

TWAS Newsletter



PUBLISHED WITH THE SUPPORT
OF THE KUWAIT FOUNDATION
FOR THE ADVANCEMENT
OF SCIENCES

The Newsletter of the
Third World Academy of Sciences

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The African Academy of Sciences (AAS) held its 5th General Conference at Hammamet, Tunisia, between 23-27 April 1999. The Conference's title, "The Millennial Perspective of African Science, Technology and Development, And Its Possible Direction Towards the 21st Century," both echoed the themes of the upcoming World Conference on Science in Budapest and provided key signposts for the future of science in Africa. How? By pointing to science and technology as critical pathways to development.

After serving as President-Elect of the Academy for the past three years, I assumed the position of Academy President at the Tunis Conference. I have been humbled by the membership's decision. It

African Academy of Sciences

is indeed an honour and privilege to follow in the

footsteps of Thomas Odhiambo who served as the Academy's President for the past 18 years. I hope that I am worthy of the members' expression of confidence in me.

As everyone who reads the newspapers or listens to television knows, Africa has faced difficult times over the past decade. As the Tunis Declaration, which was issued at the conclusion of the conference, states, countries in Africa have yet "to transform their political pledges into feasible and manageable science-led development programmes." Such shortcomings have not only meant that Africa has fallen farther behind other continents in the effective use of science and technology but, even more disturbingly, has faced "recurring threats" to its food security, public health and environmental well-being.

The Tunis Declaration also expresses a clear strategy for progress anchored onto two fundamental principles: to elevate the status of science as a tool for promoting Africa's national development programmes, and to ensure that science operates affirmatively and favourably towards achieving socio-economic growth.

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TWAS NEWSLETTER

PUBLISHED QUARTERLY WITH
THE SUPPORT OF THE KUWAIT
FOUNDATION FOR THE
ADVANCEMENT OF SCIENCES (KFAS)

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With this in mind, I have outlined three major objectives during my tenure as President. First, I would like to increase the visibility of the Academy through greater interactions with research centres, universities, the press and public that would help highlight the work and impact of its members. Second, I would like to launch a membership drive that ensures Africa's best scientists gain entrance into the Academy. Third, I would like to expand the Academy's financial base through appeals for support to African governments and international foundations and aid agencies. Such initiatives, if successful, would form an integrated strategy for success based on excellence, relevance, visibility and resources.

In addition, most observers agree that African scientists would benefit greatly from greater communication with colleagues in both the South and North. I hope to help foster such communication through my twin posts as TWAS Executive Director and now AAS President. But it is also important to note that scientists elsewhere would benefit from greater communication with African scientists who have built a storehouse of knowledge concerning science and technology issues in their own countries and regions. That is why reinvigorating science and technology in Africa should not just be a concern of Africa but of the global scientific community as well.

✦ Mohamed H.A. Hassan
TWAS Executive Director

EDITOR'S NOTE

The basic sciences—biology, chemistry, mathematics and physics—provide a fundamental understanding of natural phenomena and the process by which natural resources are transformed. In the Third World, development-oriented research and higher education in the basic sciences have received but a negligible share of total available resources from domestic and foreign resources. One unforeseen consequence of this situation has been that the indigenous base for education and technology has remained precariously weak. Another has been that the scientific communities of the recipient nations have had a limited influence on the kind of research being carried out within their own countries.

That was the assessment of the International Conference on Donor Support to Development-Oriented Research in the Basic Sciences held at Uppsala University in Sweden, in 1995. As a follow-up to that meeting, a conference on basic science for development in eastern and southern Africa was held 1-3 March 1999 in Arusha, Tanzania. Delegates from 12 countries were present—Botswana, Malawi, Mozambique, Namibia, Rwanda, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

Discussions centred on two considerations. First, that “science and its application are major factors for socioeconomic development in the subregion and that the future of the development of any one nation in the subregion is more intricately dependent on the generation, dissemination and effective use of scientific knowledge than any other development factor.” And, second, “improving the status of the basic sciences in the subregion...lies individually and collectively with the countries in the subregion.”

For these reasons, delegates recommended that their national governments and international partners:

- Initiate and promote science popularisation programmes aimed at nurturing a culture of science, largely through improvements in education at all levels.
- Emphasise the importance of basic research in national science and technology policies and, more importantly, take the necessary steps to ensure that 1 percent of a nation's annual gross domestic product (GDP) is invested in science and technology for development within the next decade.
- Enhance coordination among nations of eastern and southern Africa to guarantee the efficient use of the region's existing scientific capabilities, particularly through measures to expand exchange programmes. The region, delegates contended, should take full advantage of the new information technologies that offer unprecedented opportunities for the sharing of knowledge and data.

Conference organizers—Tanzania's Ministry of Science, Technology and Higher Education and Commission for Science and Technology, TWAS, and Uppsala University's International Science Programme—will jointly serve as the interim secretariat for post-conference initiatives. The secretariat plans to pursue two major activities: document and disseminate information about the current status of the basic sciences in each of the nations participating in the conference, and systematically assess the progress that has been made in bolstering the fields of biology, chemistry, mathematics and physics at biannual get-togethers held for that purpose. ■

For additional information about the conference and the interim secretariat's future activities, please contact: ❖ Dr. Yadon M. Kohi, Director General, Tanzania Commission for Science and Technology, Dar es Salaam, Tanzania, phone: 255 51 700750, fax: 255 51 75313, e-mail: ykohi@hotmail.com and Costech@costech.gn.apc.org.

BASIC SCIENCES

SCIENCE IN AFRICA

Five experts discuss the prospects for linking science and technology in Africa to long-range plans for economic and social development.



AS TWAS FOUNDING FELLOW AND VICE PRESIDENT THOMAS R. ODHIAMBO OBSERVES, "AFRICAN NATIONS SIMPLY DO NOT HAVE ENOUGH SKILLED RESEARCHERS AND TECHNOLOGISTS TO MEET THE CHALLENGES THAT THEY NOW FACE." HE ADDS THAT "THE SHORTFALL IN SKILLED PERSONNEL APPLIES TO ALL COUNTRIES IN ALL REGIONS AND IS A CRITICAL FACTOR BEHIND THE CONTINENT'S INABILITY TO DEVELOP A STRATEGY FOR SUSTAINABLE ECONOMIC GROWTH."

Odhiambo's assessment was echoed by a host of experts interviewed by the editor of the *TWAS Newsletter* to examine the state of science and technology in Africa today.

As Sam Momah, the Nigerian Federal Minister of Science and Technology notes, "The future is bright for advances in science and technology in Africa, but only if we educate and train enough skilled researchers and technicians with the know-how to take advantage of our vast storehouse of natural resources."

A similar sentiment was conveyed by Pius Yasebasi Ng'wandu, the Tanzanian Minister of Science, Technology and Higher Education. "To establish a strong foundation for scientific and technological progress in Africa," he asserts, "we must focus our concerns—at least initially—on teachers and students. That's because if we hope to succeed in today's global environment, we must nurture a critical mass of skilled workers who are well versed in issues related to science and technology."

Odhiambo acknowledges that "Some African nations are better off than others. For example, Egypt and South Africa have established international reputations in several different scientific disciplines—Egypt in physics and desertification research, and South Africa in mineral and mining studies.

However, other countries—for example, Ethiopia and the Central African Republic—continue to fare miserably in international comparisons of scientific and technological capabilities. As a result, they have fallen farther behind in our rapidly advancing world where science and technology reign supreme."

A chronic shortfall in skilled personnel throughout Africa, particularly in fields related to science and technology, is another crit-



ical issue raised by Odhiambo, Momah and Ng'wandu. The issue has received a great deal of attention in science and policy journals across the globe. The more critical question is what can be done about it. Here again, those interviewed express a remarkable degree of consensus.

Odhiambo, for example, asserts that governmental activism was a critical factor behind the success that some African nations have achieved in the promotion of science and technology. "Several years ago," he observes, "the government of South Africa launched a systematic programme for the development of science, which it placed largely under the direction of the Foundation for Research Development."

Odhiambo also points to other African governments that recently have invested in science and technology initiatives to establish expertise in selected areas that they hope will attract both investors and consumers from beyond their borders. "Less than a decade ago," he contends, "the government of Mauritius, a small island nation in the Indian Ocean off the coast of Madagascar, decided it could no longer depend on sugar cane and livestock for

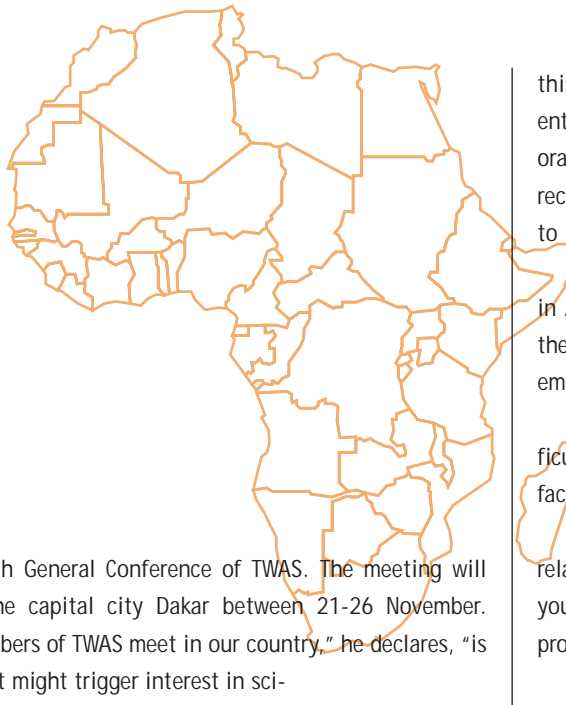
its economic well being. As a result, it designed a two-pronged strategy, conceived and financed largely by the central government, to promote information technologies on the one hand and financial services on the other. The result is that Mauritius has emerged as a leading African nation in these fields."

Although a critical factor, governmental activism does not guarantee that rapid advances in science and technology will take place. In fact, such initiatives on their own could lead to wasteful expenditures unless several other factors come into play. As

Benjamin Ntim, UNESCO-South Africa Regional Science and Technology Advisor, declares, "the issue is more than money, however important it may be. African nations must popularize science so that young people become eager to pursue careers in biology, chemistry, mathematics and physics."

One way to make headway in this effort is to hold conferences that attract internationally renowned scientists. That is why Balla Moussa Daffe, Senegal's Minister of Scientific Research and Technology, is so enthusiastic about his nation's decision to host

African nations must popularize science so that young people become eager to pursue careers in biology, chemistry, mathematics and physics.



the upcoming 7th General Conference of TWAS. The meeting will take place in the capital city Dakar between 21-26 November. "Having the members of TWAS meet in our country," he declares, "is critical because it might trigger interest in science among our general population, particularly among our young people."

Daffe contends that the meeting should also prove important for another reason. "It will afford our scientists the opportunity to meet prominent colleagues from both the North and South. Interactions during the conference could lead to lasting relationships that foster scientific cooperation long after the conference ends. Such relationships are bound to prove beneficial to the work of our scientists and helpful to their colleagues from other countries."

Finally, Daffe contends that "the conference could provide a "kick" for both Senegalese scientists and policy makers by showing the enormous gaps in scientific and technological capabilities existing between the developed and developing worlds. Such a concrete demonstration of these gaps could help instigate a change in thinking. That, in turn, could spur the creation of sustainable programmes for scientific and technological development, not only in Senegal but throughout the continent."

In fact, those interviewed considered a change in mindset—call it a policy paradigm shift—as a critical prerequisite for success. Such a shift, they contend, must not only take place among Africa's policy makers but among the continent's scientific researchers.

Odhiambo describes his position this way: "We must allow our problems to drive our research." Daffe casts the argument in similar terms by maintaining that "we must bring basic and applied research together to address specific problems." Ng'wandu places

this perspective in its most dramatic light when he argues that scientists "should gauge success not by what happens inside the laboratory but what happens outside it, and not by the accolades one receives from one's colleagues but by the contributions one makes to society."

If rapid advances in science and technology are to take place in Africa, nations throughout the continent must be responsive to the needs of their scientists as well. That means providing steady employment with reasonable pay and good working conditions.

Momah draws on his own family experience to highlight the difficulties that African universities and scientific research centres face in attracting and keeping top-rated students.

"My two daughters both have aptitudes in science," Momah relates. "Yet, my eldest daughter went into finance and my youngest daughter became a pharmacist. When I ask them what prompted their career paths, their answers are simple: We can make more money with less hassles."

"The fact is," Momah adds, "that we must find ways to make careers in science more attractive to our young people. If we don't, our overall strategies to advance science and technology in Africa are doomed to fail. We simply won't have enough skilled personnel to reach our goals."

"One way to improve working conditions for scientists in Africa," asserts Daffe, "is to develop information technologies. That's the only way African scientists will be able to keep

pace with the most current research findings in their fields. These technologies offer us great opportunities. At the same time, they pose great risks because if we fail to participate fully in the rapid advances in electronic communications, we will only fall farther behind in our science and technological capabilities."

"Another way for science and technological improvements to take place," says Ntim, "is through the continual expansion of scientific networks in the South, like those promoted by TWAS. There is a great deal of variety both in scientific know-how and the quality of the research infrastructure from one country to the next throughout the developing world. As a result, we can all learn a great deal from each another."

"Take the region I am most familiar with—southern Africa. Parts of the Republic of South Africa enjoy an infrastructure that is comparable in quality to the infrastructure found in the North. Yet, the legacy of apartheid means that only a small portion of the population has benefited from the nation's large investments in science

If rapid advances in science and technology are to take place in Africa, nations throughout the continent must be responsive to the needs of their scientists.

and technology. Historically, a majority of South Africans have been denied the education and training that they need to succeed in today's world. On the other hand, nations like Botswana and Namibia, with weak infrastructures, have devised effective strategies for mass schooling. South Africa could learn a great deal from their experience in educational reform."

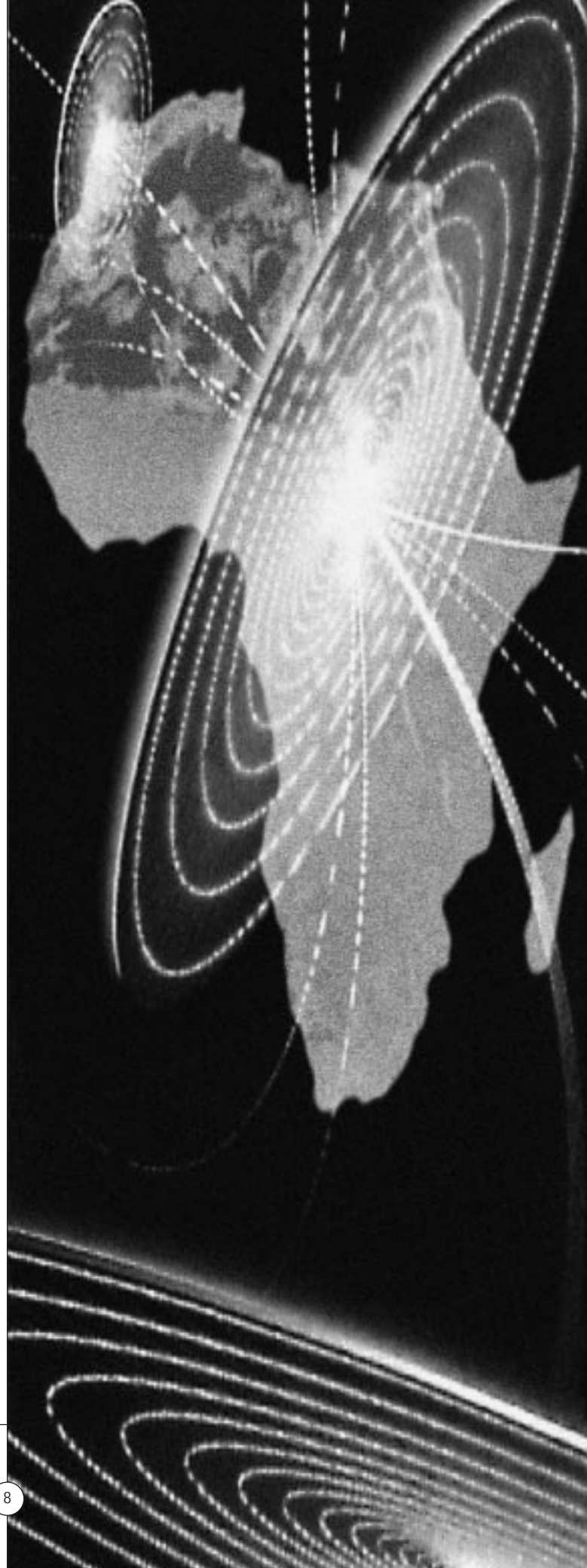
Finally, those interviewed pointed to one final indispensable ingredient that must be present for advances in science and technology to take place: political stability. That ingredient complements—indeed serves as a prerequisite for—the governmental activism that Odhiambo cited earlier as the most critical factor in the development of an effective science and technology policy.

It should be no surprise that science, which depends upon the free exchange of information, is one of the most vulnerable victims of political conflict. Two recent examples prove this point. The civil war in Mozambique, which just ended, and the civil war in Angola, which still continues, have made it impossible for either nation to advance an agenda for scientific and technological progress.

In the short term, each of these nations has been devastated by the violence and destruction that has accompanied the war. In the long term, their prospects are equally bleak because both have been forced to neglect programmes for education, training and infrastructure development that must be put in place now if they have any hope of economic and social progress in the future. As Ntim points out, "Unfortunately, they are not the only countries. Other African countries, including Ethiopia, Eritrea, Rwanda and the Central African Republic, also have been wracked by war."

Thus these experts present an ambitious agenda for science and technology in Africa, requiring support from governmental officials, educators, entrepreneurs and scientists—as well as the general population.

If the effort is to succeed, everyone must participate. And perhaps that's the way it should be. After all, if the lofty goals that these experts have outlined are to be reached, both current and future generations will benefit from the policies and programmes that are launched today in the name of science and technology. ■



Among his many responsibilities as a researcher, teacher and administrator, Nobel Laureate Werner Arber (*Medicine and Physiology 1978*) is currently the President of the International Council for Science (ICSU), one of the world's foremost scientific organizations dedicated to the promotion of interdisciplinary research. Arber recently sat down with the Editor of the TWAS Newsletter to discuss a variety of issues, including the challenges facing his organization on the eve of the World Conference on Science, which ICSU is co-sponsoring with the United Nations Educational, Scientific and Cultural Organization (UNESCO). The conference will take place in Budapest, Hungary 26 June-1 July 1999. What follows is an excerpt of the hour-long interview.

What is the International Council for Science (ICSU)?

ICSU is a worldwide organization comprised of scientific associations in the field of natural sciences. As a European, I always have to make a distinction between sciences in the Anglo Saxon sense of the term, which focus on the natural sciences, and the definition of the sciences in other European societies, most notably Germany and France, where the scope is broadened to include the humanities and the social sciences. The distinction between 'hard' and 'soft' sciences has some utility but it's not always precise. The natural sciences are not always hard and the social sciences are not always soft.

The outside range of ICSU's membership is defined by our union of anthropology and ethnology and by our union of psychology—that's the limits we have set in our definition of the sciences.

ARBER ON SCIENCE

When it comes to technology, we don't deal with electrical engineering, but we have a union of food science and technology. In medicine, we don't deal with the clinical aspects but with the basic sciences relevant to medicine like physiology.

Specifically, our membership consists of 25 international, single discipline scientific unions and 72 national multidisciplinary bodies, largely scientific academies or national research councils. In addition, 28 scientific organizations have the status of regional or international scientific associates or observers.

We are aware that many of our unions are pursuing intense activities within their disciplines. As a result, we consider that our main task is to foster co-operation among the different scientific disciplines. That sometimes happens within the national academies, but not usually among the unions. So we try to bring together the members of our different unions—sometimes with the help of the national academies or research councils—to promote interdisciplinary research programmes.

Like many other scientific institutions, ICSU believes that interdisciplinary approaches are necessary to solve the world's increasingly complex problems, particularly with regard to safeguarding the environment. Indeed our faith in interdisciplinary research dates back to ICSU's origin in 1931. For this reason, we have built upon our traditional "cross-disciplinary" mandate to encourage more and more interdisciplinary programmes, especially in fields related to environmental sci-

[continued next page]



ence, where co-operation among scientists in different disciplines must take place if we are to advance our understanding both of the problems that we face and the solutions that are available.

Many observers would agree that complex environmental problems call for interdisciplinary approaches. But do such approaches also carry benefits for scientific research as well?

Yes. Many scientific subdisciplines—take, for example, molecular biology and biology of organisms, both of which deal with life processes—have been divided again and again, sometimes creating minor distinctions among areas of inquiry that have much in common. ICSU thinks it's important for scientists in like-minded disciplines to get together and talk to one another on topics of mutual concern. These scientists have been driven apart for some time by an increasing trend for specialization, with consequences that have often been detrimental to both science and society.

Does ICSU initiate these dialogues or are the unions responsible for taking the first steps?

Both sides have launched these initiatives. For example, in 1998, I called a meeting of the presidents of ICSU's 12 biological unions, which make up about half of our union membership. Most of these unions responded favourably to our invitation and welcomed the measures that ICSU had taken to promote interdisciplinary research activities among them. But the next steps are up to the unions themselves. ICSU encourages dialogue among members of different disciplines but the unions themselves are the ones that must make it happen. This is especially true because ICSU doesn't have much funding to carry out actual research programmes. What we can do, besides initiating a process and bringing the appropriate people together, is to lend our name and to provide some administrative assistance both in formulating attractive research programmes and securing funds from other sources. The programmes, as a result, are often conducted jointly with other organizations—for example, with the United Nations Educational, Scientific and Cultural Organization (UNESCO). Over the past few years, this strategy has been particularly successful in the fields of environmental science, especially in ocean and climate research. ICSU, in effect, often provides a forum for members of different disciplines to explore areas of mutual interest where together they might make a bigger impact than they could obtain on their own.

One programme receiving its start at ICSU that we are especially proud of is the World Climate Research Programme. The programme has helped public officials throughout the world to better understand the scientific complexities surrounding the issue of climate change, as well as the realistic options that are available for addressing these concerns.

What have been the major challenges you have faced since you assumed the presidency two years ago?

A critical question for ICSU, even before I became president two years ago, was whether the organization would agree to co-sponsor the World Conference on Science with UNESCO. The conference will be held in late June and early July 1999 in Budapest. I welcomed this opportunity

because the event will give ICSU a chance to increase its visibility. With UNESCO, we hope that the conference will generate fruitful discussions between science and society, particularly scientists and political leaders. I also think that the conference will provide opportunities for scientists from the developed world to learn more about the scientific needs of those from the developing world.

We all know that science involves the universal pursuit of knowledge, but the needs of scientists—and equally important, the expectations that society has for science—are often different in the North and South. Both scientists and politicians, particularly those in the North, need to have a better understanding of these differences. For example, in my home country of Switzerland and throughout most of Europe, the majority of the population is well fed. As a result, people are not pushing for the creation of new plant varieties to increase crop yields. In fact, a sizeable portion of the population has expressed concern about the environmental fallout of genetic engineering despite research findings showing the likelihood of such problems to be quite small. On the other hand, in developing countries and especially in sub-Saharan Africa, the increased yields and improved quality of crops likely to be derived from genetic engineering could well make the difference between malnutrition and a healthy diet.

My hope is that the conference will increase the solidarity among people—especially scientists and politicians—living in different parts of the planet. But that is a big expectation. The conference, like ICSU itself, is predicated on the principle that if you bring people together and encourage them to talk about issues of common concern, the dialogue could lead to an agenda far more ambitious and effective than any agenda you could devise on your own—whether as an individual, a government official or member of a scientific academy or union.

What is TWAS's relationship with ICSU? How do you expect the relationship to evolve in the future?

Until now, under ICSU's statutes, TWAS has been a regional scientific associate of ICSU. Last spring, at our extraordinary general assembly, we passed new statutes that make it possible for organizations like TWAS to become full members. I expect that in the near future TWAS and other similar international organizations, in fact, will become full members with full voting rights. Yet, because our relationship with TWAS has always been strong, I don't think this decision will have much tangible impact on the way in which we interact with one another. I suspect we will continue to work closely together on projects of mutual interest. Our relationship will simply be recognized in a more formal way, which I think is a good thing. For example, it could help us strengthen the UNESCO/ICSU/TWAS Fellowship Programme in Basic Sciences, which has already achieved considerable success. Or, it could further advance TWAS's involvement in our Committee on Science and Technology in Developing Countries (COSTED), where the Academy has already been actively involved. Over all, I foresee the relationship between TWAS and ICSU remaining as energetic and productive as it has been in the past, if not more so. That's not just good news for the organizations but good news for science and society as well. ■

1998 TWAS AWARDS IN BASIC SCIENCES

Each year, the Third World Academy of Sciences (TWAS) awards five US\$10,000 prizes to individual scientists from developing countries who have made outstanding contributions to advancements in basic science. Awards are given in biology, chemistry, mathematics, physics and basic medical science. The following individuals have received prizes for 1998.

BASIC MEDICAL SCIENCES

• **Felix Konotey-Ahulu**/Ghana
Cromwell Hospital
London, United Kingdom
Health Research Unit
Ministry of Health
Accra, Ghana

✦ for his outstanding contribution to knowledge in sickle cell disease and other haemoglobinopathies, and in African anthropogenetics as well as for stressing ethical values in genetic programmes

TWAS

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Felix Konotey-Ahulu

BIOLOGY

• **Gabriel Guarneros** /Mexico
Department of Genetics and Molecular Biology
Centre for Research and Advanced Studies
National Polytechnical Institute (IPN)
Mexico City, Mexico

✦ for his fundamental contributions to the characterization of novel genetic signals which regulate messenger RNA translation in prokaryotes



Gabriel Guarneros

CHEMISTRY

- **Biman Bagchi**/India
Solid State and Structural Chemistry Unit
Indian Institute of Science
Bangalore, India

❖ for his pioneering contributions to the front-line area of physical chemistry pertaining to liquid state dynamics which have led to our understanding of a wealth of experimental phenomena

MATHEMATICS

- **Marcelo Viana**/Brazil
Institute for Pure and Applied Mathematics (IMPA)
Rio de Janeiro, Brazil

❖ for his fundamental contribution to the global structure of dynamical systems, in particular to the theory of chaotic attractors and their statistical properties, as well as the theory of bifurcation of dynamics, especially homoclinic bifurcations

PHYSICS

- **B. Sriram Shastry**/India
Physics Department
Indian Institute of Science
Bangalore, India

❖ for his fundamental contributions to the physics of interacting quantum many body systems, especially exact solutions of one dimensional fermion and quantum spin models, and the phenomenology of high T_c superconductors

Prize winners will receive their awards at the TWAS 7th General Conference, which will be held from 21 to 26 November 1999 in Dakar, Senegal.

Additional information about TWAS may be found at

❖ <http://www.ictp.trieste.it/~twas>.



Biman Bagchi



Marcelo Viana



B. Sriram Shastry

TWOWS HOLDS SECOND INTERNATIONAL CONFERENCE

THE CAPE TOWN GATHERING BRINGS TOGETHER MORE THAN 300
WOMEN SCIENTISTS FROM THE SOUTH TO DISCUSS ISSUES RELAT-
ED TO SCIENCE AND SUSTAINABILITY.

The Third World Organization for Women in Science (TWOWS), whose membership now stands at 2350 worldwide, held its Second General Assembly and International Conference in Cape Town, South Africa, between 8-11 February 1999. The conference, which focused on issues related to “women, science and technology,” attracted more than 300 women scientists, largely from the developing world.

Among the featured speakers were Princess Chulabhorn Mahidol of Thailand; Thabo Mbeki, Deputy President, South Africa; Christina Amoako-Nuama, Minister of Lands and

Forestry, Ghana; Roger Jardine, Director General of the Department of Arts, Culture, Science and Technology, South Africa; Khotso Mokhele, President of the Foundation for Research Development, South Africa; Indira Nath, Professor and Head of Department of Biotechnology, All India Institute of Medical Sciences, India; Mohamed El-Ashry, Chief Executive Officer and Chairperson, Global Environmental Facility, USA; and Anita Borg, President, Institute for Women and Technology, USA.

The first two days of the conference—Monday and Tuesday—were devoted to keynote addresses and plenary sessions examining the role of women in science and the impact that international organizations have had—and will continue to have—in advancing the status of women in scientific fields. The conference’s third day, Wednesday, consisted of a host of parallel sessions divided into four major thematic tracks: women and science education; women and health; women and the environment; and women and the new information technologies.

On Thursday, the final day, members attending the conference, re-elected Lydia P. Makhubu, Professor of Chemistry and



Vice-Chancellor of the University of Swaziland, TWOWS president for another four-year term. Makhubu has served in that capacity since 1993. (See *TWAS Newsletter*, October-December 1998, for a commentary by Makhubu in which she assesses the impact of TWOWS since its inception in 1993 and her hopes for the organization's future).

The conference concluded with a general statement, unanimously approved by the membership, in which attendees proclaimed that the "creation of TWOWS was inspired by the conviction that women have a unique and valuable perspective to bear upon the application of science and technology to development." The statement went on to declare a renewed commitment by TWOWS and its members "to pursue the high objectives of the organization" and "urged TWOWS's fellow colleagues, women and men, to join them in this collective endeavour."

The TWOWS Second General Assembly and International Conference was sponsored by the Foundation for Research Development, Department of Arts, Culture, Science and Technology in South Africa, Department for Research

Cooperation of the Swedish International Development Cooperation Agency (SAREC-Sida), Rockefeller Foundation, United Nations Educational, Scientific and Cultural Organization's (UNESCO) Pretoria Office in South Africa, and TWAS. For more detailed information about the event, please contact:

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TWOWS EXECUTIVE BOARD, 1999-2002

MEMBERS OF THE THIRD WORLD ORGANIZATION FOR WOMEN IN SCIENCE (TWOWS) RECENTLY ELECTED THE ORGANIZATION'S NEW EXECUTIVE BOARD. THE ELECTION TOOK PLACE AT THE 2ND GENERAL ASSEMBLY AND INTERNATIONAL CONFERENCE, HELD BETWEEN 8-11 FEBRUARY, IN CAPE TOWN, SOUTH AFRICA. ALL BOARD MEMBERS WILL SERVE FOUR-YEAR TERMS.

PRESIDENT

• **Lydia P. Makhubu**
Vice-Chancellor and
Professor of Chemistry
University of Swaziland
Kwaluseni, Swaziland

VICE PRESIDENT/Africa

• **Grace Alele-Williams**
Director
Institute of Education
University of Lagos
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and the Caribbean
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Onostre De Olivo
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and Physics
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La Paz, Bolivia

MEMBER/Asia and

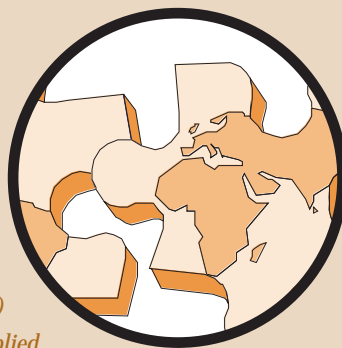
the Pacific
• **Farida Habib Shah**
Faculty of Life Sciences
Genetics Department
Universiti Kebangsaan
Malaysia
Bangi, Malaysia

MEMBER/Arab Region

• **Hilweh A. Malhas**
Director
General Federation
of Jordanian Women
Amman, Jordan



TWNSO 1998 PRIZES IN APPLIED SCIENCES



The Third World Network of Scientific Organizations (TWNSO) has announced the winners of its 1998 Prizes in the Applied Sciences. The awards, which are granted every other year, honour individuals and institutions making significant contributions in science and technology that address concrete economic and social problems in the developing world. Each prize carries a US\$10,000 cash award.

AGRICULTURE (SHARED)

Individual

- **Octavio Paredes-López**/Mexico
Plant Biotechnology and Genetic Engineering Unit
Centre for Research and Advanced Studies
National Polytechnical Institute (IPN)
Irapuato, Mexico

❖❖❖ for his outstanding contributions to agro-food biotechnology of indigenous plants in Latin America

Institution

- **The Shelterbelt Research Group**
Institute of Applied Ecology
Chinese Academy of Sciences
Shenyang, China

❖❖❖ for its outstanding work in the planning, design, planting, management and assessment of shelterbelts for desertification control

TECHNOLOGY (SHARED)

Individual

- **Hameed Ahmed Khan**
Pakistan Institute of Nuclear Science & Technology
Islamabad, Pakistan

❖❖❖ for his outstanding contributions to the development of Solid State Nuclear Track Detection (SSNTD) and its scientific and technological applications in Pakistan and other Third World countries

Institution

- **Central Leather Research Institute**
Council of Scientific and Industrial Research (CSIR)
Chennai, India

❖❖❖ for its innovative microenterprise strategies in the traditional leather sector, leading to sustainable socioeconomic development with the potential for large-scale propagation

Prize winners will receive their awards at the TWAS 7th General Conference, which will be held from 21 to 26 November 1999 in Dakar, Senegal.

TWNSO, which is based in Trieste, Italy, has 154 members in 74 countries. Members include ministries of science and technology and higher education, science academies and research councils. Additional information about TWNSO may be found at <http://www.ictp.trieste.it/~twas/TWNSO.html>.

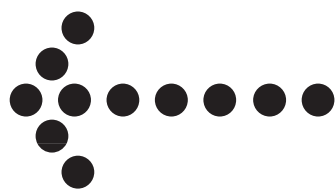


Octavio Paredes-López



Hameed Ahmed Khan

PEOPLE, PLACES, EVENTS



BIOPROSPECTING

"In India we have over 5,000 tribes. It's impossible to find a plant species that isn't being used by one tribe or another." That observation, offered by TWAS Fellow (1995) P.S. Ramakrishnan in *Newsweek*, helps to shed light on the growing controversy surrounding the use of tropical plants and traditional tribal practices for remedying such diseases as cancer and AIDS. Everyone agrees that joining ancient tribal knowledge on the medicinal value of plants and flowers with the efficiency and marketing skills of Western pharmaceutical companies could improve the lives of millions of people. The key question is who should profit from this marriage of cultures. It's a controversy likely to become increasingly heated in the years ahead as the world learns more about the wonders of traditional medicine in the developing world, and as medical researchers continue to make advances in genetic engineering and other realms of biology. Ramakrishnan is Professor of Ecology and Dean of the School of Environmental Sciences at Jawaharlal Nehru University in New Delhi, India. For a complete text of the article, see *Newsweek*, 30 November 1998, pp. 46-52.

Gurdev S. Khush



PRIZE FOR KHUSH

Gurdev S. Khush (TWAS Fellow 1989), World Food Prize Laureate and Principal Plant Breeder at the International Rice Research Institute (IRRI) in the Philippines, has received The Rank Prize in London for "his application of crop science and plant breeding technology to the improvement of rice yield." He shares the prize with Sanyaya Rajaram, a scientist with the International Wheat and Maize Improvement Centre (CIMMYT) in Mexico. Khush, who was born in India, and educated at the Government Agricultural College in Ludhiana, India, and the University of California at Davis in the United States, is a fellow of the Indian National Science Academy, Indian Academy of Agricultural Sciences, and Royal Society of London. He also is a foreign associate of the National Academy of Sciences in the United States. For his contributions to crop science (more than 300 rice breeding lines have been developed and released worldwide under his leadership), Khush has received the Borlaug Award (1977), Japan Prize (1987), International Agronomy Award (1989) and University of Davis Emil E. Mrak International Award

(1990). The Rank Prize, which carries a cash prize totalling £40,000 (US\$65,000), was established in 1972 by the late Lord Rank to promote the science both of human nutrition and optoelectronics.

C.R. RAO'S DOCTORATE

TWAS Founding Member C.R. Rao, who holds the Eberly Family Chair in Statistics and directs the Center for Multivariate Analysis at Pennsylvania State University in University Park, Pennsylvania, USA, has been awarded an honorary doctorate degree from the University of Brazil. Rao has now received 21 honorary degrees from 14 nations. Rao is one of 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 (UK) and Indian National Science Academy, Indian Academy of Sciences and National Academy of Sciences, India; a member of the US National Academy; foreign member of the Lithuanian Academy of Sciences; and honorary fellow of the American Academy of Arts and Sciences.

PEOPLE, PLACES, EVENTS

ROBERT HALL HAYNES

Robert Hall Haynes (TWAS Associate Fellow 1989) died on 22 December 1998 at the age of 68. Haynes was Distinguished Research Professor Emeritus of Biology at



Robert Hall Haynes

York University in Toronto and President of the Royal Society of Canada. He is best known for his pioneering work in biophysics and his research on DNA repair and mutagenesis. Haynes was educated at the University of Western Ontario, where he received degrees in mathematics, physics and biophysics. In addition to his post at the University of Toronto, he was a teacher and researcher at the St. Bartholomew's Hospital Medical College at the University of London in the U.K.; University of Chicago, University of California at Berkeley, and Yale University in the United States; and Berlin Institute for Advanced Studies (Wissenschaftskolleg zu Berlin) in Germany. Haynes was the recipient of many awards, including the Queen Elizabeth II Silver Jubilee Medal in the United Kingdom; the Environ-

mental Mutagen Society 1984 Annual Research Award; and the Flavell Medal Royal Society and Officer of the Order of Canada. In 1992-1993, Haynes was President and Editor-in-Chief of *Annual Reviews* in Palo Alto, California. He is survived by his wife Jane Banfield and three sons.

EL-BAZ AWARD

The Geological Society of America, consisting of 16,000 geologists worldwide, has established the Farouk El-Baz Award for Desert Research. The award is named in honour of TWAS Fellow (1985) Farouk El-Baz, Research Professor and Director of the Center for Remote Sensing at Boston University in Boston, Massachusetts, USA. "Deserts," El-Baz notes, "have not received as much attention as other types of land forms. That is why we need to encourage young scientists to strive for excellence in arid land studies." The Geological Society of America Foundation, a non-profit, tax-exempt organization that endows the Society's educational programmes, will over-



Farouk El-Baz

see the initiative. For additional information, please contact the Farouk El-Baz Award, Professional Development Dept., Geological Society of America, 3300 Penrose Place, Boulder, Colorado, USA.

POPULARIZING SCIENCE

Seven south Asian countries—India, Pakistan, Bangladesh, Sri Lanka, Nepal, Maldives and Bhutan—have launched a programme designed to raise public appreciation for science throughout the region. At a five-day workshop in Islamabad, Pakistan, organized by the Pakistan Science Foundation and South Asian Association for Regional Cooperation, representatives from the participating countries agreed to sponsor an annual regional festival, create a student exchange programme and explore the possibility of launching a peer-reviewed journal dedicated to advancing public understanding of science in south Asia. Representatives also recommended that 10 percent of air-time on state-controlled networks, including 1 percent of the time during peak audience viewing, focus on science-related issues. For more details about the October meeting, see *Nature*, 5 November 1998, p. 6.

WHAT'S TWAS?

THE THIRD WORLD ACADEMY OF SCIENCES (TWAS) WAS FOUNDED IN 1983 BY A GROUP OF EMINENT SCIENTISTS FROM THE SOUTH UNDER THE LEADERSHIP OF THE LATE NOBEL LAUREATE ABDUS SALAM OF PAKISTAN. LAUNCHED OFFICIALLY IN TRIESTE, ITALY, IN 1985 BY THE FORMER SECRETARY GENERAL OF THE UNITED NATIONS, TWAS WAS GRANTED OFFICIAL NON-GOVERNMENTAL STATUS BY THE UNITED NATIONS ECONOMIC AND SOCIAL COUNCIL THE SAME YEAR.

At present, TWAS has 517 members from 76 countries, 62 of which are developing countries. A Council of 14 members is responsible for supervising all Academy affairs. It is assisted in the administration and coordination of programmes by a small secretariat of 10 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, which is administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Atomic Energy Agency (IAEA). UNESCO is also 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 154 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 1900 women scientists from 83 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: <http://www.ictp.trieste.it/~twas>

FELLOWSHIPS

Want to spend some time at a research institution in another developing country?

Investigate the South-South Fellowships:

<http://www.ictp.trieste.it/~twas/>

[SS-fellowships_form.html](http://www.ictp.trieste.it/~twas/SS-fellowships_form.html)

GRANTS

Need funding for your research project?

Take a look at the TWAS Research Grants:

http://www.ictp.trieste.it/~twas/RG_form.html

TWNSO runs a similar scheme, for projects carried out in collaboration with institutions in other countries in the South:

<http://www.ictp.trieste.it/~twas/>

[TWNSO_RG_form.html](http://www.ictp.trieste.it/~twas/TWNSO_RG_form.html)

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:

http://www.ictp.trieste.it/~twas/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:

http://www.ictp.trieste.it/~twas/Lect_form.html

<http://www.ictp.trieste.it/~twas/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:

http://www.ictp.trieste.it/~twas/SM_form.html