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Support of Science in Underdeveloped Countries

There is a proverb to the effect that an alms-giver throws a starving man a fish, whereas a truly charitable man gives him a hook and line. The U.S. foreign aid program is in effect almsgiving. We have not recognized what has to be done to bring prosperity to the underdeveloped nations.

In a recent issue of *Science* (4 February), Homi Bhabha delineated the problem and suggested a means of solving it.

> What the developed countries have and the underdeveloped lack is modern science and an economy based on modern technology. The problem of developing the underdeveloped countries is therefore the problem of establishing modern science in them and transforming their economy to one based on modern science and technology.

Bhabha went on to advance the thesis that the problem of establishing science as a live and vital force in a society is an inseparable part of the problem. Bhabha spoke authoritatively, for he was the key man in creating a self-reliant atomic energy industry in India. In 1943 no scientific institution in India had facilities for work in subjects at the frontiers of physics, including nuclear physics. Bhabha persuaded an industrialist, J. R. D. Tata, to establish the Tata Institute of Fundamental Research, which has been a constituent institution of Bombay University from the beginning "and has had close relations with many other universities in India, so that students of many of them have done work for the Ph.D. at the institute." From a small start with a recurring annual budget of $16,000, the institute grew initially at the rate of 30 percent per year. Its current budget is $3 million.

Early in its history the institute had a key role in the development of atomic energy.

> . . . groups were established at the institute to design and build all the electronics instrumentation without which atomic energy work is impossible. Thus, the Physics Division and the Electronics Division of the Atomic Energy Establishment at Trombay were both initially housed and built up in the institute. The electronics group of the Atomic Energy Establishment has today a staff of over 1300 people and is the strongest research and development group in electronics in the whole country.

In contrast to the fine performance in atomic energy, where a strong base in fundamental physics existed, Bhabha described the dismal performance of the steel industry. In turn, German, Russian, and British consultants have been called in, but India still does not have the capacity to design and build new steel plants.

> . . . Unless powerful scientific and engineering groups are established during the construction and operation of existing steel plants as a matter of deliberate policy, the dependence on foreign technical assistance will continue, and the steel industry will not reach a stage of technical self-reliance. A similar situation exists in almost every other industry.

Had Bhabha lived and had his influence expanded, many of India's problems might have been solved. Science and technology can expand faster than populations, thus providing time to solve the population problem. Bhabha and the Tata Institute have shown the profound effect of small sums spent wisely in support of fundamental research. If the United States wishes to be a true friend to the underdeveloped countries, it will find means of helping in the establishing and supporting of indigenous fundamental research institutes. Basic research is only one of several important prerequisites to obtaining optimal benefits from science, but competence in research provides a base from which the most complex technology can evolve when governments are alert and stable.

—PHILIP H. ABELSON