in the mountains, as anywhere else, invariably involves sensitive changes in the relationship of man to man. Developmental funds and talents spent in the mountains are resources denied the cities and the plains. In the end, this may be the greatest challenge of all: how to convince the people of the plains that the future of the mountains cannot be isolated from their own.

References and Notes

1. International Workshop on the Mountain Environment, Munich, December 1974, sponsored by the German Foundation for International Development. For further discussion of deteriorating mountain environments see E. P. Eckholm, *Losing Ground: Environmental Stress and World Food Prospects* (Norton, New York, in press).
2. "Highlands" is defined as all areas more than 1000 meters in altitude.
3. Unesco, Programme of Man and Biosphere, *Working Group on Project 6: Impact of Human Activities on Mountain and Tundra Ecosystems, Final Report, Lillehammer, 20 to 23 November 1973* (MAB Report Series No. 14, Paris, 1974), pp. 20–21.
4. R. G. M. Willan, Chief Conservator of Forests, *Forestry in Nepal* (UNDP, Kathmandu, 1967).
5. Government of Nepal, National Planning Commission Secretariat, *Draft Proposals of Task Force on Land Use and Erosion Control* (Kathmandu, August 1974).
6. Government of India, Department of Agriculture, *Soil and Water Conservation in Nepal: Report of the Joint Indo-Nepal Team* (New Delhi, November 1967), p. 5.
7. J. C. Cool, *The Far Western Hills: Some Longer Term Considerations* (mimeograph) (U.S. Agency for International Development, February 1967), p. 6.
8. International Bank for Reconstruction and Development and International Development Association, *Agricultural Sector Survey, Nepal, Volume II* (Washington, D.C., 3 September 1974), p. 7.
9. Government of Nepal, Ministry of Forests, *Introduction of Department of Soil and Water Conservation* (mimeograph) (Kathmandu, no date).
10. D. C. Kaith, "Forest practices in control of avalanches, floods, and soil erosion in the Himalayan front," *Fifth World Forestry Congress Proceedings* (Seattle, 1960), vol. 3.
11. World Food Programme, *Interim Evaluation of Project Pakistan 385, "Watershed Management in the Kaghan and Daur Valleys,"* draft, 29 October 1974 (FAO, Rome, October 1974).
12. FAO/U.N. Special Fund, *Survey of Land and Water Resources, Afghanistan*, vol. 1, *General Report* (FAO, Rome 1965), p. 22; K. J. Lampe, *Forst in Paktia, Afghanistan* (Federal Agency for Development Assistance, Frankfurt am Main, 1972).
13. W. H. McNeill, *The Rise of the West* (Mentor, New York, 1963), p. 455.
14. F. Monheim, "The population and economy of tropical mountain regions, illustrated by the examples of the Bolivian and Peruvian Andes," presented to Munich Workshop on the Development of Mountain Environments, 8 to 14 December 1974 (German Foundation for International Development, Feldafing, December 1974), p. 6.
15. J. A. Mason, *The Ancient Civilizations of Peru* (Penguin Books, Harmondsworth, England, 1957), p. 139.
16. A. Metraux, *The History of the Incas*, G. Ordish, Translator (Random House, New York, 1969), p. 166.
17. R. F. Watters, *Shifting Cultivation in Latin America* (FAO, Rome, 1971).
18. D. A. Preston, *Geograph. J.* **135** (1), 1 (March 1969).
19. "Erosion, Landslides, and Sedimentation in Colombia," proposal to the U.S. Department of State, Agency for International Development–Bogota by Cornell University, Corporacion Autonoma del Valle de Cauca, and Universidad del Valle, J. A. Liggett, Principal Investigator (December 1974).
20. F. Monheim (*14*, p. 10) provides migration data for Peru.
21. Republica del Peru, Oficina Nacional de Evaluacion de Recursos Naturales, and Organizacion de los Estado Americanos, *Lineamientos de Politica de Conservacion de los Recursos Naturales Renovables del Peru* (Lima, May 1974), pp. 8–14.
22. G. Nicolas, "Peasant rebellions in the socio-political context of today's Ethiopia," *Fifteenth Annual Meeting of the African Studies Association*, Philadelphia, 8 to 11 November 1972, p. 11.
23. World Food Programme, "Project summary: Reforestation and soil conservation in the province of Wollo," *Ethiopia Project No. 2097, WFP/IGC: 26/9 Add. 11* (FAO, Rome, July 1974); "Reforestation and soil conservation in the province of Tigre," *Ethiopia Project No. 769, WFP/IGC: 23/10 Add. 2* (FAO, Rome, March 1973); U.S. Department of the Interior, Bureau of Reclamation, *Land and Water Resources of the Blue Nile Basin, Ethiopia, Appendix VI, Agriculture and Economics* (prepared for U.S. Agency for International Development, Washington, D.C., 1964), p. 140; H. F. Mooney, "The problem of shifting cultivation with special reference to Eastern India, the Middle East, and Ethiopia" *Fifth World Forestry Congress Proceedings* (Seattle, 1960), vol. 3, p. 2023; quote from W. D. Ware-Austin, "Soil erosion in Ethiopia: Its extent, main causes and recommended remedial measures," mimeograph (Institute of Agricultural Research, Addis Ababa, May 1970), p. 1.
24. L. Brown, *East African Mountains and Lakes* (East African Publishing House, Nairobi, 1971), pp. 70–71.
25. FAO/U.N. Special Fund, *Report on Survey of the Awash River Basin*, vol. 2, *Soils and Agronomy* (FAO, Rome, 1965), p. 114.
26. R. T. Jackson, P. M. Mulvaney, T. P. J. Russell, J. A. Forster, *Report of the Oxford University Expedition to the Gamu Highlands of Southern Ethiopia, 1968* (School of Geography, Oxford University, Oxford, 1968), pp. 34–37.
27. J. M. Cohen, "Land reform in Ethiopia: The effects of an uncommitted center on the rural periphery," presented at the Sixteenth Annual Meeting of the African Studies Association, Syracuse, 31 October to 3 November 1973.
28. W. A. Hance, *The Geography of Modern Africa* (Columbia Univ. Press, New York, 1964).
29. A. Warren, "East Africa," in *Africa in Transition*, B. W. Hodder and D. R. Harris, Eds. (Methuen, London, 1967), p. 117; M. S. Parry, "Progress in the protection of stream-source areas in Tanganyika," *East African Agricultural and Forestry Journal*, vol. XXVII, special issue, March 1962, p. 104; W. T. Lusigi, "Some environmental factors in food production in Kenya," prepared for the United Nations World Food Conference, 5 to 16 November 1974 (National Environment Secretariat, Office of the President, Nairobi, 1974).
30. P. H. Temple, in *Studies of Soil Erosion and Sedimentation in Tanzania* A. Rapp, L. Berry, P. H. Temple, Eds. (University of Dar es Salaam, Bureau of Resource Assessment and Land Use Planning, and Department of Physical Geography, University of Uppsala, 1972), pp. 110–155; A. Rapp, V. Axelson, L. Barry, D. H. Murry-Rust, in *ibid.*, pp. 255–318.

NEWS AND COMMENT

Third World: Science and Technology Contribute Feebly to Development

The military power of the Soviet Union and the tensions inherent in the widening gap between rich countries and poor are perhaps the two major foci of instability in the world as seen today from the United States. In both issues, science and technology play a primary role. They are the Danegeld in détente, and a decisive ingredient in development. But whereas the handover in the first case is simple, the transfer of science and technology to the developing countries has proved far less straightforward than was at first envisaged.

Organized knowledge is now recognized to be a major determinant of economic growth and to account for much of the disparity in living standards between developed and developing nations. Yet the truth about the state of science in many developing countries, to quote an article in the current issue of *Foreign Affairs*, "is so hard to bear that it does not easily pass the lips of the proud [inhabitants] nor of the courteous foreign expert enjoying the hospitality of a short visit." The authors, Michael J. Moravcsik of the University of Oregon and J. M. Ziman of the University of Bristol in England, severely criticize the scientific community, the AAAS included, for neglecting the plight of their Third World colleagues (see box). Behind the facade, they state, one often finds in developing nations "no more than the fragments of a scientific community, disorganized, disunited, of limited professional competence, poverty stricken, intellectually isolated, and directed toward largely romantic goals—or no goals at all."

Extreme though this view may seem to be, Moravcsik and Ziman's general diagnosis is quite widely shared by both scientists and economists familiar with Third World problems. The developing countries possess some two thirds of the world's population but conduct only 2 to 3 percent of its research and development. Not only do they spend little—typically 0.2 percent of GNP compared with about 3 percent allocated in advanced countries to R & D—but the returns on their investment are of dubious quality. The brain drain of scientists and engineers to advanced countries—a kind of reverse foreign aid that for several developing countries equals or exceeds the aid they receive—is in large measure the external symptom of an economy that cannot absorb such people.

According to the old strategy for development, there was no need for developing countries to reinvent the wheel. They could

simply import whatever technology they needed from the West and—through the high productivity and rate of saving engendered thereby—"leapfrog historical evolution" by attaining economic "take-off" in a fraction of the time that Western nations had required. But at almost every point in the attempt to set up a scientific infrastructure, whether in basic research, applied research, or the ability of domestic industries to compete technologically with the multinational corporations, developing countries have discovered the leapfrogging of evolution to be an exercise in frustration.

Basic research, for instance, often suffers from fragmentation into small departments of subcritical mass, and from a tendency by scientists to look outward to the academic fashions of the country where they were trained instead of inward toward the needs at home. According to Henry Arnold, director of the Office of Science and Technology in the Agency for International Development (AID), "People from the less developed countries become victims of the prestige and charisma that go with esoteric science, and once they have done this they are almost useless for the immediate problems of their own country—they either join the brain drain or become frustrated."

In many developing countries there is no tradition of purposeful research, no external users around to convey their needs, and no established culture of links between the academic and the practical. Moravcsik and Ziman speak of "the extraordinary incoherence and inconsequence of the research that is actually attempted, especially in academic circles," a failing they attribute in part to the scant resources available to a Third World scientist—about a tenth of what his colleague in an advanced nation would think sufficient—and in part to his intellectual isolation. How can research be possible, the two physicists inquire,

> in a country where the *Physical Review* comes a year late, where the best library has no more than tattered copies of the undergraduate textbooks of a generation back, where the last visit of a foreign physicist was 18 months ago, where there is nobody within 500 miles who can understand or criticize the work one is doing . . . ? It is easy to predict that the scientific productivity even of our [advanced country] colleague would decay rapidly to zero under these conditions.

Even when a deliberate attempt is made to direct research toward relevant ends, as in applied research centers and the several hundred industrial research laboratories supported by developing country governments, the picture is little different. The same handful of institutions is cited repeatedly in the literature as exceptions to the general rule. The Korean Institute of Science and Technology has provided a tangible stream of benefits to local industry. The Central Leather Research Institute in Madras has developed techniques to exploit new export markets and trained local craftsmen in their use. The Malaysian Rubber Research Institute has assiduously kept rubber productivity rising fast enough to keep pace with competition from synthetic substitutes.

Yet the work of these centers contrasts with what a World Bank economist calls "the generally disappointing record of technological institutes in most developing countries." James Blackledge, of the Denver Research Institute, recently visited 50 such organizations in 13 developing countries on behalf of AID and returned with the following conclusion:

> The research institutes tend to engage in programs which have no real relevance to industry needs or problems or to the national plan. The research staff, with no real motivation and incentive, leans toward replication of the research of their graduate days, or seeks the great breakthrough in single cell protein, cancer chemotherapy, solar energy, or yet another use for bagasse [the refuse from sugar making]. Interaction with industry and government enterprises is limited and infrequent. The research institute subverts what should be a prime role in the national development plan.*

Even when a viable project is completed, it often molders on the shelf for lack of a taker. To quote Blackledge again,

> Nearly every research center has a sizable collection of complete research projects awaiting exploitation by an entrepreneur. These include processes for producing chip board (or some other product) from bagasse or bamboo or other fibers, anti-cancer or anti-fertility compounds from indigenous shrubs (usually with a history of folklore efficacy), or an enriched protein foodstuff, derivable from local raw materials and which can substitute for that expensive imported variety. . . . So far, contribution of much of this research has to be considered as a form of education for indigenous research staff with very little input to industrial growth and development.

It is not just foreign experts who look askance at the contribution of developing-country scientists to economic growth. "Many Indians regard their scientists as a parasitic community," says one development expert. "There is a feeling in some of these countries that research institutes are just a tax for being part of the international community," remarks Michael Dow, of the Board on Science and Technology for International Development of the National Academy of Sciences (NAS). According to Mahbub ul Haq, formerly chief economist with the Pakistan planning commission, not more than 1 percent of the $2-billion industrial program formulated for Pakistan's third 5-year plan is likely to be based on the technological research developed by the country's Council of Scientific and Industrial Research. Haq, now with the World Bank, considers that research priorities should be derived from a country's economic growth requirements and aimed at exploiting its natural resources. Such an approach, he observes, "might induce doctors to do some research on local diseases, rather than waiting for an Albert Schweitzer to come and do it for them because they are too busy working on heart surgery or other fashionable subjects."

*In *Appropriate Technologies for International Development* (Office of Science and Technology, Agency for International Development, Washington, D.C., 1972).

Honeymoon over with Multinationals

What Haq calls the "negligible net contribution" of indigenous industrial research is one of the constellation of factors that render many Third World nations so feeble in the arena of commercial technology. Their negotiators often lack the expertise to obtain even a proper price for technology purchased off the shelf, let alone the knowledge to break a package down into its parts, some of which might be handled domestically; nor do they insist on the design of low cost systems tailored to their needs. Many developing countries have become highly dependent for managerial and technical skills on foreign firms. The multinational corporations, once welcomed as providing quick access to Western technology, are now accused of a multitude of antisocial practices.

By means of restrictive agreements, critics say, the multinationals have withheld their sophisticated technology from host countries, and the technology they do transmit turns out to be obsolete, overpriced, or inappropriate. They make little attempt to adapt their technology to local needs and conditions, the critics continue, and because they can rely on their parent companies for research, they have an unfair advantage over nationally owned firms. Latin American countries, such as Argentina and Mexico, are now trying to redress the balance with multinationals by regulating the terms on which technology is imported. A principle of the "new international economic order" advocated last year by the United Nations is that there should be formulated "an international code of conduct to transfer technology corresponding to the needs and conditions prevailing in developing countries."

Yet the technological dependence on multinationals, and the ineffectual nature of indigenous research efforts, may both to some extent be the fault of a factor well within a developing country's control—its economic policy. For reasons having partly

to do with political convenience, many developing countries set the price of capital artificially low, and ensure that the price of labor is kept high by minimum-wage legislation. According to an influential theory of economic development proposed by Gustav Ranis, director of the Economic Growth Center at Yale, a country's choice of technology is heavily influenced by the prevailing price signals. Under conditions of low cost capital and high priced labor, both private firms and government will tend to choose their imported technology from the capital-intensive, labor-saving end of the shelf. Such countries throw away their chief comparative advantage, the cheapness of their labor, but they can shelter their inefficiencies by protective barriers, since at this stage of economic development they are trying simply to substitute for imports, not to export their manufactures abroad.

Countries which decide to export, however, need first to correct their price signals so as to reflect accurately the relative abundance of labor and capital. When this is done, as in the case of Korea and Taiwan, entrepreneurs not only borrow their technology more carefully, they have the incentive to improve upon it by making labor-using and other adaptations. (An expensive machine, for example, may be operated more intensively than is usual in its country of origin; defective items may be repaired by hand instead of discarded.) It is in the process of assimilating borrowed technology that a country's technical skills and industrial research laboratories can be brought most effectively to bear.

Taiwan, for example, managed within 10 years of economic reform to construct an export trade based on labor-intensive industries such as textiles, wood products, and electronics, in place of one that had been primarily agricultural. Korea devalued its currency in 1964 and doubled interest rates the following year. Labor-intensive industrial exports such as electronics, textiles, and footwear had constituted 15 percent of all exports in 1962; by 1968 they amounted to 80 percent of exports and were as a group increasing at 35 percent a year. Ranis finds a similar, if less dramatic, relationship between price signals and technological flexibility in Pakistan, Kenya, and Mexico.

Technology change "cannot be harnessed effectively" to the tasks of economic growth and the stimulation of employment as long as a country's macroeconomic policies distort price relationships, Ranis concludes. Further, the highest pay-off is to be gained from adaptive research of the kind carried out in the machine shop, not from basic research. An important implication of this thesis would seem to be that scientists and technologists do not even have a proper chance to supply research results to a country's industrial growth if its economic policies fail to encourage any strong demand for them.

What Developing Countries Can Do

What can be done by developing countries to make science and technology more efficacious contributors to economic growth? On the topic of basic research, there is an evident schism between scientists and economists. Moravcsik and Ziman, for example, believe that a strong basic science community is essential because of its cultural importance and to avoid a demeaning intellectual dependence on the West. Richard Nelson, on the other hand, an economist with the Institute for Social and Policy Studies at Yale, finds the arguments in favor of building up a strong basic research capability unpersuasive; even with industrial research, he says, both the arguments and the evidence for a substantial investment by developing countries "continue to be sketchy." In the opinion of Julien Engel, of the Board on Science and Technology for International Development, there is in most developing countries "little justification for basic research except for sustaining a viable teaching effort, and this should be no greater than what is needed to establish universities and to keep your best brains at home."

A common view among economists who have studied the science and technology issue is that a strong adaptive research effort is the place to begin. Japan—and the United States for that matter—developed their industry by buying in technology from abroad and adapting it to their own needs; only later did they invest heavily in creating their own technology and become strong scientific powers. Adaptive technology, the process of assimilating a technique to local endowments of labor and resources, is the one sort of technology that cannot be purchased abroad. The general objective of a technology policy, suggests Ernest Stern, World Bank senior adviser on development, "should not be technological self-sufficiency, but rather increased capacity to innovate, experiment, modify, and choose among alternatives, and a decreased dependence on imported packages of technology."

Role of Developed Countries

As for developed countries, there are numerous voices suggesting they should do more to address the scientific and technical problems of the Third World, but fewer suggestions as to how. A report produced for the Second United Nations Development Decade, the *World Plan of Action for the Application of Science and Technology to Development*, requires that by 1980 the developed nations should be committing at least 0.05 percent of their gross national product to the direct support of science and technology in the developing world. Furthermore, each developed country should devote "at least 5 percent of its own internal non-military research and development expenditures" to research on Third World problems. The World Plan lists 13 priority areas for research, eight of them agricultural and only one to do with manufacturing industry.

It is not so easy for developed countries to do research on behalf of the developing—AID, for example, developed a hand pump and plastic roofing which never found markets. Agricultural research and the semi-theoretical field of "appropriate technology" are two areas in which efforts have been more successful. Though the green revolution is not without its share of social and ecological drawbacks (*Science*, 20 and 27 December 1974), it remains the most egregious and encouraging example of how developed nations can harness their scientific resources to Third World problems. The core of green revolution research is performed at international centers located in the main agricultural regions of the developing world (*Science*, 9 May 1975). But even here, the ability of the developing countries' national research establishments to absorb and adapt the techniques developed at the centers is now emerging as the chief bottleneck in the system.

It is often suggested that the developed countries should do more research along the green revolution model, for example in industrial technology. Green revolution crops are carefully designed to suit the environment in which they are to be grown; similarly Western technology, it is argued, evolved in an environment of cheap capital and expensive labor, and must be redesigned to suit the generally opposite conditions that prevail in developing countries. The concept of "appropriate technology" has been extensively debated by development economists, those against it arguing chiefly that labor-intensive technologies make inefficient use of even what little capital they need. An early and practical exponent of appropriate technology is E. F. Schumacher (*Science*, 18 July 1975). His London-based Intermediate Technology Development Group, founded in 1965, designs and disseminates low cost technologies which exploit locally available skills and materials. There is a definite demand for ITDG's services, although not quite enough for the group to be economically self-supporting; customers have been inclined to assume that intermediate

technology means second best, however appropriate it may be. An American organization with similar aims is Volunteers in Technical Assistance, a network of scientists who supply written technical advice to developing countries. VITA's emphasis is on village technology, items that can be made locally or, if imported, can be repaired by the village craftsman (*Science*, 6 June 1975).

Certain policies of donor agencies tend to encourage the import of inappropriate technology—the tying of aid to purchases from the donor, for example, or the World Bank's otherwise not unreasonable practice of requiring that loan recipients buy only technology which has proved itself commercially in the developed countries. For the most part, however, appropriate technology is probably best developed in its site of application, and developed countries can perhaps help more with advice than with practical assistance.

Another important kind of advice that can be offered is that developing countries should put their economic house in order if they wish science and technology to contribute more pertinently to employment and growth. Developing countries are often ruled by upper class elites who allow high profit, high cost industries to operate behind protective barriers and under conditions which discourage entrepreneurs from developing more suitable industries or tackling the difficulties of export markets. Aid donors, according to Ranis, should make the macro-economic setting for technology a central part of any discourse with aid recipients. Failure to discuss the importance of switching to a regime more sensitive to endowments and technology "may well render all other actions null and void," Ranis observes.

Almost the identical message has been sounded on agricultural research by Theodore W. Schultz of the University of Chicago. Schultz, the chief economic theorist of the green revolution, complained recently that distortions in the farm product prices of many developing nations "greatly reduce the potential economic value of agricultural research." Despite the sensitivity of the issue, he considers it the task of outside economists to make known "the extent to which low-income countries are themselves responsible for their shortage of food."

Developing countries may need first to put their own economic houses in order, but that does not reduce the need for the advanced countries in their own, let alone humanitarian, interests to put science and technology more effectively at the Third World's disposal. Some 98 percent of the world's research and development is conducted in, and almost entirely for the benefit of, the advanced nations, a circumstance which does not find favor with those who consider, as President Allende once said, that science and technology "are the property of all mankind, not an elite or group of nations." Moravcsik and Ziman may seem fanciful in talking of the "very real possibility of repudiation of the whole scientific enterprise by the majority of mankind." Yet the developing countries face

U.S. Scientists and Development

Moravcsik and Ziman contend in their *Foreign Affairs* article that scientists in developed countries and their organizations, such as the AAAS, do too little to assist their colleagues in the developing world. "Through their lack of imagination and their utter self-interest, the leaders of the scientific community miss the opportunity to make momentous social and political contributions to humanity," the two physicists declare.

While it is doubtless true that more could be done, institutional problems and the economic policies of Third World countries pose certain constraints on this opportunity (see accompanying article). Nor are the extra-governmental activities of scientists in the United States entirely negligible. Some of the major efforts aimed at the developing countries are as follows.

Board on Science and Technology for International Development of the National Academy of Sciences. Since 1964, NAS committees have conducted joint workshops with scientists and government officials of developing countries under an AID contract worth about $1 million a year. The office also issues technical reports on topics of development interest. Through the workshops the NAS gives advice on matters such as science policy, industrial research, and agriculture. The field is a hard one in which to show results, but officials of at least two developing countries (Ghana and Colombia) are on record with praise of the academy's work. A generally favorable verdict of the academy's work abroad was reached in a critical study commissioned by AID. The study noted that the members of the NAS committees, average age 55½, were sometimes inadequately briefed, but gave an accolade to the staff members of the Office of the Foreign Secretary; they have performed well under "a set of responsibilities which are intellectually taxing and which require extraordinary interpersonal and diplomatic skills," the study says. Moravcsik and Ziman criticize the NAS, and the Royal Society in London, for being active in development "mainly because they are the official channels through which some government aid funds are distributed." Government funds, however, are what the NAS uses for money; it took the initiative in getting AID to award it the contract, and gently promotes its services to Third World governments.

AAAS. The AAAS, according to Moravcsik and Ziman, "has yet to show results of activity in science development in spite of a sizable grant from the Rockefeller Foundation to explore the possibilities in this direction." The Rockefeller grant was for $25,000, not the kind of money with which to move mountains. Moravcsik, a member of the AAAS committee supported by the grant, says its purpose was to enable the AAAS to decide what it wanted to do about development, and that this the committee failed to do. Irene Tinker, director of the international office of the AAAS, agrees that the committee did not complete its report, but says her office has assumed its task. Tinker denies that her office, which received the remainder of the Rockefeller grant, has yet to show results; the money has been used to organize two conferences and issue two reports and a book. The office's major source of support is a $300,000, 3-year grant from AID which focuses on population problems.

National Science Foundation. Through a program entitled "Scientists and engineers in economic development," also supported by AID, the NSF sponsors short term visits by American scientists to institutions in developing countries. The NSF received 70 applications from the scientific community last year and awarded 20 grants. The number of grants is to be doubled this year.

Volunteers in Technical Assistance. VITA was founded in 1959 with the specific purpose of enabling the scientific and technical community to give personal help with the problems confronting developing nations (see accompanying article). The presence of some 6000 names on VITA's register constitutes what would seem to be a reasonably active concern.—N.W.

the prospect not just of a technology gap, but of a technology that is changing faster than they can ever acquire it.

"What is, almost inexplicably, concealed in economic writings," says Nobel laureate Gunnar Myrdal in his monumental *Asian Drama*, "is the obvious fact that scientific and technological advance in the West has had, and is having, an impact on the South Asian countries that is very detrimental to their development prospects." For example, technology has weakened the trading position of these nations because of the development of synthetic substitutes for the raw materials they used to export, and medical advances have endowed them with a population explosion.

Myrdal goes on to remark that "it would be contrary to our belief in progress, the very spirit of our civilization, to argue that, as a protection to the underdeveloped countries, these advances should be stopped or their results should not be used." As long as developing countries can hope to share in that progress, they would probably agree. It would certainly be unfortunate if, through inadequate attention to the distribution of scientific knowledge and its fruits, a majority of the world's population were to decide they would be better served should the tree of knowledge be less intensively harvested.

—NICHOLAS WADE

Court Ruling Supports Academy View on Information Issue

A recent federal court decision supports the claim of the National Academy of Sciences (NAS) that it should not be subject to the laws which require federal agencies and advisory committees to give the public access to committee meetings and documents. On the old question of whether the academy is a federal agency or a private organization, Judge John D. Sirica, who wrote the opinion, comes down firmly on the latter side.

Sirica's decision came in a court order filed on 28 July in a suit in the U.S. District Court for the District of Columbia brought by the Public Interest Campaign, a Nader-type organization which concentrates on air pollution problems. The suit asks that NAS be ordered to comply with the Federal Advisory Committee Act (FACA) and the Freedom of Information Act (FOIA). Louis Lombardo, president of the campaign and plaintiff in the suit, said that his organization has filed an appeal on 20 August with the U.S. Court of Appeals.

In the original suit, which dates from March 1974, the campaign charged that Lombardo had been prevented from gaining access to the meetings and working papers of the academy's Committee on Motor Vehicle Emissions (CMVE) in violation of FACA and FOIA. The crux of the matter is the question of whether the academy has federal "agency" status and, therefore, is subject to those laws.

The Public Interest Campaign argued that NAS has numerous government connections and comes within the scope of the definition of an agency in FACA and FOIA. The plaintiffs point out that the academy is chartered by Congress, reports to Congress, and derives a very substantial portion of its income from the federal government. They note that the academy is mentioned in several federal laws which give some legal significance to reports or recommendations of NAS, calling particular attention to the Clean Air Act Amendments of 1970 which require the administrator of the Environmental Protection Agency to arrange for the academy to conduct studies concerning the feasibility of meeting certain emission standards. (The CMVE was created under these arrangements.) These arguments are stressed again in the appeal.

The academy has insisted in recent years that it is a private organization (*Science*, 5 April 1974), but the matter has been regarded as lying in a legal gray area. Rulings on the subject have been issued by various government agencies, mostly reinforcing the view that NAS is a private entity, but the Sirica decision is apparently the first court finding that bears directly on the issue.

In his opinion, Sirica refers to the language of both FACA and FOIA and to the legislative histories which reflect congressional assumptions and intentions. He concluded that the academy is not covered by the provisions of either law, denied the plaintiff's motion, and granted the defendant's motion to dismiss the case.

Commenting on the decision, Lombardo expressed the view that the academy would be better off if the Public Interest Campaign won the case. "We're not trying to do away with the academy," he said, "it's a great institution." Lombardo said that de facto the academy is the "supreme court of science," and that the campaign was trying to make it so de jure. "If we lost," he said, "they'd be just another bunch of consulting engineers."

Academy officials are described as "very pleased" with the decision and confident that the court's finding that NAS is a private organization would be confirmed.

The academy, however, is not untouched by public concern about the private workings of public bodies. A new policy is being implemented under which the public will have access to the minutes of study committees as well as much of the information used by the committees during their deliberations. Classified information, trade secrets, and information of a personal character will be excluded. In remarks to academy members at their April meeting, academy president Philip Handler described the new policy as follows:

> For some time, we have been reviewing the matter of public access to our advisory activities. The notion of opening our procedures, in some part, does not derive from external pressure, but out of our own belief that it is appropriate that our institution operate within the spirit of the Freedom of Information and the Federal Advisory Committee Acts, to the extent that we can do so without injury to our advisory capabilities, and without loss of control over our own activities. After many months of discussion and refinement, the Council has adopted an institution-wide policy in these regards. By this policy, henceforth, whenever useful and appropriate, early in its study, each project committee may make arrangements to receive data, evidence and points of view from public and private groups and individuals; following publication of its report, the minutes of meetings of the committee and its panels, copies of all information and documents that have come to the committee from external sources, and reports from all panels and subcommittees will be made available upon request. Implementation of this policy will go a long way toward assuring others of the accountability of our institution.

Guidelines based on the policy are expected to be put into effect after review by the academy's governing council this month.

The academy is the defendant in another court case still pending. The Office of Equal Employment Opportunity (OEEO) is demanding that the academy pay 2 years' salary to a job applicant who was never hired, but who, the suit claims, was injured by NAS practices in checking ref-