

depends on the competence and morale of its own scientists, technologists and other colleagues, and sufficient appreciation by its general public of the value of scientific solutions to development.

Support from developed countries could take the form not only of direct financial assistance, but of collaboration between individuals and agencies concerned with issues ranging from basic research to industrial consultation, and the dissemination of packaged technology to an illiterate rural population. In short, an active partnership of Third World scientists and technologists is an important prerequisite for success of development efforts. It is, furthermore, important to make the general public in the Third World — especially the few leaders with so much influence — aware of the critical role of science and technology in development, and to make the necessary tools available.

*Dr Yuthavong is at Mahidol University, Bangkok*

## Three imperatives: food storage, energy, work ...

Guido Brunner

A GREAT responsibility rests on those who will be taking part in UNCSTD in Vienna. They have to make a fundamental choice. They will either be drawn into a discussion of abstract principles of a new international economic order, or — and this is what I hope to see — they will get down to some practical business. The first will merely lead to yet another diplomatic deadlock of the kind we have seen already too often in meetings between the developed and developing world. The other will spark off that real scientific and technical co-operation which is so necessary for the solution of the problems of development.

This is an especially significant time for the conference. Prospects for the world economy are clouded, and governments are worried about the rising cost, and shortages, of energy. For the developing



*Brunner: fundamental choices*

world the three imperatives are: the storage of food, energy and work. The conference must see that the proper scientific and technological resources are freed to contribute to these great tasks.

A long term effort internationally and at home will be required if the developing countries are to build up the necessary internal scientific and technological capability. The transfer of technologies from the developed to the underdeveloped is only one aspect of the problem. What is equally important is to establish the means for the developing countries to improve their educational and managerial standards.

The Community and its nine Member States will play their part in this great venture. Our association with 57 developing countries in Africa, Asia and the Caribbean within the Lomé Convention has already enabled us to make a contribution, and the new Lomé Convention will provide us with a framework for offering additional support for scientific and technical co-operation.

*Dr Brunner is Commissioner of the European Communities for Energy, Research, Science, and Education*

## Policymaking should be at the highest level of authority

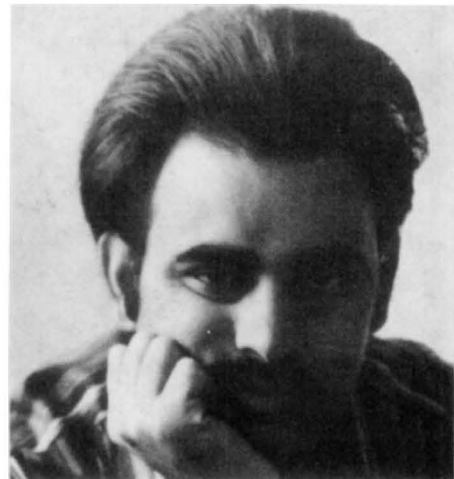
Antonio Pinilla

THE most pressing need is for a strong, deep and consistent political decision that science and technology constitute essential elements for each state to obtain:

- social integration;
- economic development;
- cultural independence;
- political coherence; and
- administrative efficiency and productivity.

Inadequate knowledge generates racial, social or religious prejudice, frustrating the national integration of countries. Economic growth requires agricultural and industrial mechanisation and rationalisation and these are impossible without a certain advanced degree of scientific and technological development. Payment of duties and royalties make national products uncompetitive in international markets. Economic dependence often generates cultural dependence, so decreasing awareness of national identity. Political and administrative sciences are key solutions to problems concerning political coherence, continuity, administrative efficiency and productivity within a free society.

For these reasons the making of science and technology policy should be the responsibility of the highest levels of authority, such as the president of the Republic (Head of State), parliament and



*Sardar: self-confidence*

the cabinet. The person in charge of implementing science and technology policy should have the rank of minister of state, or even better, be a full cabinet member.

The usual type of problem confronting each cabinet member is something very specific and urgent. Cabinet members cannot afford to concentrate on the scientific and technological aspects of the problems they face. That is why it is critically important that present-day states create national systems of science and technology, giving them the highest level of responsibility and authority to ensure scientific and technological aspects of national plans and objectives, policies and actions are sound, do not include errors or insufficient information, and are adequate and appropriate to each national reality.

*Prof Antonio Pinilla is President of the Peruvian Consejo Nacional de Investigacion Cientifica, Lima*

## Inculcating an appropriate sense of confidence

Ziauddin Sardar

ALL developing starts with the individual, and science development is no exception. The first and the most critical action, in my book, concerns the scientists of the developing countries themselves: every Third World scientist must consciously inculcate in him/herself an appropriate sense of confidence. Science can only play its full role in development when the integrity of those who do science is preserved. And this integrity cannot be preserved when the Third World scientists themselves do not have any confidence in their ability to manage their enterprise.

There is a natural corollary to the development of confidence in Third World scientists: confidence in oneself precedes from confidence in one's society, tradition, culture and institution. If someone has confidence in his ability as a scientist and



*Salam: 10 times more scientists*

his culture and society, then he does not look down on the needs of the society as 'insignificant' and indigenous research as 'inferior'; nor does he apologise away his research efforts to solve local problems or place too heavy a reliance on outside help and consultants and advisors. Furthermore, a scientist with confidence in himself builds up confidence in his colleagues and does not feel threatened by younger scientists. Nor does he articulate the desire to block the paths to full realisation of those who have potentially more to contribute to science development.

As far as I am concerned, science development in the developing countries begins and ends with the confidence the Third World scientists have in themselves, their society and the science that they practise.

*Dr Sardar is at the Hajj Research Centre, King Abdul Aziz University, Jeddah*

## Local scientific committees

### are too small

Abdus Salam

I HOPE the conference can focus on and initiate action on the following important area. Any declared intention of applying science and technology to development is — and will remain — meaningless until the developing countries build and deploy indigenous scientifically and technologically trained communities. At present, however, such communities simply do not exist, or their sizes are tenths or hundredths of what is needed. Their direction and deployment must be the concern of scientists and technologists themselves, and not of the economists and bureaucrats of national and international planning commissions.

It must be realised that whatever priorities the countries set themselves (food production, mineral exploitation, transport, health, manufacture or even

defence), a meaningful application of science and technology needs commitment; is not cheap in money, men or time; and it brooks of no magic formulae.

Turning to the reciprocal role of developed countries, we note that the theme of world development has been woefully neglected by the scientific and technological communities of the developed countries, who have made little organised effort to help in this task, nor have they collectively shown any great vision. The same applies to their state agencies.

In addition, the international funds at the disposal of bodies like ICSU — or even UNESCO — for the development of science and technology for global concerns are pitifully small. (The entire UNESCO budget — not to restrict it to what is spent on science and technology — is smaller than that of the Ford Foundation). These international funds need to be increased by at least an order of magnitude.

*Prof Salam is Director of the International Centre for Theoretical Physics, Trieste*

## A large debt remains for past exploitation

Joseph Hanlon

THERE is a need for a 'new scientific order', like the new economic and information orders, which attempts to break the stranglehold of the developed over the developing nations. Scientists in developed nations must realise that the science gap has not come about by accident. During the past 200 years of scientific progress, most Third World nations were colonies which were not permitted to develop an independent scientific capability. Small wonder, then, that there is a gap now.

The challenge today, especially for UNCSTD, is that the developing nations are working hard to maintain and widen that gap. The brain drain continues, with the developed nations sucking the brightest scientists into their companies, health services, and universities. Patent laws are now being used to block Third World research into key areas such as alternative energy. Journals and scientific societies, controlled by developed world scientists, define 'good' science as that which is of interest to developed nations. Tied aid ensures that experts and equipment come from such a wide variety of countries that even the most talented local scientist cannot digest and control the results.

All of this ensures that in those scientific areas which are of most importance to the developing nations — health, energy, ecology and geology — the expertise and control will remain with the developed nations.

UNCSTD can help to end this exploitation. But it will require the realisation in the developing nations that they must stop bowing to the demands of journals and aid agencies in the industrialised world. And it will require that scientists and science policy makers of the developed world understand that a large debt remains to be paid for past exploitation, and that a way of repaying is to provide increased aid — not for what they think the Third World needs, but for what local scientists and policy makers feel is required.

*Dr Hanlon is a development journalist*

## Loosen the grip on proprietary rights in technology

Jose Goldemberg

THE most critical actions necessary to improve science and technology in the developing world are probably beyond the powers of UNCSTD, or of the United Nations.

Science, especially technology, does not flourish in the Third World — not because of incompetence amongst the people involved (although that exists too) — but because it is not really needed in the present model of development being followed in most of the Third World. Machines, technical expertise and a powerful marketing system coming from abroad inundate the developing countries, ministering to some of the needs of the people, creating others and above all generating a craving for the comforts of modern civilisation as defined by the industrial nations.

There is little that science can do to interfere with this situation, because most of the science needed exists already, and there are no fundamental new discoveries that could change the situation or the climate in which science could flourish in the Third World.

Technology, however, has to be adapted, in many cases to local conditions (of temperature, humidity, and so on) and to local fuels and materials. Native technologies have a role to play there, but in general technology is imported.

The most critical action to take in my view would be to loosen the grip on proprietary rights in technology. If these were made available and essentially free, local industries would have more room to move and more scientists and technologists would be needed to make choices and develop missing links. One thing that could accelerate this process would be to have international funding institutions which preferentially support projects that use as much native technology as possible.

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