LETTERS

Third World Science and Technology

Let us hope that Nicholas Wade's article on science and technology in the Third World (News and Comment, 5 Sept., p. 770) is the beginning of a much wider discussion of the subject among scientists and in the columns of *Science*. Unfortunately the article itself illustrates some of the conceptual confusion that obfuscates this field and paralyzes action.

Wade's quotations demonstrate that most economists do not grasp the multidimensional role of science in the 20th century. But one cannot conclude (as some do) that science is not a valuable activity because it does not yield immediate benefits, or because it cannot live up to the more extreme claims of its supporters. It is essential to expose, in all its weaknesses, the tacit assumption that the only motivation for science in the less developed countries is a contribution to *today's* economy.

The boxed statement entitled "U.S. scientists and development" exemplifies the familiar error of failing to distinguish between science and technology. The reports the National Academy of Sciences has issued over the years deal overwhelmingly with technology and so do the two reports and the book the AAAS produced recently, not to mention its population program. The Volunteers in Technical Assistance (VITA) also works almost exclusively on technological problems.

The point we have been emphasizing is not that aid to indigenous technology is not important. It is, and it already absorbs virtually all the efforts and resources devoted to "science and technology" assistance. But these efforts are building on sand unless substantial resources of persons, time, and money are also devoted to the considerably more subtle, more difficult, but potentially more rewarding task of helping to create self-respecting scientific communities in the countries concerned.

Our article in *Foreign Affairs* (*1*) referred to by Wade touches only on a few of the main points regarding the neglect of science development. More extensive documentation is available in a recent book (*2*). The most persuasive evidence can be obtained through personal visits to less developed countries and through eloquent, well-reasoned, and rigorously documented accounts, widely publicized, by scientists from those countries themselves.

We have no hesitation in reiterating our basic contention that the world scientific community, dominated by scientists from advanced industrial nations, has so far contributed exceedingly little to the fostering of indigenous science, "basic" or "applied," in the less developed countries, and the knowledge and experience of scientists from the Third World itself will undoubtedly confirm this contention.

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References and Notes

1. M. J. Moravcsik and J. Ziman, *Foreign Aff.* **53**, 699 (1975).
2. M. J. Moravcsik, *Science Development—The Building of Science in Less Developed Countries* (International Development Research Center, Indiana University, Bloomington, 1975).

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It is obvious that the scientific community at large is having a difficult time coming to grips with the complex question of the relationship between science, technology, and economic development (STED). Discussions of this relationship do not focus on pragmatic solutions to the problems of underdeveloped countries which, among other things, must include the build-up of a native manpower pool capable of promotion, installation, and management of science-based technology for the manufacturing of indirect or direct consumer products. This is the case regardless of whether the given developing country follows free enterprise or centralized economic policies.

What the Third World really needs are technological entrepreneurs, *doers* rather than STED philosophers. The University of Detroit has just launched a program designed to turn out such doers. It is the Master of Science in the Economic Aspects of Chemistry (MSEC) program. However, if the MSEC and similar programs turn out to be effective, their graduates will do the Third World little good unless the appropriate authorities of the Third World governments, President Ford, Dr. Kissinger and his technological experts in the State Department and AID, and the appropriate personages of the World Bank, the Bank for International Development, the United Nations, the Organization of American States, and so forth, take note of them and decide to make use of them.

If the yearly direct cost of a trainee from an underdeveloped country is set at $6,000 and 2 years are required to complete programs like MSEC, it follows that $360,000 can prepare 30 persons for the role of technological entrepreneur in a given region. If we assume that only ten of these survive the temptations of bureaucratic complacency and other obstacles and become truly effective catalysts for economic growth, can we underestimate the effect of these ten potential DuPonts or H. H. Dows on the economy of a developing country?

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Fetal Blood-Typing

Barbara J. Culliton, in her article "Amniocentesis: HEW backs test for prenatal diagnosis of disease" (News and Comment, 7 Nov., p. 537), indicates that, before 1968, the use of amniocentesis "was restricted to women in late pregnancy, for example to type fetal blood in situations in which Rh disease was possible." This is incorrect, as the method was not used for the purpose of typing the blood of the fetus but, rather, for evaluating the extent of the disease process in erythroblastosis by studying the amniotic fluid. Although, at present, amnioscopy and fetal blood-typing are a reality, they are done in only a couple of institutions in the world on a research basis and are dangerous procedures.

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NIH Committee Vacancies

In her article "NIH advisory committees: The politics of filling vacancies" (News and Comment, 31 Oct., p. 443), Barbara J. Culliton describes the large number of vacancies on advisory committees at the National Institutes of Health due to the failure of William S. Ballenger, who has the final say, to approve many nominees. Since Ballenger hopes to increase participation on these decision-making committees of women and of minority persons, and to avoid the "inbreeding" tendency of the scientific community, he is hereby referred to the national registry of women scientists compiled by the Association for Women in Science. Ballenger can have searches made for women specialists in any field from any geographical location. Women scientists are invited to register.

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