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THE NEWSLETTER OF THE THIRD WORLD ACADEMY OF SCIENCES



第三世界科學院



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At the TWAS officers meeting, held in Trieste, Italy, on 7 May 2000, José I. Vargas, who had been President of TWAS since 1996, read a statement announcing his resignation. What follows is an extended excerpt from the letter. The TWAS council accepted his resignation with deep regret and sincere thanks. They wished their president well in the new challenges he will face as the Brazilian ambassador to the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Dear Colleagues,

I wish to inform you that I have been nominated by the Brazilian government to head its permanent delegation to the United Nations Educational, Scientific and Cultural Organization (UNESCO).

UNESCO and the Italian authorities are presently negotiating provisions for a law to be submitted to the Italian parliament, similar to the one generously enacted for the

Vargas steps down

Abdus Salam International Centre for Theoretical Physics (ICTP). The law shall hopefully assure the financing of TWAS future activities on a more sustainable and predictable basis. The new generous Italian commitment was communicated to TWAS by Ambassador Gianfranco Facco Bonetti, director general for cultural promotion and cooperation of the Italian Foreign Ministry, during the opening session of our meeting at Trieste in December 1998. The announcement serves as the basis for the ongoing negotiations.

To ensure the desirable advances in the implementation of this initiative, Academy members were recently asked to approve amendments to the statutes so that TWAS's truly international status could be recognized. This change was deemed indispensable by the Italian legal advisers to expedite the preparation of the pertinent national legislation.

Despite the generous contributions that the Italian government and UNESCO (as well as Brazil, China, India, Kuwait, Nigeria, Sweden, and others) have made to TWAS programmes and administrative activities, the Academy shall only fulfil its high role when the target set in its endowment fund and a more permanent generous contribution resulting from Italy's proposed law are attained.

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With a view to further contributing to these objectives, I have invited, on your behalf, a distinguished member of our Academy, President Cardoso of Brazil, to lend his prestigious support by addressing, personally and in writing, the former Prime Minister of Italy, Romano Prodi, and the Italian Foreign Minister, Lamberto Dini, on TWAS's future needs. Cardoso expressed Brazil's recognition for the most valuable and generous initiatives taken by Italy on TWAS's behalf and, more generally, for Italy's support for international cooperation, which Brazil also pursues.

President Cardoso is also a signatory of the renewed appeal for contributions to the TWAS endowment fund. With the fund thus far receiving support only from developing countries, President Cardoso on several occasions expressed the view that it is time for the industrial countries to generously make their contributions. To assist in reaching these objectives and in addition to its own past contribution of \$500,000, Brazil made a new contribution of \$89,000 in 1998, to help TWAS meet administrative expenses, particularly those arising from efforts made in promoting the fund.

The assistance of Brazilian diplomatic missions, first in Italy and later in France, Norway, Sweden, Finland, the Czech Republic and Hungary, was extended in good grace to the president of TWAS and, at times, to its executive director. Such assistance facilitated our contacts, both with high-level national administrations and national academies, to deal with TWAS programme extensions (Sweden); with institutional and financial matters (Italy); and with all of them on issues related to fostering the endowment fund. Some of these activities were reported to you following our Budapest meeting.

In light of the above and in view of the special administrative subordination of TWAS to UNESCO, the presidency of TWAS is incompatible with that of permanent delegate for a member state of UNESCO.

In addition to this pressing legal consideration, ongoing bilateral negotiations between UNESCO and the Italian government on the future status of TWAS should in no way be affected by the participation of third party — namely, Brazil.

For these reasons, I kindly invite you to accept my resignation as president of TWAS.

Allow me to warmly thank all colleagues of TWAS who so kindly have extended their trust and friendship to me while I tried, to the best of my limited capacity, to honour the impossible burden of succeeding our most illustrious founding father, the late Abdus Salam.

While I remain certain that I have not achieved for TWAS the high aims dreamed of by our founders — dreams that I myself ardently wished to have been fulfilled — I'm sure that these noble objectives shall be attained at a much faster pace, thanks to your collective endeavours under the competent and farsighted leadership of our most distinguished president-elect, scientist and world science statesman, our friend C.N.R. Rao. ■

✦ José I. Vargas
Trieste, Italy

INTERACADEMY PANEL COMES TO TRIESTE

TWAS WILL HOST THE SECRETARIAT OF THE INTERACADEMY PANEL (IAP), A GROUP OF 80 SCIENTIFIC ACADEMIES FROM AROUND THE WORLD. GLOBAL INFORMATION EXCHANGE AND ACADEMY CAPACITY BUILDING ARE AMONG IAP'S MAJOR OBJECTIVES.

The Third World Academy of Sciences (TWAS) has been chosen to host the secretariat of the InterAcademy Panel (IAP). The decision was made at the IAP's General Assembly on 19 May, following the Conference of the World's Scientific Academies, "Transition to Sustainability in the 21st Century," held in Tokyo, Japan, from 5-18 May.

The purpose of the IAP, which was launched at the United Nation's Population Summit held in New Delhi, India, in 1993, is "to act as an international forum that brings together academies of all nations to discuss problems of global concern." The panel also pursues strategies for promoting "the role of science and technology in addressing these problems." In effect, the IAP seeks to foster coop-

eration, networking and capacity-building among academies and to strengthen the voice of academies in discussions of science-related issues in both national and international settings.

IAP membership currently consists of 80 academies worldwide. For the past five years, the secretariat has been located at The Royal Society in London.

At the same meeting, the IAP voted to create the InterAcademy Council (IAC), which will be responsible for providing, upon request, expert scientific advice on issues of global con-

cern to such international organizations as the United Nations, the World Bank and the International Monetary Fund. Council expertise will also be made available to governments, again upon request. The IAC will be located at the Royal Netherlands Academy of Arts and Sciences in Amsterdam.

A close working relationship is expected to develop between the IAP and the IAC. One of the two co-chairs of the IAC, for example, will serve as an ex-officio member of the IAP General Assembly and Executive Committee (the two chairs may either split the responsibilities or one chair may serve in both capacities). The IAP, in turn, will nominate scientists to serve on the IAC's study groups created to provide expert information and de-



tailed reports to international organizations and governments.

To date, the IAP has focused its energy on building a forum in which science academies throughout the world could exchange information and ideas. To that end, the IAP has participated in two United Nations (UN) conferences: one devoted to global population in 1993 and another to megacities in 1996. The conference in Tokyo, which focused on scientific issues related to sustainability, was IAP's third international gathering.

The IAP also periodically "issues statements on major global issues." In Tokyo, for example, a statement signed by representatives from 60 science academies called for "applying the values of scientific and technological community to build sustainability through international understanding and cooperation."

In addition to serving as international forum for scientific academies and as a vehicle for raising the voice of academies in discussions of critical global issues, IAP will also seek to:

- Promote cooperation between academies through the development of bilateral, regional and global links forged largely through workshops, symposia and conferences.
- Assist scientific communities, particularly those in developing countries, to create academies where they do not exist and to strengthen them where they do. A critical function of the IAP will be academy capacity build-

ing, particularly in the South.

In Tokyo, Eduardo Krieger (TWAS Fellow), president of the Brazilian Academy of Sciences and Yves Quéré, foreign secretary of the French Academy of Sciences, were elected new co-chairs of the IAP. Members of the IAP also agreed to appoint a temporary executive committee to draft an IAP constitution and operating procedures. The committee consists of the two IAP co-chairs and representatives of the academies of India, China, the Caribbean, Sweden and the United Kingdom. In addition, a representative of TWAS and one of the co-chairs of the IAC were made ex-officio members of the executive committee.

Representatives have put into motion a strategy for transforming the loosely woven organization into a tightly knit entity with a clearly defined agenda and detailed procedures for achieving the IAP's goals. The framework created during the next few months and the energy and resources applied to transforming that framework into a solid and enduring structure over the next year or two will likely determine the IAP's long-term impact on global science and international decision making.

As members of the IAP go about their business of strengthening the panel's internal mechanisms and structures, TWAS, as IAP's host, will be busy at work seeking to create a nurturing environment for its new neighbour and partner. The Italian govern-

ment has generously agreed to provide both operational money and a home for the IAP. We are currently negotiating both arrangements through discussions with local, regional provincial and national authorities, and we expect the plans to be finalized in the months ahead.

Refurbishing one of the proposed sites for IAP's and TWAS's permanent headquarters will take time. Meanwhile, the Abdus Salam International Centre for Theoretical Physics has agreed to provide temporary quarters for the IAP — a gracious gesture on the part of the ICTP that helps to ensure that the panel will get off to a quick start.

It's only fitting to find TWAS and the ICTP working closely together on this project. As many of you know, both scientific organizations were products of the fertile mind of Nobel Laureate Abdus Salam. Indeed it was Salam, founder and then long-term president of both ICTP and TWAS, who sometimes responded to calls for changing the name of the Third World Academy of Sciences with this refrain: The only name change that I would seriously consider for TWAS is to the "One World Academy of Sciences."

We still have a long way to go to realize Salam's vision. But he would be pleased to know that organizations which he created and nurtured are now playing major roles in a larger effort to help realize the noble cause to which he devoted much of his life. ■



GOLDEN ANNIVERSARY

THE PRESIDENT OF THE CHINESE ACADEMY OF SCIENCES, LU YONGXIANG, TALKS ABOUT HIS ORGANIZATION'S STRENGTHS AS WELL AS ITS HOPES FOR THE FUTURE.

中国科学院

Beijing, China. The Chinese Academy of Sciences (CAS) celebrated its 50th anniversary last November. What began as a small organization created soon after the Revolution has evolved into China's largest scientific association. Today the Academy oversees the work of 122 institutes employing some 60,000 researchers who are involved in virtually all fields of scientific inquiry.

The Academy's most distinguished institutes include the Institute of Physics, which has gained an international reputation for research in high-temperature superconductivity, nano-metre science and condensed matter physics; the Institute of Geology and Geophysics, which has acquired prominence in mineralization theory and quaternary research; and the Shanghai Institute of Organic Chemistry, which has made significant contributions to the fields life organisms and computer chemistry.

As Lu Yongxiang, the President of the CAS, noted in a recent interview with the editor of the *TWAS*

Newsletter: "Ever since its inception, the Academy has served as one of the cornerstones of China's efforts to improve agricultural and industrial productivity. More specifically, CAS has shouldered three major responsibilities: to contribute to China's economic and social development; to recognize and honour the nation's best scientists and engineers; and to promote the growth of cutting-edge high-technology industries. In short, the Academy has sought to boost scientific and technological innovation in China through the support that it has given scientists engaged in basic and applied research."

To date, 633 of China's most distinguished scientists have been elected members of the Academy. CAS members include Zhao Zhongxian (TWAS Fellow 1987) who was awarded the 1986 TWAS Prize in Physics for his research on liquid nitrogen high-temperature superconductors; Chen Shupeng (TWAS Fellow 1992), who received the nation's 1995 Special Gold Award for Environmental Science for his work on



A STRONG FRAMEWORK FOR CO-OPERATION BETWEEN THE CHINESE ACADEMY OF SCIENCES AND TWAS IS ALREADY IN PLACE: 64 MEMBERS OF TWAS ARE FROM MAINLAND CHINA. THAT IS MORE THAN 10 PERCENT OF TWAS'S MEMBERSHIP.

remote sensing and geographic information systems (GIS) for use in environmental monitoring, natural disaster assessment, biomass estimates and resource management; and Chen Zhu (TWAS Fellow 1999), an internationally renowned biologist who has identified cellular and molecular mechanisms for the treatment of acute leukaemia and the characterization of gene expression profiles in hematopoietic stem/progenitor cells.

As we enter the next millennium, Lu Yongxiang notes that the Academy faces a host of challenges. On the "issue front," he says that CAS "must continue to embrace effective measures both to promote economic development and to protect the environment. The government and the public," he adds, "realize that long-term sustainable development depends on avoiding strategies that achieve growth today at the expense of the nation's future environmental well-being. The Academy must be attentive to these concerns."

That is why, Lu Yongxiang observes, the Academy has stepped up its research on science-based strategies for protecting the nation's habitat and biological diversity, improving water quality and management, controlling air pollution and greenhouse gas emissions, and reducing industrial and household wastes.

Lu Yongxiang acknowledges that "scientific research alone cannot advance these goals." He declares that "the findings of basic scientific research must be integrated into technological solutions that make sense for industry, commerce and other sectors of the economy. That requires sufficient funds for the

promotion of research and development, the training of engineers and technologists, and the development of effective legal and regulatory frameworks."

"The Academy," Lu Yongxiang states, "has focused its recent efforts on issues of critical importance to China's economic and ecological future: for example, strategies for the reduction of carbon dioxide pollution associated with the burning of coal (the prime source of energy in China for the generation of electricity and heat); development of biodegradable materials for use in manufacturing processes and consumer goods; fostering of new agricultural techniques and hybrid seeds for boosting crop yields in semi-arid and arid lands (with increasing emphasis on advances in biotechnology); and conservation of tropical rain forests through the development of sustainable practices that remain economically viable through the sale of forest-related products."

Lu Yongxiang also was recently elected a vice president of TWAS. In this capacity, he hopes "to promote international exchanges and co-operation among scientists from the developing world, particularly those living and working in northeast and southeast Asia."

As a first step in advancing these goals, CAS, in co-operation with TWAS, organized an international conference on dryland grass ecosystem management. The



Lu Yongxiang

The Chinese Academy of Sciences (CAS) oversees the work of 122 institutes and some 60,000 researchers.

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SOUTH AFRICA'S NEW ACADEMY

Cape Town, South Africa. While the Chinese Academy of Sciences draws on 50 years of experience to help China's scientific institutions meet new challenges, the Academy of Science of South Africa, which is just 5 years old, is seeking to establish an identity for both itself and South Africa's scientific community in a nation that has recently experienced an inspiring revolution in racial relations and democracy. As Wieland Gevers, the Academy's president, explains: "We are in our infancy and there is still quite a way to go before our infrastructure is well established."

Gevers, who was educated in South Africa, Great Britain and the United States and has enjoyed a long and

distinguished career as a scientific researcher and administrator in South Africa, faces a host of down-to-earth logistical problems as he and the Academy's council seek to build a strong foundation for his fledgling institution.

"The Academy, which currently has some 140 members, can play a major role in promoting social equity and economic development," Gevers notes, "particularly through its international connections and partnerships." But he acknowledges that "the Academy has been plagued by a weak infrastructure and an unresolved place in the South African science system. We are hoping that these weaknesses can be addressed over the course of the next few years."

Such problems should come as no surprise. The Academy was established in 1996 after public officials in the newly created democracy realized that neither of the nation's long-standing academies, the Royal Society of South Africa or the South African Academy for Science and Arts, "could inclusively represent the whole of the South African scientific community."

The nation's new post-apartheid society, they concluded, would need a new science academy as part of a larger effort to build credibility and confidence among institutions in South Africa and throughout the rest of the world.

During the post World War II era, South Africa developed a strong foundation in scientific research in

conference, which took place in August 1999 in Xilinholt, Inner Mongolia, China, drew nearly 100 participants from six countries (Australia, China, Japan, Mongolia, Russia, and the United States). Discussions focused on improving science-based management practices for dryland ecosystems that cover vast expanses of the developing world. In China, for example, dryland grass ecosystems stretch over nearly 20 percent of the land mass. Among the issues discussed at the conference were global change and sustainable grassland management, conservation of grassland biodiversity, grazing management techniques and the role of women in pasture development.

In addition, the Academy, again in co-operation with TWAS, held a symposium in Beijing, China, in November 1999, on the impact of digital technology. More than 500 participants from 27 countries examined the ways in which digital technology has radical-

ly altered global communications in general and scientific research more specifically. Moreover, they explored what measures developing countries — both individually and collectively — should pursue to take full advantage of the "digital revolution."

In the near future, CAS plans to organize a workshop examining science-based strategies for the protection of habitat and biodiversity in tropical rain forests and another workshop exploring current research initiatives designed to ensure adequate quantities of clean

drinking water in the developing world. "All of these activities," notes Lu Yongxiang, "are driven by our desire to promote South-South co-operation."

In the final analysis, Lu Yongxiang believes that the most important step that developing nations can take to close the science and technology gap existing

The Academy has focused its recent efforts on issues of critical importance to China's economic and ecological future.

several fields, including palaeontology, clinical medicine and ornithology. These efforts nurtured the development of several internationally recognized experts, including anatomist Raymond Dart of the University of the Witwatersrand in Johannesburg and anthropologist Phillip Tobias, who succeeded him, and Len Eales of the University of Cape Town.

However, like everything else under South Africa's oppressive apartheid system, opportunities for scientific research and development, not to mention the tangible benefits derived from these efforts, were confined to the nation's white minority. "The South African Academy of Sciences will promote both excellence and opportunity for all of our

nation's scientists," Gevers observes. "Our membership includes such world-renowned scientists as Malingapuru Makgobae (immunology), Kanti Bhoola (pharmacology), and Daya Reddy (applied mathematics)."

While continuing to honour the work of these accomplished scientists, Gevers hopes that the Academy can also help broaden the pool of scientific talent in South Africa through programmatic initiatives — for example, the granting of fellowships, travel stipends and awards — that have become characteristic of scientific academies throughout the world. He also hopes that the Academy can serve as a valuable source of information and insight for addressing science-related issues

of critical importance to South Africa's future economic and social well-being.

As Gevers notes, "the scientific fields viewed as most critical to South Africa's future are those linked to such national needs as information technologies to improve education, biotechnology to enhance the productivity and safety of food supplies, health research to combat infectious diseases, and hydrology research to improve both the quantity and quality of the nation's limited supplies of water."

"The value of scientific research in our democracy," Gevers adds, "will depend on our ability to address issues of public concern. That's why I think the Academy's broad view of science, ranging from the natural to

[CONTINUED PAGE 10]

between the North and South is to put more money into scientific research and development.

"Today," he observes, "China invests about 0.7 percent of its gross domestic product on science and technology. That commitment has already had a positive impact on our economy, which has grown at an average rate of nearly 10 percent over the past 10 years. I'm not suggesting that our investment in science and technology has been the only factor in our progress, but it is one of the underlying reasons for the sustained period of development that China has recently experienced."

At the same time, Lu Yongxiang acknowledges that adequate funding for research and development is not enough. "Many forces must come into play for a science-based economic development to succeed," he notes. "Educational reforms, initiatives boosting public support for science, adequate financial backing for innovation, and international scientific exchanges are all essential elements of a broad-based, comprehensive strategy."

"International scientific exchanges," Lu Yongxiang asserts, "could prove productive in several areas critical to our global well-being. Such areas include environmental protection, public health and the efficient use of resources." But for these exchange efforts to succeed, he adds, "the North must provide assistance to the South for improving training and research programmes, particularly for young scientists, which give them the skills and tools they need to pursue innovative research projects in the future."

"As we enter the next millennium, a nation's long-term economic and social well-being depends less and less on its ability to provide conventional goods and services, and more and more on its ability to innovate. The innovation gap, in fact, may be the largest gap that exists between the North and the South. As a result, helping to close that gap through international assistance and co-operation, particularly in areas of scientific research and technological development, may be the most valuable help that developed nations can provide to developing nations." ■

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Wieland Gevers



Malegapuru Makgoba



Kanti Bhoola

the social and human sciences, closely linked to technology and engineering, will allow us to make major contributions to our nation's progress."

The success of the Academy's efforts will depend in part on its ability to address issues related to its internal administration and its primary functions and responsibilities within South Africa's scientific community and larger society.

Yet there is another dimension to the Academy's work that Gevers maintains could prove equally important to the institution's future: its rela-

tionship with scientists and scientific academies in the rest of the world, particularly in Africa. He points out that "for many years, South Africa did not fully participate in international scientific research activities and programmes, and it had virtually no interaction with its neighbours to the North."

Such isolation is dangerous for most endeavours, but it is especially worrisome for science, whose universal values are advanced by a continual exchange of information and ideas free of political, social and racial barriers.

To address these potentially paralyzing shortcomings, Gevers says that the Academy recently has forged promising relations with such leading scientific institutions in the developed world as the U.S. National Academy of Sciences and the Royal Society in the United Kingdom.

"We also have signed protocol agreements for co-operation and exchange with the Royal Swedish Academy and French Academy. A memorandum of understanding has been reached with the Russian Academy of Sciences and discussions for future co-operation have taken place with representatives from scientific academies in Brazil, China and India as well."

Gevers hopes that "these efforts will allow the Academy of Science in South Africa to become a fully participating member of the international community of scientific academies."

Centuries of racism and apartheid have made the Academy's relationship with scientific communities in Africa particularly sensitive. Yet Gevers anticipates rapid progress on this front as well.

"We expect that members of our Academy will soon be able to become members of the African Academy of Sciences too. In addition, we hope that as our Academy gains strength and focus, we will be in a position to develop co-operative pan-African programmes that examine scientific issues of common concern to the continent. We believe that our expanding relationship with TWAS could prove particularly helpful in our efforts to forge individual and institutional partnerships with colleagues and research centres throughout Africa."

The challenges facing the South African Academy of Science may be daunting. Yet, they pale in comparison to the challenges South Africa itself faced when putting an end to apartheid. The successful resolution to what seemed intractable racial and political problems, hardened by deep-seated hatred and violence, offers hope for the future of the Academy as it seeks to find a place for itself both in South Africa's new society and the international scientific community.

That hope is driving Gevers' strategy to make the Academy a respected player in his nation's and the world's overall efforts to create a more equitable and prosperous society. ■



SCIENTIFIC CAPACITY BUILDING IN AFRICA

PARTICIPANTS AT A MEETING IN TRIESTE EXPLORE NEW OPTIONS FOR GETTING AFRICA'S SCIENTIFIC RESEARCH EFFORTS BACK ON TRACK.



The newly created Science Institutes Group (SIG) recently met at the TWNSO secretariat in Trieste, Italy, to discuss ways to increase scientific knowledge in Africa. SIG's ultimate goal is to build centres of excellence for research and training throughout the South.

A planning meeting to explore the possibility of extending the Millennium Science Initiative (MSI) to Africa was held in Trieste, Italy, on 5-6 May. The meeting, organized by the Science Institutes Group (SIG), was hosted by the Third World Network of Scientific Organizations (TWNSO).

"The purpose of the meeting" explains C.N.R. Rao, president of the Third World Academy of Sciences (TWAS) and SIG board member, "was to examine

options for strengthening science and technology in Africa through the MSI."

MSI, launched in 1998 with help from the World Bank, is seeking to promote world-class science and scientific talent, especially in the developing world, through programmes that "foster innovative research and applications of value to the host country or region." Specifically, MSI hopes to help train future generations of scientists and spur efforts to build institutional networks of excellence.

SIG was created in 1999 with assistance from the David and Lucile Packard Foundation. The grant constituted the foundation's first foray into international science programmes. SIG's purpose is to provide "strategic direction" and guidance for MSI.



In addition to Rao, who serves as president of the Jawaharlal Nehru Centre for Advanced Scientific Research in India, other SIG board of directors include Phillip A. Griffiths, chair and director of the Institute for Advanced Studies, USA; Arlen K. Hastings, SIG secretary; François Gros, secrétaire perpétuel (permanent secretary), Académie des Sciences, France; Jacob Palis, TWAS fellow (1991) and director of the Institute of Pure and Applied Mathematics (IMPA), Brazil; and Chung W. Kim, president of the Korea Institute for Advanced Studies (KIAS). Each of their institutions are charter members of the SIG.

“The Millennium Science Initiative,” notes Michael F Crawford, who represented the World Bank at SIG’s Trieste meeting, “began in the late 1990s when Jim Wolfensohn, president of the World Bank and an IAS trustee, was seeking ways for the Bank to become more involved in science and technology capacity building in developing countries.” This new approach was signalled by the publication of the Bank’s 1998-

1999 *World Development* report, which strongly suggested that the Bank was redirecting its corporate strategy from one based on ‘bricks and mortar’ to one based on ‘knowledge.’

“The MSI idea,” notes Crawford, “took off at a 1998 meeting in Chile, where both the Chilean president and the minister of science and technology suggested their nation would be interested in receiving World Bank assistance for programmes designed to increase the scientific knowledge and technical capacity in Chile. The three Mercosur countries — Chile, Brazil and Argentina, with

Chile in the lead — had been discussing how to develop innovative new strategies for advancing science and technology in their countries for some time.

Chile, in fact, became the first nation to join the MSI when it received a small loan from the World Bank “to get the ball rolling.” A larger loan is expected to be issued in the near future. Meanwhile, Venezuela, Argentina, Brazil and Romania have expressed interest in participating in the programme. “The goal,” notes

*“Each country,
no matter how poor,
needs to develop its
own science.”*

Crawford, "is to enable countries to reap the benefits of science and technology.

Under the umbrella of SIG, proponents of the Millennium Science Initiative have now turned their attention to Africa. "Each country, no matter how poor," notes SIG board member Rao, "needs to develop its own science." SIG, he adds, "hopes to serve as a catalyst for building such capacity and knowledge throughout Africa."

All participants at the Trieste meeting agreed that science in Africa over the past two decades has been battered by political turmoil, paltry funding, deteriorating working environments both in universities and research institutes, and the migration of talented African scientists to institutions in the North.

"Yet," as G.B.A. Okelo, secretary-general and executive acting director of the African Academy of Sciences in Nairobi, Kenya, observes, "pockets of scientific excellence exist in Africa despite these trying conditions." He cites the International Livestock Research Institute in Kenya (funded by the Consultative Group for International Agricultural Research), and the International Institute of Tropical Agriculture in Nigeria, as prime examples of institutions that are conducting excellent — and, in a few cases, internationally recognized — research. A critical aspect of the problem, he says, is that these centres remain isolated within Africa. "In fact, they are often more closely tied to institutions beyond Africa's borders."

Keto E. Mshigeni, pro-vice-chancellor of Academic Affairs and Research at the University of Namibia, concurs with this assessment. He notes, for example, that African researchers working in domestic universities and research centres have gained "a great deal of knowledge in the cultivation of mushrooms. If funding for additional research were made available, this knowledge could be shared" and put to use "to develop a valuable agricultural commodity that would boost

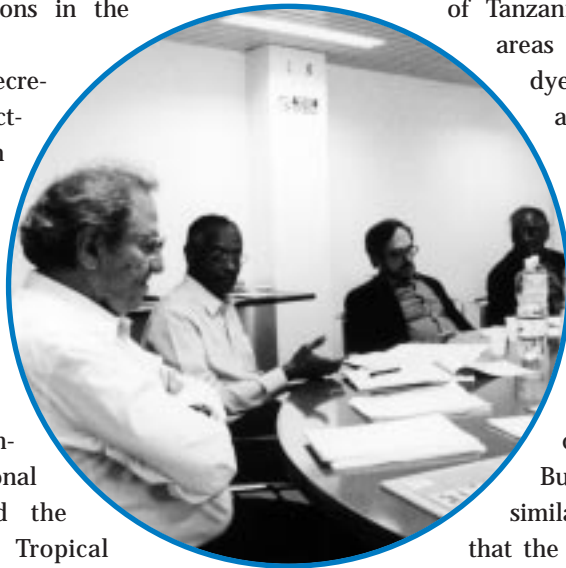
the economy while simultaneously enhancing the region's scientific capacity." Mshigeni asserts that "a similar strategy could be successfully applied to seaweed, berries and algae — all of which have a potential market value of millions of dollars if developed in a scientifically sound way."

A.P. Nanyaro, Director-General of the Tanzania Industrial Research and Development Organization, pointed to his organization's modest track record of success in the application of science and technology as proof that Africa has the potential to "build a strong framework for S&T" if additional assistance is given "to those institutions that are having an impact today despite their limited resources." He cited the work

of Tanzanian research centres in such areas as the production of natural dyes and tannin-based wood adhesives, the conservation of marine resource, and the efficient use of energy as encouraging initiatives worthy of additional financial support (see "Towards Centres of Excellence in Africa," p. 14).

V.P.K. Titanji, professor of chemistry and deputy vice-chancellor of the University of Buea in Cameroon, expressed a similar sentiment when he observed that the biotechnology initiative in his country, launched in 1986, has made modest progress on the research front since then. The effort, he added, has been handicapped "by inadequate funding and an isolated environment that makes it difficult for researchers to keep abreast of the latest advances in the field." Titanji noted that additional funding for Cameroon's biotechnology centres "would help place the effort on more solid ground and increase its chances for sustained success."

Despite examples of modest progress, all participants at the conference agreed that the basic sciences in Africa are in desperate trouble and that efforts to build on existing institutions "may not work" because of the poor state of institutional research and training throughout the continent. As Titanji noted, "virtually all assessments indicate that the state of the basic sci-



ences in Africa is worse today than it was 30 years ago — there are declining numbers of professors producing fewer publications for international journals; abysmal pay and working conditions; and a dearth of top-quality students who often choose to pursue medicine and engineering, instead of math or physics, because the rewards are more substantial and immediate.”

For these reasons, participants agreed it may be necessary to build new centres of excellence in the basic sciences or at least “virtual centres” with independent oversight boards that would monitor the progress of the existing centres as they seek to improve the state of their research and teaching. These institutes, Palis claims, “could stand out like big towers in each country or region.”

But the participants acknowledge that such a strategy won't be easy. Crawford notes that the World Bank, under its “knowledge capacity” initiatives, has “moved away from such complicated, expensive efforts.”

That's why Palis suggests SIG and the participants at the Trieste meeting “consider a two-step strategy,

which, in the near term, would devise a blueprint for upgrading Africa's best research centres, and in the long term would provide support for a few new centres dedicated to basic science.” The latter, Palis maintains, “could ultimately make a big difference for the whole continent.”

The conversation, initiated in Trieste, Italy, will continue in Nairobi, Kenya, this fall when SIG plans to hold a follow-up meeting hosted by the African Academy of Sciences that will seek to turn the concepts outlined during the May planning session into a blueprint for action. ■

For additional information about the Sciences Institutes Group, contact

••• Arlen K. Hastings,

Secretary of the SIG Board, SIG at the Institute for Advanced Study, Einstein Drive, Princeton, NJ 08540, USA, e-mail: sig@ias.edu; fax: +609 683 7605; phone: +609 734 8202, or visit the SIG homepage: www.msi-sig.org.

TOWARDS CENTRES OF EXCELLENCE IN AFRICA

by A.P. Nanyaro

The Tanzania Industrial Development Organization (TIRDO), created in 1979, is a government-sponsored industrial research facility whose modest success has often been obscured by the chronic wave of bad news associated with science and technology in Africa.

Today, TIRDO, with an 80-person staff that includes some 40 scientists and engineers, runs on an annual budget of US\$500,000. Its main areas of activity have been industrial research and technology develop-

ment. Specifically, TIRDO promotes “the use of indigenous raw materials that can be processed with equipment built by local machinists in local workshops.”

Research projects sponsored by TIRDO include the production of natural dyes from mangrove trees; the manufacture of caustic soda from lime deposits; the creation of tannin-based wood adhesives; and the development of blackboard chalk from gypsum deposits.

In addition, TIRDO, working under contract with the Tanzania Electric Supply Company (TANESCO), has surveyed industries throughout the

nation to (1) assess the cost of electricity use in relation to overall production costs, and (2) to revise strategies for improving energy efficiency.

TIRDO also provides services to local industries on instrumentation maintenance and repair (assistance involves calibration and diagnosis of generators, oscilloscopes and semiconductors); chemical analyses of water, minerals, foodstuffs and soils (assistance involves use of spectrophotometres and calorimetres); and material testing (assistance involves radiography, ultrasonic, tensile and magnetic testing).



Despite the success of these worthwhile endeavours, TIRDO's progress has been handicapped by a lack of resources and an insufficient number of trained personnel. In a 1998 proposal that T.K. Mahuly and I prepared, calling for the creation of the International Centre for Industrial Technology and Marine Sciences (ICITEMS), we noted that "although many scientists, engineers, and technologists have been trained in Tanzania since independence, the critical mass needed to spearhead effective scientific and technological development in the country has not yet been realized."

We went on to note that this critical shortfall could be overcome in part by allowing "interrelated institutes to be developed as satellites, which could then be interlinked through physical, computer and telecommunications networks." The networks, in turn, could then "be developed as multidisciplinary centres of excellence."

To advance the strategy outlined in the 1998 report, the Tanzania government has formed the International Centre for Industrial Technology and Marine Sciences (ICITEMS) comprised of TIRDO and the Institute for Marine Studies (IMS). The effort is designed to "establish a focal point for industrial technology and marine research in the country and neighbouring regions," and to build "a national framework for undertaking joint research" that would take full advantage of "the nation's meagre resources."

ICITEMS concentrates on research areas of vital importance to the nation's future well-being, including

energy and the environment, food and biotechnology, information technology and instrumentation, chemical and environmental marine sciences, and marine education and extension development.

In addition to carrying out longstanding responsibilities in industrial research and the marine sciences, ICITEMS has helped co-ordinate the activities of a dozen affiliated centres housed in research facilities and universities throughout Tanzania. Among the centre's most noteworthy accomplishments are the development of the Marine Park on Mafia Island and the completion of a comprehensive survey of the coastal resources around Zanzibar island. The centre has also continued to strengthen its ties with universities in Sweden and Canada, including Uppsala University, Memorial University of Newfoundland and Guelph University, and such international organizations as the Swedish Agency for Research Cooperation (SAREC), the Norwegian Agency for Development Co-operation (NORAD), the Canadian International Development Agency (CIDA), the German Technical Agency (GTZ) and the United Nations Environment Programme (UNEP), International Development Research Centre (IDRC), World Association of Industrial Technological Research Organizations (WAITRO), and the United Nations Industrial Development Organization (UNIDO). Moreover, ICITEMS's industrial research initiatives have attracted interest — and limited funding — from private industry.

Despite such efforts and enthusiastic governmental support, funding

remains sparse (US\$150,000 of ICITEMS' annual US\$500,000 is derived from the government; the rest is generated from international aid agencies, foundations and consultancy work). As a result, facilities are ill-equipped, salaries chronically low; and the prospects for future improvement suspect at best.

To bring ICITEMS' infrastructure up to international standards, in our 1998 proposal we estimated that it would cost several million dollars for equipment upgrades and replacements and several million dollars more for building construction and maintenance.

ICITEMS has clearly come a long way since its inception in 1994. But, just as clearly, it still has a long way to go — and it will need a great deal of help from both domestic and external sources — to reach its ultimate destination.

In many ways, the centre's experience offers hope that Africa will be able to build its own science and technology infrastructure. But, as the ICITEMS experience also shows, transforming that hope into reality will require patience, resources and political determination from all those concerned about Africa's future.

For additional information about TIRDO, contact
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TWOWS RECEIVES SIDA-SAREC GRANT

ADDITIONAL FUNDING WILL ALLOW TWOWS TO EXPAND ITS EFFORTS TO ASSIST YOUNG WOMEN SCIENTISTS IN THE WORLD'S POOREST NATIONS.

The Department of Research Cooperation (SAREC) of the Swedish International Development Cooperation Agency (Sida) has awarded the Third World Organization for Women in Science (TWOWS) a three-year, US\$285,000 grant designed to assist young women scientists in sub-Saharan Africa and the world's least developed nations to pursue post-graduate training at universities and research centres in the developing world. The "fellowship" grant is a follow-up to the \$150,000 grant awarded to TWOWS in 1998-1999.

"We are delighted that Sida-SAREC has agreed both to extend and expand funding for this programme," notes Lydia Makhubu, President of TWOWS. "We can think of no better confirmation of the positive impacts that the previous grant has had on higher education and scientific research in the sub-Saharan Africa."

"More importantly," Makhubu says, "the grant will allow us to continue to provide critical help to young African women scientists seeking doctorate degrees under trying conditions. In fact, the grant will enable many of the recipients to complete their education and receive doctorate degrees instead of having to cut their education short after earning their masters."

"Sida-SAREC is pleased with the initial progress of the programme," says Cecilia Scharp, who is responsible for overseeing the programme for the Swedish development assistance and capacity building organization. "Attaining a doctorate takes time.

That's why a portion of the additional funding will be used to continue grants already in place and a portion will be used to fund new applicants."

"The two features of this programme that make it particularly valuable," Scharp adds, "are its long-term investment strategy and the fact that the training will take place in the South. The first factor makes it more likely that students will complete their educational training; the second makes it more likely that they will remain in a developing country after receiving their degree, hopefully in their native countries."

In the initial grant cycle between 1998 and 1999, some 25 students received grants. In the next grant cycle, to take place between 2000 and 2001, an additional 29 students have been added to the awards' list. The grants cover travel expenses to the host country and provide stipends for daily living expenses during the time of study, which can continue for up to three years. Meanwhile, host institutions agree to waive tuition and research fees, and, if possible, to provide free accommodation. Only female students from sub-Saharan Africa and the least developed countries (LDCs) are eligible to apply.

"An applicant," Scharp notes, "can either be a full-time student at an institution outside her country or register as a Ph.D. student in a university in her country and then pursue a portion of her research at another institution in the South under a 'sandwich programme.' In the latter case, a student

will ultimately be required to receive her doctorate degree from her home-country institution.”

Institutions that hosted students in 1998-1999 include the University of Witwatersrand, Department of Physiology in Johannesburg, South Africa (which hosted a student from Cameroon); the India Institute of Technology, Department of Chemistry (which hosted a student from Nigeria); the University of Karachi, H.E.J. Institute of Chemistry (which hosted a student from Sierra Leone); and Rhodes University, Department of Ichthyology and Fisheries Science, South Africa (which hosted a student from Uganda).

Institutions invited to host the next round of grants include the International Rice Research Institute, Plant Molecular Biology Laboratory, and the University of Philippines, Plant Breeding, Genetics and Biochemistry Division, Los Banos, Philippines (which will jointly host a student from Bangladesh); the International Center for Agricultural Research in Dry Areas, Aleppo, Syria (which will host a student from Ethiopia); the International Livestock Research Institute in Addis Ababa,

Ethiopia (which will host a student from Kenya); and the Institute of Computer Technology, Sri Lanka (which will host a student from Myanmar).

“The primary goal of the grant programme,” notes Scharp, “is to help women scientists from some of the world’s poorest nations attain their doctorates and pursue productive careers in science in their home countries. The programme, however, has the added benefit of increasing the diversity of universities and research institutes in the South. Both goals will help strengthen the foundation for science-based development throughout the developing world.” ■

For additional information about the programme, contact

❖❖❖ **Leena Mungapen**

Third World Organization for Women in Science (TWOWS), c/o ICTP, Strada Costiera 11, 34014 Trieste, Italy; phone: +39 040 2240321; fax: +39 040 224559; e-mail: info@twows.org.

The deadline for the next round of applications is 15 September 2000.

GOAT BUSTERS

TWOWS FELLOWSHIP STUDENT HOPES SCIENCE CAN BOOST VALUE OF KEY COMMODITIES IN HER NATIVE ZIMBABWE

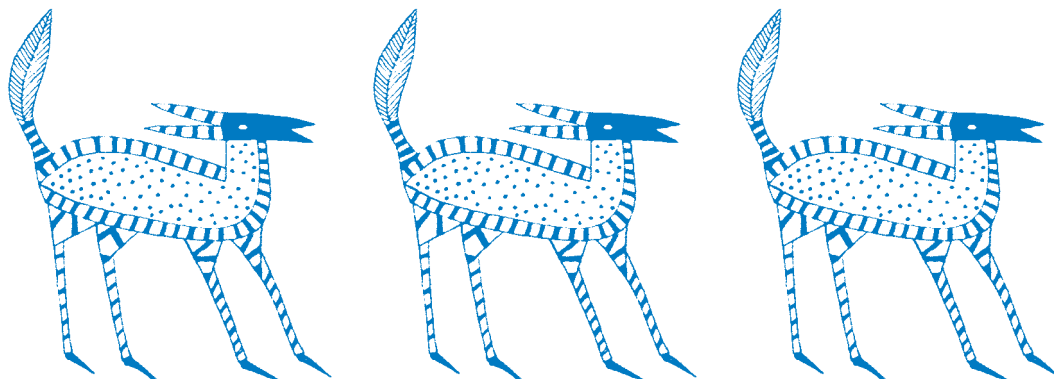
In 1996, Zimbabwe-born Langelihle Simela received her masters degree from the University of Zimbabwe in the nation’s capital city Harare. Although she was a top student in her university and wanted to continue her education to attain a doctorate in animal science, the prospects for reaching that goal were bleak. “I simply didn’t have enough money to pursue my education. I thought my master’s degree could well be my final degree and that I would find work in a university or con-

sultancy firm — perhaps as an assistant researcher or project coordinator. In fact, that’s exactly the kind of work I did at the University of Zimbabwe and an agricultural consultant company for two years after receiving my undergraduate degree.”

Today, Simela is on her way to earning a doctorate at the University of Pretoria in South Africa, where she is a Third World Organization for Women in Science (TWOWS) “fellowship” student in the Department of Animal and Wildlife Sciences. The



Langelihle Simela



focus of her research is the development of technologies designed to improve the quality and marketability of goat meat.

“My studies,” she recently observed, “combine science and economics in ways that I hope will increase the value of a commodity that is plentiful but historically undervalued in the marketplace. The results could have implications not only for Zimbabwe but many other developing nations with large populations of goats.”

Her dissertation, which Simela plans to complete over the next two years, examines the scientific parameters that may be used in determining chilling and storage regimes for goat carcasses. The ultimate goal is to make goat meat more marketable by improving its appearance and extending its shelf life through agreed-upon mechanisms that enable livestock farmers, meat processors and retailers to rely on quality science-based standards that the public can trust.

“Many of the research initiatives being pursued by our fellowship recipients have been applied in their

orientation,” says Lydia Makhubu “One student, for example, is investigating the causes of hypertension — both genetic and environmental — among women in South Africa. Another is exploring ways to improve water resource management in Lake Chilwa in Malawi. Still another is examining the prospects for applications of solar energy in Tanzania.”

“Yet, what’s important about these research exercises is not whether they lead to technological breakthroughs,” declares Makhubu, “but the growth in intellectual capacity and problem-solving ability that takes place among students during their studies and laboratory experiments. The legacies created by such experiences will not only help the young women who participate in the programme; it will also enhance the learning environment of the institutions hosting these efforts and boost the technical expertise of the villages, regions and nations in which these young women choose to live for decades to come.”

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TWAS



THE ACADEMY'S NEWEST MEMBERS

IN 1999, 31 FELLOWS AND 4 ASSOCIATE FELLOWS HAVE BEEN ELECTED AS MEMBERS OF THE THIRD WORLD ACADEMY OF SCIENCES (TWAS). THAT BRINGS THE TOTAL NUMBER OF TWAS MEMBERS TO 546. BELOW ARE NAMES AND INSTITUTIONAL AFFILIATION OF THE ACADEMY'S NEWEST MEMBERS.

TWAS FELLOWS 1999

- Samir F. Atweh, Chairman, Department of Internal Medicine, American University of Beirut, Lebanon
- Francisco Bolívar-Zapata, Instituto de Biotecnología, Universidad Nacional Autónoma de México (UNAM), Morelos, Mexico
- Ana Maria Cetto Kramis, Consultant, UNESCO, Paris, France and Instituto de Física, Universidad Nacional Autónoma de México (UNAM), Mexico City, Mexico
- Srinivasan Chandrasekaran, Chairman, Department of Organic Chemistry, Indian Institute of Science, Bangalore, India
- Eduardo H. Charreau, Instituto de Biología y Medicina Experimental, Buenos Aires, Argentina
- Chen Yun-tai, Director, Institute of Geophysics, China Seismological Bureau, Beijing, China
- Chen Zhu, Shanghai, China
- Shashikumar M. Chitre, Department of Astronomy & Astrophysics, Tata Institute of Fundamental Research, Mumbai, India
- Sushanta Dattagupta, Director, S.N. Bose National Centre for Basic Sciences, Calcutta, India
- Koussay Dellagi, Director General, Institut Pasteur de Tunis, Tunisia
- Carlos Augusto Di Prisco, Instituto Venezolano de Investigaciones Científicas, Departamento de Matemáticas, Caracas, Venezuela
- Dong Shaojun, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, China
- René Favaloro, Fundación Favaloro, Buenos Aires, Argentina
- Avílio A. Franco, EMBRAPA-Agrobiologia, Seropédica RJ, Brazil
- Otto Richard Gottlieb, Departamento de Fisiología e Farmacodinâmica, Instituto Oswaldo Cruz, FIOCRUZ, Rio de Janeiro RJ, Brazil
- Guo Jing Kun, Director, Shanghai Research Center on Advanced Materials, Shanghai, China
- Mashooda Hasan, Department of Chemistry, Quaid-i-Azam University, Islamabad, Pakistan
- Seyed E. Hasnain, Director, Centre for DNA Fingerprinting & Diagnostics (CDFD), Hyderabad, India

[CONTINUED PAGE 21]



- Reuben Jih-Ru Hwu, Institute of Chemistry, Academia Sinica, Taipei, Taiwan
- M. Shamim Jairajpuri, Vice-Chancellor, Maulana Azad National Urdu University, Hyderabad, India
- Sudhanshu S. Jha, Director, Tata Institute of Fundamental Research (TIFR), Mumbai, India
- Ricardo M. Lantican, Department of Agronomy, UPLB College, Laguna, Philippines
- Li Yiyi, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China
- Lin Qun, Institute of Systems Science, Chinese Academy of Sciences, Beijing, China
- Ahmadou L. Ndiaye, Rector, Université Gaston Berger, Saint-Louis, Senegal
- Nguyen Van Dao, President, Vietnam National University, Hanoi, Vietnam
- Thavamani J. Pandian, School of Biological Sciences, Madurai Kamaraj University, Madurai, India
- Palle Rama Rao, Chairman, Atomic Energy Regulatory Board (AERB), Mumbai, India
- Maurice Tchente, Rector, Université de Dschang, Faculté des Sciences, Département d'Informatique, Dschang, Cameroon
- Marcelo M. Viana da Silva, Instituto de Matematica Pura e Aplicada (IMPA), Rio de Janeiro RJ, Brazil
- Wang Zhi-Xin, Institute of Biophysics, Academia Sinica, Beijing, China

TWAS ASSOCIATE FELLOWS 1999

- Louise N. Johnson, Head, Laboratory of Molecular Biophysics, Department of Biochemistry, University of Oxford, Oxford, United Kingdom
- David A. King, Department of Chemistry, University of Cambridge, Cambridge, United Kingdom
- David D. Sabatini, New York University School of Medicine, Department of Cell Biology, New York NY, USA
- Daniel C. Tsui, Department of Electrical Engineering, Princeton University, Princeton NJ, USA

For a detailed description of their scientific accomplishments and contributions, see
❖ <http://www.twas-online.org/Elected99.html>



PEOPLE, PLACES, EVENTS

CARLOS CHAGAS 1919-2000

- TWAS Founding Fellow **Carlos Chagas Filho** died earlier this year after a long illness. Chagas, one of Latin America's most accomplished and honoured scientists, was born in Rio de Janeiro and educated in Brazil and France. In 1945, soon after receiving his doctorate, he founded the Institute of Biophysics at the Federal University of Rio de Janeiro, and then served as the institute's director for the next 20 years. Under Chagas's leadership, the institute emerged as one of the most respected scientific research facilities in the developing world — a centre of excellence that served as a model for others. In appreciation of his endless contributions, the



Carlos Chagas Filho

institute has been named in his honour. Chagas served as President of the Brazilian Academy of Sciences from 1964-1966; Brazil's Ambassador to the United Nations Educational, Scientific and Cultural Organization (UNESCO) from 1966-1970; President of the Pontifical Academy of Sciences from 1972-1988; and President of the Latin American Academy of Sciences from 1982-1991. His many awards included honours from Belgium, Canada, Chile, France, Portugal, Spain, the United States, and, of course, his native country, Brazil. Chagas was also Vice President of TWAS from 1985-

1991. In addition to biophysics, his major research fields encompassed cytology, pharmaco-chemistry and pharmaco-physics. In 1997, Chagas was bestowed the honour of Patron of TWAS' 9th General Meeting, held in Rio de Janeiro. In what was to be his final appearance before Academy members. Chagas observed that "TWAS' role in stimulating scientific research knows no bounds." Yet, he also noted, "the Academy must now shoulder an added responsibility... to preserve the cultures of individual nations in light of the levelling power of technology and global communication." He urged "each nation in the developing world to continue to build its own national scientific infrastructure... in ways that not only enhance science but protect each nation's historic identity and culture." With the vigorous participation of TWAS, Chagas expressed confidence "that scientific progress and cultural preservation would emerge as compatible — indeed complementary — goals in the 21st century." It was a fitting description not only of the Academy he helped to create, but of his own unique contributions to science and society.

NEW HEALTH AWARDS

- The Rockefeller Foundation has announced that it is sponsoring a new international awards scheme to support cooperation in health research development. The scheme will provide 10 grants, each totalling about US\$250,000, to regional and national partnerships that seek to strengthen health research agendas, increase awareness of the importance of health research among stakeholders, promote ethical practices, improve

communication and dissemination of research results, refine methods for evaluating the impact of research, or enhance management capacities for research. Applications are invited from institutions in Africa, Latin America, the Caribbean, south and southeast Asia, China, the Pacific islands, Middle East, and eastern and central Europe. Award winners will be announced at the International Conference on Health Research for Development to be held in Bangkok, Thailand, in October. For additional information, contact the Awards Selection Council Secretariat, c/o the College of Public Health, Chulalongkorn University, Phya Thai Road, Bangkok, 10332 Thailand; fax: 4122 7914169; e-mail: ihrreach@hotmail.com; internet: www.rreach.ch.

ATTA-UR-RAHMAN MINISTER

- **Atta-ur-Rahman** (TWAS Fellow 1985) has been appointed Minister of Science and Technology in Pakistan, with lead responsibility for designing and overseeing the nation's science and technology policies. During his decade-long tenure as director of the H.E.J. Research Institute of Chemistry in Karachi, Pakistan, the institute became one of the most prestigious in the developing world. During his five-year tenure as coordinator general of COMSTECH (ministerial standing committee on scientific and technical cooperation for the Organization of Islamic Conference {OIC}), the committee emerged as one of the most influential voices for the advancement of science and technology in the Islamic world. Atta-ur-Rahman was educated at the University of Karachi in



Atta-ur-Rahman



Pakistan and King's College in the United Kingdom. He serves on numerous editorial boards, including *Current Medicinal Chemistry*, *Studies in Natural Chemistry*, and *Combinatorial Chemistry and High Throughput Screening*, and he is the recipient of many awards, including the UNESCO Science Prize, TWAS Medal Lecture, Kuwait Foundation for the Advancement of Sciences' Islamic Organization Prize for Science, and Pakistan Academy of Sciences Gold Medal and Award. Atta-ur-Rahman's major fields of research include synthesis of bioactive natural products, studies of marine and terrestrial natural products, and nuclear magnetic resonance spectroscopy.

IFS GRANTS

- The International Foundation for Science (IFS), a non-governmental organization founded in 1972 and headquartered in Stockholm, Sweden, supports young scientists in developing countries by awarding research grants and providing grantees with additional services such as travel grants. Research grants are awarded to a maximum of US\$12,000 for 1 to 3 years and may be renewed twice. These grants are intended to be used for the purchase of equipment, expendable supplies and literature.

Applicants must be citizens of and carry out research in a developing country. They also should work at a university or national research institution in a developing country (countries in Europe, including Turkey and Cyprus, or the former Soviet Union, as well as Argentina and Uruguay do not qualify for support). In addition to being under 40 (under 30 for applicants from China) and at the start of their research careers, candidates must have an academic degree that should be at least an MSc or equivalent. IFS supports projects dealing with the management, use and conservation of biological resources. The foundation organizes its activities into six research areas: animal production, aquatic resources, crop science, food science, forestry/agroforestry and natural products. For additional information and an application form in English and French write to — IFS, Grev Turegatan 19, S-114 38 Stockholm, Sweden, fax: + 46 8 54581801; e-mail: info@ifs.se; web address: www.ifs.se.

C.N. RAO HONOURED

- **C.N. Rao** (TWAS Founding Fellow), Holder of the Eberly Family Chair in Statistics and Director of the Center for Multivariate Analysis at Pennsylvania State University (USA), has been honoured by the government of India as the namesake of a national award to be presented to the country's most outstanding young statisticians. India's Department of Statistics and Program Implementation, under the federal Ministry of Planning, created the awards in memory of P.V. Sukhatme and in honour of C.R. Rao, two of India's

most renowned statisticians. The National Award in honour of C.R. Rao, given every other year, recognizes outstanding work conducted during the preceding three years in any field of statistics. Rao, who was born in India and educated in India and the United Kingdom, is one of



C.N. Rao

the world's foremost mathematicians and statisticians. His contributions to mathematics and to statistical theory and applications have become part of graduate courses in statistics, econometrics and electrical engineering throughout the world. He is a fellow of the Royal Society (U.K.) and Indian National Science Academy, Indian Academy of Sciences and National Academy of Sciences, India; a member of the U.S. National Academy; foreign member of the Lithuanian Academy of Sciences; and honorary fellow of the American Academy of Arts and Sciences. Rao's major fields of research include linear algebra, theory of estimation and multivariate analysis.

WHAT'S TWAS?

THE THIRD WORLD ACADEMY OF SCIENCES (TWAS) IS AN AUTONOMOUS INTERNATIONAL ORGANIZATION THAT PROMOTES SCIENTIFIC CAPACITY AND EXCELLENCE IN THE SOUTH. FOUNDED IN 1983 BY A GROUP OF EMINENT SCIENTISTS UNDER THE LEADERSHIP OF THE LATE NOBEL LAUREATE ABDUS SALAM OF PAKISTAN, TWAS WAS OFFICIALLY LAUNCHED IN TRIESTE, ITALY, IN 1985 BY THE SECRETARY GENERAL OF THE UNITED NATIONS.

At present, TWAS has 545 members from 77 countries, 63 of which are developing countries. A Council of 13 members is responsible for supervising all Academy affairs. It is assisted in the administration and coordination of programmes by a small secretariat of 9 persons, headed by the Executive Director. The secretariat is located on the premises of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. UNESCO is responsible for the administration of TWAS funds and staff. A major portion of TWAS funding is provided by the Ministry of Foreign Affairs of Italy.

The main objectives of TWAS are to:

- Recognize, support and promote excellence in scientific research in the South.
- Provide promising scientists in the South with research facilities necessary for the advancement of their work.
- Facilitate contacts between individual scientists and institutions in the South.
- Encourage South-North cooperation between individuals and centres of scholarship.

TWAS was instrumental in the establishment in 1988 of the Third World Network of Scientific Organizations (TWNISO), a non-governmental alliance of 155 scientific organizations from Third World countries, whose goal is to assist in building political and scientific leadership for science-based economic development in the South and to promote sustainable development through broad-based partnerships in science and technology.

TWAS also played a key role in the establishment of the Third World Organization for Women in Science (TWOWS), which was officially launched in Cairo in 1993. TWOWS has a membership of more than 2000 women scientists from 87 Third World countries. Its main objectives are to promote the research efforts and training opportunities of women scientists in the Third World and to strengthen their role in the decision-making and development processes. The secretariat of TWOWS is currently hosted and assisted by TWAS.

WANT TO KNOW MORE?

TWAS offers scientists in the Third World a variety of grants and fellowships. To find out more about these opportunities, check out the TWAS web-pages! Our main page is at: www.twas-online.org

FELLOWSHIPS

Want to spend some time at a research institution in another developing country? Investigate the South-South Fellowships: www.twas-online.org/SS-fellowships_form.html

GRANTS

Need funding for your research project? Take a look at the TWAS Research Grants: www.twas-online.org/RG_form.html TWNSO runs a similar scheme, for projects carried out in collaboration with institutions in other countries in the South: www.twanso.org

EQUIPMENT

But that's not all TWAS has to offer. For instance, do you need a minor spare part for some of your laboratory equipment, no big deal, really, but you just can't get it anywhere locally? Well, TWAS can help: www.twas-online.org/SP_form.html

TRAVEL

Would you like to invite an eminent scholar to your institution, but need funding for his/her travel? Examine these pages, then: www.twas-online.org/Lect_form.html www.twas-online.org/Prof.html

CONFERENCES

You're organizing a scientific conference and would like to involve young scientists from the region? You may find what you are looking for here: www.twas-online.org/SM_form.html