Voices from the Fringe

International Science and National Scientific Identity. Australia between Britain and America. R. W. HOME and SALLY GREGORY KOHLSTEDT, Eds. Kluwer, Boston, MA, 1991. x, 318 pp., illus. $99. Australasian Studies in History and Philosophy of Science, vol. 9. From a conference, Melbourne, May 1988.

What features characterize the processes by which scientific knowledge is transmitted between "center" and "periphery"? What has it been like to practice science at the periphery, considering the effects of such a location on the achievement of recognition for one's ideas? The 11 essays in this book offer a valuable addition to the small but growing body of writing on such questions, most specifically on the history of "colonial science" and the spread of science round the globe since the 19th century.

All the papers deal with Australian science in one way or another, with some perhaps unanticipated comparative studies of practice appearing—of acclimatization efforts in Australia and Algeria (Michael Osborne) and of techniques of fire control in Australia and America (Stephen Pyne). Natural history and biology (loosely construed) attract the attention of five authors (Elizabeth Newland, M. Osborne, Sally Kohlstedt, Jan Sapp, and S. Pyne). There are two papers (by Robert Stafford and Homer Le Grand) dealing with geology and one with ionospheric physics (Stewart Gillmor). Rod Home writes on the Australian cohort of fellows of the Royal Society, comparing them with fellows from India, and discusses thereby the interesting question of scientific patronage. Wade Chambers considers the vexed question of "the tyranny of distance" for Australian scientists. (The phrase, widely known in Australia, was coined by the Melbourne historian Geoffrey Blainey.) But David Knight argues that there are centers and peripheries even in Britain, and even today. (Situated in Durham, he writes: "Even now, the north-east of England seems a long way from the centre of things.")

It's a pleasure to say that I liked all the papers in the book. But my attention was particularly attracted by the essay of Chambers, with his effort to undermine the view that historically in Australia so much has been determined by the "tyranny of distance." Chambers argues, *contra* Blainey, that distance *per se* didn't make all that much difference to the way scientists thought and functioned in Australia; though Blainey's *Tyranny of Distance* was a valuable "popular history of Australian transport," it failed to consider satisfactorily the role of geographical distance in Australian cultural and intellectual history. Yet having demonstrated that (for example) Australians were in some respects ahead of their European, or even British, peers in taking up Darwinism, Chambers acknowledges that Australian scientists may have been "tyrannized" by "social, cultural, psychological and finally professional" distances, even if not geographical ones. I'd suggest that such distances may, in the last analysis, be attributed to geography. Anyway, it is with social distances that several of the other papers are concerned.

Newland, for example, describes how George Bennett, little known I suppose outside Australia, sent his important observations on the nautilus, the platypus, and the kangaroo's reproductive system, together with specimens, to Richard Owen in London, who promptly described and published them under his own name. Bennett didn't protest, and metropolitan hegemony prevailed.

Analogous in some ways to Newland's account of Bennett is the story told by Stafford. It has to do with the hegemony exercised over early Australian geology by Sir Roderick Murchison. Not content with using his influence in the matter of appointments, Murchison wanted to see his theoretical ideas deployed and vindicated in Australia, as elsewhere, and he entered into vigorous debate with any Australian geologist who differed from his opinions. Thus there was the situation of Murchison, who had never visited Australia, seeking to overrule the ideas of the colonial naturalist W. B. Clarke and others concerning Australian rocks.

In fact, geology was the science initially the most beholden to the British model. In Australia, sciences such as botany and zoology readily furnished original observations to individual naturalists. But for 19th-century geology, maps were all-important. For these, systematic coordinated work among a number of scientists was needed; and this required a suitable bureaucratic structure. The British Survey provided the model, and many of the staff besides. It produced offspring in the colonies, rather like a reproducing organism. This being so, the central hegemony exemplified by Murchison was only to be expected.

It is interesting, then, to consider Le Grand's paper. This shows that, in the matter of continental drift theory, the common assumption that the mobilist hypothesis was given more favorable consideration in the early days in the Southern Hemisphere than in the Northern is not correct, so far as Australia was concerned. So though there were indeed well-known mobilists in Australia, notably Tasmania's Warren Carey, and though Canberra researchers provided important geomagnetic evidence that assisted the plate tectonics revolution, it is incorrect to say that Australian geologists as a whole took the minority view—the one that eventually prevailed. Thus it would appear from Le Grand's researches that for the most part Australian geologists were as subservient to the prevailing paradigm as were geologists elsewhere.

There has long been a desire to find a general historiographical model for the spread of science round the globe. Though many writers cite the well-known schema of George Basalla only to reject it, it seems to me that nothing better has really been found. One may suspect, therefore, that the desire for a universal model for the process is unlikely to be satisfied. Nonetheless, a point made in the editors' introduction is noteworthy. They mention that achieving scientific independence from the old centers is, perhaps paradoxically, best seen as a process in which full integration into the world community is achieved. When a country becomes scientifically mature, its scientists are no longer marginal figures: scientific participation and leadership become decentralized as mature science spreads.

Whether a condition of full maturity has yet been reached in Australian science as a whole, I'm not sure. Probably not. For I don't think that Australia is yet a major source of novel scientific ideas or techniques (or philosophical ideas, or economic theories, or . . .). To be sure, we have some; and perhaps more than our expected share. But the "ferment of knowledge" of a "center" is not found in Australia—or, to the extent that it is, it occurs in Sydney or Melbourne, not Wagga or Cairns. The intellectual pressure is nothing like that in the old centers of Europe and America. Thus there is still

some kind of tyranny at work in Australia; and, Chambers's arguments notwithstanding, it does, I think, have to do with distance, as well as absolute numbers of scientists and a host of social and cultural factors.

This raises the issue of the appropriate social conditions for the emergence and spread of science. This question is not tackled directly in *International Science*, but it will surely occur in the mind of the reader. Meanwhile, the book provides an invaluable source of empirical information for those who wish to theorize more widely on the matter.

DAVID OLDROYD
School of Science and Technology Studies, University of New South Wales, Kensington, NSW 2033, Australia

Hardship Conditions

Scientists in the Third World. JACQUES GAILLARD. University Press of Kentucky, Lexington, 1991. xvi, 190 pp., illus. $32. Agrarian Questions. Translated from the French edition.

An economically, environmentally, and politically interdependent planet needs all possible creative thinking to cope with the problems that beset it. The scientific output of developing countries, where three-quarters of the world's population lives, is therefore increasingly important. *Scientists in the Third World* paints a picture of the life of researchers in those countries; and the result is not encouraging.

The book is based on an extensive survey of Third World scientists in 67 countries who have received grants from the International Foundation for Science. The IFS is a private international organization based in Stockholm that provides small competitive grants (generally under $10,000) to young scientists in biological and agricultural topics. Gaillard was a staff officer of that organization for several years in the 1980s.

The purpose of IFS grants is to give scientists beginning their careers in developing countries (where support for research is often severely limited) at least modest funds to enable their research. Without this support, many young scientists may drift into other fields—teaching, for instance—or take on second and third jobs to earn an adequate living. Alternatively, many fresh Ph.D.s returning from study abroad soon find themselves "promoted" into administrative posts for which they have no training and little affinity, while their plans for conducting useful research dwindle.

The results of Gaillard's survey portray the typical developing country scientist as underpaid, underequipped, underfunded, and underappreciated by his countrymen. Although many of us may feel that this description fits U.S. scientists as well, the problems of Third World researchers are immeasurably greater than those of counterparts in the industrialized countries.

Of special concern to scientists in developing countries is the sense of scientific isolation. Colleagues with similar research interests are often few and widely scattered—the daily interaction of an active scientific community is nonexistent. Money to attend international scientific meetings is lacking or difficult to find, particularly for young scientists, and sabbatical leaves are virtually nonexistent. Local scientific journals are often not selective in what they publish and have limited circulation, and shortage of hard currency means that most Third World universities and research institutes cannot subscribe to well-known international journals. As a result, according to a study cited by Gaillard, 45 percent of the journal articles cited by Third World scientists are over 10 years old, whereas authors from industrialized countries cite such pieces only 29 percent of the time.

In most developing countries, a large proportion of the funds available for research comes from international or national foreign-aid organizations. This is a mixed blessing at best. Although foreign aid is often the essential fuel for the research engine of many Third World countries, it also comes with the priorities and limits of the donor country or organization attached. This frequently skews the direction of the research that is undertaken and diminishes the opportunity for local scientists to express their own views. Moreover, foreign aid often provides expensive equipment in situations where no technicians are available to maintain or repair it.

Scientists in the Third World includes chapters on the origins and education of Third World researchers, on the profession and the practice of research, and on scientific production in the Third World and a chapter that summarizes an earlier comparative study by Gaillard on the scientific communities in Costa Rica, Senegal, and Thailand. Valuable data are provided on details of the life and work of the scientists who responded to the IFS survey. There are so many tables of statistics, however, that the detail is sometimes overwhelming, and I wanted more of the statements sprinkled through the book from the scientists themselves describing their aspirations, the obstacles they face, and the ingenious methods they often employ to overcome these constraints.

Gaillard provides a good overview of the survey on which the book is based, and his analysis of the data is insightful. The book's weakness lies in the conclusions presented in the final chapter. Following on a carefully built mosaic that shows the compelling need for innovative action to create a nurturing environment for research in developing countries, the conclusions are banal and inadequate.

With respect to the funding of research, the principal conclusion Gaillard presents is that foreign donors of research funds should coordinate their activities more closely. Coordination in small doses is often good medicine. Nevertheless, to effect a cure much more than donor coordination is needed. Third World governments themselves must assess the importance of research in their national priorities and come to grips with the need for adequate and stable funding. Scientific communities must play a more active and persuasive role in pleading their case to legislative bodies and policymakers and in demonstrating the relevance of their efforts to long-term national needs. The donor organizations should rethink policies that affect scientific communication and the provision of equipment: support of research projects might generally include funds for participating in scientific networks and meetings, for example, while the donation of sophisticated equipment might be made only when there is also provision for training a local repair and maintenance technician.

Similarly, the problems of scientific communication in the developing countries are addressed very lightly, with emphasis largely on strengthening local journals. Yet projects currently under way in Africa suggest that modern information technologies may have considerable usefulness in very poor countries. CD-ROM technology, for example, may offer a good way for Third World scientists to gain access to important databases or journals. Desk-top publishing software may provide a way to prepare educational material in situations where journals or textbooks are lacking.

It is in the interest of people everywhere that Third World scientists make a better contribution to addressing the problems of humanity. Gaillard has made a useful diagnosis of the factors that impede this contribution. What falls short is his prescription for solutions.

JOHN HURLEY
Board on Science and Technology for International Development, National Research Council, Washington, DC 20418