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.

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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.

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