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Towards a Culture of Scientific Excellence in the South in a Changing World

by

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It is indeed an honour to be here today to speak before H.R.H. Princess Astrid of Belgium and such a distinguished group of scientists and scholars on the occasion of the 75th Anniversary of the Royal Academy of Overseas Sciences.

The Royal Academy of Overseas Sciences is a unique institution bringing together eminent scientists and scholars from around the globe to examine some of the world's most critical social and moral issues. The Academy, of which I am a proud member, serves as a valuable link between science and our larger global community — at a time when such links have become ever-more fragile in our increasingly fractured world.

Indeed the theme of this opening session — “New Challenges for the Academies in a Changing World” — has assumed even greater importance in recent years.

Academies, under the umbrella of the-Inter-Academy Panel on International Issues (IAP) — a global network of 90 science academies worldwide with its secretariat in Trieste and operating under the administrative umbrella of the Third World Academy of Sciences (TWAS) —, are seeking to respond in innovative ways both to the challenges and opportunities faced by our knowledge-based global community.

Unprecedented advances in science and technology — first in physics and, more recently, in biology — have drawn science and cultural values

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closer together in a difficult but enlightened debate over fundamental principles concerning nothing less than the meaning and goodness of life.

No genetic scientist can blithely ignore the ethical dilemmas posed by biotechnology, just as no religious authority can turn a blind eye to the potential benefits that this technology could bring to millions of people suffering from such chronic and often debilitating diseases as HIV/AIDS, diabetes and malaria.

The gap in scientific capacity between the North and South, however, means that many of these advances are made by scientists working in well-equipped laboratories in developed countries primarily for the benefit of people in the North.

I am sure that we all agree that the developing world will not break out of its unending cycle of poverty and material deprivation unless it embraces a similar culture of excellence in science and technology.

And I also am sure that we all agree science will only take root within a society if it is embraced as an integral part of the prevailing culture. This can only happen if the local population views science as powerful instrument for solving real-life problems.

That is why scientific innovation and traditional cultural values must be considered partners, not adversaries, in our global quest for a better future.

In the context of this discussion, it is important to note that traditional knowledge has continued to play a critical role in developing countries — long after the ability of these countries to pursue cutting-edge scientific inquiries had been compromised by political and social conflicts and a host of other factors —, some self-inflicted, others created by forces beyond the society's control and influence.

Acquired and tested over centuries, today traditional knowledge is proving increasingly important as we try to tailor our global concerns for economic and social well-being to a myriad of local circumstances.

Respect for such knowledge, in fact, could provide a gateway for re-establishing a culture of scientific excellence in the developing world while simultaneously giving universities and research institutions in both the North and South valuable time-tested information and techniques for examining some of the world's most difficult food security, public health and environmental problems. In other words, traditional knowledge may serve as a vital connection between science and our global society, steering both into closer collaboration.

Take the example of a group of farmers in Ghana who, contrary to the tenets of modern scientific research, have successfully grown crops underneath trees.

Modern science tells us this is a bad practice because the tree roots suck up the very water that the plants need to grow. What the farmers of Ghana have discovered, through experience, is that the tree roots not only absorb water but help to disperse it, laterally, just beneath the soil's surface. As a result, the roots prove to be an aid, not a hindrance, to crop production. The trees and plants live in an harmonious, symbiotic relationship in which the health of one promotes the health of the other. More roots, better crops.

Yet, what is perhaps most fascinating about the experience in Ghana, as discussed at a meeting of the British Association for the Advancement of Science held last month and reported in a recent article in the electronic news portal SciDev.Net, is that it is not an isolated experience. In fact, hillside farmers in Nepal pursue similar tree-shaded farm practices with equally impressive results.

What all of this shows is that local knowledge may not be local at all. Instead it may represent a way of understanding based on experience and born of an innate of sensibility that draws on the time-tested strategy of "knowing by doing".

It is a kind of knowledge that modern society should not romanticize, yet should not ignore.

In this spirit, I think it is important for all of us to recognize — as the founding president of TWAS, Abdus Salam, often said — "science is the cultural heritage of all humankind".

No culture has a "god-given" monopoly on science and technology. And all cultures have a great deal to learn from exchanging experiences and knowledge, both on the wonders of our natural world and on the scientific and technological benefits derived from human ingenuity.

Given all this, what practical steps should the developing world take to create a culture of scientific excellence ?

Put another way, what factors could help the South knit scientific excellence into the fabric of its cultures in ways that would enable traditional values and modern science to be woven together in a pleasing harmonious pattern ? And, at the same time, allow the North to embrace science not just as a tool for individual material acquisition but as a source of social and cultural advancement in the broadest sense of what it means to be "advanced".

Let us first acknowledge that the task is not an easy one. Here are some snapshots that reveal the depth of the challenge :

— The South is home to 80 % of humanity but produces just 10 % of the articles published in international peer-reviewed journals and

accounts for only 5 % of the world's total expenditure on research and development ;

- Since the Nobel prize was initiated over a century ago, it has been awarded to only three scientists who have conducted research in the developing world: C.V. Raman in India (1930), Bernardo Houssay in Argentina (1967), and Luis F. Leloir in Argentina (1969) ;
- Israel, which has only 4 million people, publishes more science and technology research papers in international peer-reviewed journals than the entire 57 countries belonging to the Organization of Islamic Conference (OIC), with a total population of nearly 1.3 billion.

Yet, we should not be discouraged by the challenges we face. By investing in their higher education systems and their research and development infrastructures, several countries — notably Brazil, China, India, Mexico and South Korea — have dramatically advanced their science and technology capabilities in a variety of fields, from electronics and computer software programmes to biotechnology and remote sensing.

These countries and several others have expressed a strong desire and commitment to engage in South-South cooperation programmes in education and research aimed at helping less privileged countries to develop their own scientific capacities.

Such experiences — along with more effective strategies for North-South cooperation — suggest that the road to scientific excellence in the developing world may no longer be marked by wrong turns and dead ends.

In fact, we know what it takes to succeed and we now have examples of how to get there :

- First, we need to establish national foundations for science and technology, in countries throughout the developing world, that continuously provide generous research grants based on competition and a peer-review system and that remove nepotism and seniority from the selection process. Here the efforts of such organizations as TWAS and the African Academy of Sciences to provide competitive grants in a variety of fields bode well for the future of science in many places throughout the developing world where similar national foundations do not exist. Such programmes, however, need substantial additional funding if we are to build and sustain a critical mass of world-class scientists in every country of the South.
- Second, we need to engage institutions of excellence that can attract, train and retain scientific talent and undertake problem-solving

research. Here the work of the Third World Network of Scientific Organizations (TWNSO) may prove particularly significant. TWNSO, which operates under the administrative umbrella of TWAS in Trieste, first identified and then involved institutions of high standing in the South in the building of networks dedicated to addressing real-life concerns in the developing world. To date, TWNSO has launched networks in indigenous and medicinal plants, dryland biodiversity, water management and, most recently, renewable energy. These networks closely track the critical problems — water, energy, health, agriculture and biodiversity — that UN Secretary-General Kofi Annan recently cited as a framework for action in events leading to the World Summit on Sustainable Development held in Johannesburg last year.

- Third, we need to devote sufficient resources to the problems of least developed countries (LDCs) whose scientific communities have become increasingly isolated and marginalized in recent years. Here is where TWAS's recent programme to recognize and support the best research groups in the LDCs could prove to be a critical strategy for developing and sustaining scientific excellence under difficult conditions. The programme offers annual grants of up to US\$ 30,000 a year for three years to research groups in universities and research institutions. Again, this is an excellent initiative requiring an infusion of additional funds if it is to reach its full potential.
- Fourth, scientists need to communicate, in an atmosphere marked by mutual respect and understanding, with the keepers of other forms of knowledge — notably, practitioners of traditional knowledge in health, the environment and natural resources. Here TWAS's call for greater interaction with indigenous sources of knowledge, as outlined in its most recent strategic plan, could help bridge the divide — melding the universality of modern science with localized traditional knowledge in ways that serve both these noble pursuits.
- And, fifth, we need to nurture an environment that fosters cooperation between leading organizations that support the pursuit of excellence in science and technology. Here the initiatives of the Inter-Academy Panel for International Issues (IAP) to strengthen merit-based national science academies in the South could help transform a vastly underutilized source of scientific expertise into a strong and effective voice for science-based decision-making.

In all these endeavours, we must never lose sight of the fact that promoting a culture of scientific excellence generates benefits beyond a

society's material well-being — that, in fact, a culture of scientific excellence is a boon to the entire culture. Opportunities to interact with individuals associated with education and research organizations beyond one's national borders promote greater understanding of the cultural values of different societies. This interaction, in turn, enriches and transforms cultural attitudes and customs.

And it is within this matrix of scientific interaction where Academies, working individually and in concert through such organizations as TWAS and IAP, can play a vital role.

Historically, Academies have provided an intellectual sanctuary for eminent scientists. Indeed the world's first science academy, *Accademia dei Lincei*, was created 400 years ago largely for the purpose of fostering an insular environment of camaraderie among the burgeoning pockets of scientific inquiry found in Renaissance Italy.

In the 21st century, however, Academies have a more critical role to play in three vital areas central to the relationship between science and society:

- First, Academies must promote high-quality science within their own nations. This means they must seek to recognize scientific achievement and encourage the pursuit of scientific excellence. Such goals are fulfilled through the merit-based election of its members, the awarding of prizes and medals, and the forging of links with scientific communities abroad.
- Second, Academies must seek to promote public understanding of science through public lectures and interaction with the media. At the same time, Academies should seek to support quality science education and establish exchanges with other sectors of society, including the private sector.
- Third, Academies must reach out to government by offering independent, objective advice on issues of vital importance to their nations. Academies must also become intimately involved in programmes sponsored by international institutions, especially those that focus on science-based development issues.

For too long, and in too many countries, Academies have been an underutilized intellectual resource. The Academies themselves, often content to operate as clubs rather than as dynamic forces within their societies, bear part of the responsibility for the science community's limited involvement in policy discussions.

But today, we can ill-afford to have the voice of science remain muted in a world where so many of the critical forces shaping our present and driving us into the future are fuelled by scientific discovery and technological advancement.

Our understanding of the state of the world depends in many ways on science — and so does our ability to mitigate critical problems and take advantage of unprecedented opportunities.

This does not mean that science alone should be our sole source of knowledge and understanding. We are, after all, also a people anchored by deep cultural values and spiritual awareness — sources of strength and well-being that depend more on faith than reason.

But to keep science out of the equation is to fight our battles for a more equitable and just world with a paralysing handicap.

Academies of science can — and must — play a crucial part in efforts to create a more scientifically enlightened world. It is a role that our Royal Academy of Overseas Sciences has sought to play in the past and one I am sure is eager to play in the future. I can assure you that TWAS — and its affiliated organizations, including the Inter-Academy Panel — are eager to join you in this noble campaign.

On this note and on behalf of the African Academy of Sciences and TWAS, I would conclude by congratulating the Royal Academy of Overseas Sciences on the occasion of its 75th Anniversary.

TWAS, which will celebrate its 20th Anniversary in Beijing next week, is pleased to have established close links with the Royal Academy in the past few years, highlighted by the signing of a Memorandum of Understanding in 1999 that provides a framework for cooperation that I am sure will grow even more fruitful in the years ahead.

I wish the Royal Academy of Overseas Sciences the greatest success in the next 75 years and beyond.