American) dominance, an effort seemingly at odds with the simultaneous goal of acceptance as equals by foreign colleagues. In these essays we discover the paradox that Australian scientists have often gained independent recognition at precisely the moment they merge into an international network.

SALLY GREGORY KOHLSTEDT
Department of History,
Syracuse University,
Syracuse, NY 13210

An Internationalist Focus

Nature in Its Greatest Extent. Western Science in the Pacific. ROY MACLEOD and PHILIP F. REHBOCK, Eds. University of Hawaii Press, Honolulu, HI, 1988. xiv, 288 pp., illus. $43. From a symposium, Berkeley, CA, 1985.

The social history of scientific development has typically taken the nation as its focus. But this volume reawakens us to other historiographical possibilities: the interaction of nations in the exploration, scientific development, and exploitation of a major geographical region. Elegant surveys by O. H. K. Spate and Alan Frost capture well the early European fascination with the Pacific, its peoples, and the harnessing of science to political and economic designs. Miranda Hughes's sensitive and witty account of the Baudin expedition (1800–1804) analyzes the ways in which the assumptions of European philosophy and anthropology manifested themselves in Bau-

"Giving Hawaii the Scientific Once Over," newspaper cartoon, 29 August 1920." [From P. F. Rehbock, "Organizing Pacific science," in *Nature in Its Greatest Extent*; courtesy of Bishop Museum, Pacific Science Congress Scrapbook]