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THE NEWSLETTER OF THE THIRD WORLD ACADEMY OF SCIENCES



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Members of the executive committee of the InterAcademy Panel (IAP) gathered in Nice, France, from 6 to 8 July, marking the committee's first meeting since IAP member academies voted in May to have the Third World Academy of Sciences (TWAS) host the panel's secretariat in Trieste, Italy. The purpose of the meeting was twofold: to prepare a final draft of the IAP statutes and to devise a preliminary programmatic agenda for the upcoming year.

In attendance were IAP's newly elected co-chairs Yves Quéré, foreign secretary of the French Science Academy, and Eduardo Krieger, president of the Brazilian Academy of Sciences. Also present were members of IAP's provisional executive committee: Peter Collins, director of science policy of the Royal Society; Goverdhan Mehta, president of the Indian National Academy of Sciences; Erling Norrby, secretary general of the Swedish Royal Academy; Harold Ramkissoon, foreign secretary and immediate past president of the Caribbean Science Academy; and Zhao Shidong, an official with the Chinese Academy of Sciences. Mohamed Hassan, executive director of TWAS and president of the African Academy, represented the IAP secretariat. Bruce Alberts, president of the U.S. National Academy, and Larry Kohler, executive director of the International Council for Science (ICSU) in Paris, were there as observers.

IAP moves ahead

The three-day meeting, held in a serene setting near the French Riviera not far from Nice, produced a draft statute that will be sent to all IAP academy members for their consideration and approval.

The statute reflects IAP's informal, participatory nature, which has been a hallmark of the organization since its inception in 1993, following the New Delhi Population Summit of the World Scientific Academies. For example, the statute stipulates that membership will be voluntary and that there will be no membership fees. The statute also states that membership is open to one national academy per country and to scientific groups representing various regions of the world (for instance, in the case of TWAS, scientists in the developing world). Finally, the statute outlines the organizational framework of the IAP, which will consist of a general assembly, executive committee and secretariat.

Participants at the meeting also agreed to increase the size of the executive committee from seven to 13 members. Such an expanded framework, proponents of the change maintain, will help ensure that the board is fully representative of the diverse views of the IAP's member academies.

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In addition to its work on the panel's statute, participants at the Nice meeting agreed to pursue a host of research and training activities. The activities, scheduled to begin in 2001, will focus on three main themes: science education; capacity building for young science academies, particularly in Africa; and science and the media. Other issues targeted for attention, although not on the scale of the three major themes, include the role of science in addressing concerns related to mothers and children (for instance, infant nutrition and adolescent health care), and the intricate ties, both in theory and practice, among mathematics, computer science and engineering.

Meanwhile, on the logistics and staffing fronts, the Abdus Salam International Centre for Theoretical Physics (ICTP) has agreed to provide the IAP with temporary office space on the top floor of the Centre's Adriatico Guesthouse, which offers an expansive view of the Adriatic Sea. Renovations have been completed and the secretariat should be able to move into its new quarters by early fall. The U.S. National Academy has said that its technical staff in Washington, D.C., will maintain the IAP's homepage for the next year or so with the editorial assistance of the new IAP secretariat. And last but by no means least, the Italian Ministry of Foreign Affairs has sent a bill to the Italian parliament asking for the legislature to provide US\$750,000 to cover the panel's operational expenses for the first year.

As IAP co-chair Quéré noted just after the meeting: "Our predecessors have laid a firm foundation for the panel's success and we look forward to building upon their efforts. At the same time, we realize that the IAP's expanded range of proposed activities pose a new set of challenges. The first round of discussions and decisions have all been positive, which gives us good reason to be optimistic about the IAP's future."

"The goal of the IAP," adds Krieger, who shares the IAP chair with Quéré, "is to raise not only the capabilities but the presence of science academies among both the public and decision makers. In a sense, we hope to make the academies a little less academic and a little more proactive. I agree that the IAP is off to a promising start and I hope we can keep up the momentum in the months ahead as we begin to implement the programmatic agenda we have put together in Nice." ■

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TRANSGENIC DEBATES

A RECENT STUDY BY SCIENTIFIC ACADEMIES, INCLUDING TWAS, CAUTIOUSLY LENDS ITS SUPPORT FOR THE DEVELOPMENT OF TRANSGENIC TECHNOLOGIES TO MEET THE WORLD'S FUTURE FOOD NEEDS.

In July 2000, an independent panel of some 30 scientists, representing seven academies of science, issued a report on the use of genetically engineered crops. The monograph, *Transgenic Plants and World Agriculture*, is designed to provide an impartial scientific counterpoint to the heated political discussions that have surrounded — and at times engulfed — the debate on genetic engineering.

The two-year effort was organized jointly by Britain's Royal Society, the national science academies in Brazil, China, India, Mexico and the United States, and the Third World Academy of Sciences (TWAS).

Muhammad Akhtar, TWAS founding fellow and vice president, represented TWAS in these discussions. What follows is his assessment of how the discussions evolved from the initial meeting to the final draft of the publication.

Our first discussion session was held at the Royal Society headquarters in London on 12-14 July 1999. The issue of genetic engi-

neering, especially when applied to food production, had already aroused a great deal of public concern, especially in Europe. Many scientists throughout the world had come to believe that the scientific community had a responsibility to provide a united front against opponents of genetically modified (GM) plants. Several scientists present at the meeting made statements implying that the case for the development of GM food was based on good science, while the case against it was based on misinformation and driven by an anti-science bias.

As discussions proceeded, however, a more balanced and cautious view began to emerge. Several participants, including myself, pointed out that first-generation GM plants — herbicide-resistant soya bean and insecticide-resistant corn — primarily benefited multinational corporations and large farms in the North, and offered no discernible advantages to consumers. Agro-economists, for example, projected that Northern consumers

would spend no more than US\$100 to US\$200 a year on GM commodities.

An obvious question was this: Even if the cost economies accrued from GM agriculture were passed to consumers (and there is no indication that they would be), is the risk, however remote, worth the trivial gains? Furthermore, there was a hesitant realisation that the first-phase GM seeds had been introduced in haste without due consideration to potential ecological hazards.

Among GM enthusiasts are well-meaning individuals who embrace the technology as a potential solution to the food needs of poor countries. Nevertheless TWAS has examined this issue and found that the main impediment to the use of GM plants in developing countries has been that the technology is controlled by commercial firms, which have safeguarded their financial interests by claiming intellectual property rights on the transgenes.

In TWAS's view, as long as this

state of affairs prevails, the poor of the world will not benefit from GM technology, however potentially useful it may be. That's why TWAS has expressed strong support for the proposition that "all agriculture life forms should be legislated to belong to all of humanity and be excluded from intellectual property claims" (See *TWAS Newsletter*, July-September 1999, pp. 4-5, or www.twas-online.org).

The historic basis of TWAS's position is that since the dawn of civilisation, agricultural seeds have been regarded as public goods generously exchanged among friends and foes alike in traditional societies. This noble philosophy has benefited countries that are now rich and technologically strong. Rather than changing the rules of the game, rich countries should feel some obligation to repay their historic debt.

Proponents of intellectual property rights, however, contend that the 'innocent' noncommercial attitude towards agriculture, where it still exists, must change because it is a disincentive for the development of improved crops by international plant breeding companies. Champions of intellectual property rights have given this patronising advice to third world countries: Don't oppose the system, play within it.

At a crucial stage in the debate, following the preparation of the first draft of the report by the seven science academies in the



summer 1999, TWAS retorted by noting that poor countries have neither the financial resources nor the legal and technical know-how to become involved in the complexities of patenting. And even if developing countries choose to fight, it will be a battle between unequals because poor countries would be no match for enormously rich and resourceful multinationals backed by their powerful governments.

The second round of the discussions, which took place 20-22 February 2000 also at the Royal Society offices in London, included an articulate pre-diner presentation by Margaret Llewelyn, senior lecturer in law, University of Sheffield, U.K., on the daunting intricacies of intellectual property rights and patent laws. Her message was clear: playing the patenting game is not for the poor, yet they cannot escape the traps laid by the WTO (World Trade Organization) and the appropriately titled TRIPS (agree-

ment on Trade Related Aspects of Intellectual Property Rights).

Such insights helped to steer the conversation to a more balanced appreciation of the conditions that must be satisfied for GM technology to benefit those who may need it the most. The final report, while generally endorsing the use of GM technologies, also included the following caveats that are designed to protect, at least in a limited way, the interests of poor nations:

- Farmers must be allowed to save seeds for future use.
- Broad intellectual property right claims, or claims on DNA sequences, without a true invention being made, should not be granted.
- An international advisory committee should be created to assess the interests of both private companies and developing countries in the generation and use of GM plants to benefit the poor.
- New public-sector initiatives should be launched as part of a



larger effort to make GM crops beneficial to poor farmers in developing regions.

While the final text, *Transgenic Plants and World Agriculture*, does not address all of the concerns of developing countries and while this “scientific perspective” is unlikely to quell the debate over the use of GM technology, the report should be commended on several accounts.

First, the findings of the published report are much more responsive to the needs of agriculture in developing countries than discussions in the first meeting suggested they would be. Academy representatives attending the meetings should be commended for keeping open minds about perspectives that differed from their own and for their willingness to incorporate these perspectives into the final draft.

Second, the “plus and minus” assessment has added credibility to other reports, most notably a report by Christian Aid, *Selling Suicide* (<http://www.christian-aid.org.uk/reports/suicide/index.html>).

Such reports have stressed the need to give greater importance to the optimal use of traditional agricultural techniques as part of a comprehensive global strategy to address the food needs of the next century, especially among developing countries.

Discovering crops, which are fit for human consumption, tolerant to salt, and capable of growing on poor soils, is a compelling challenge that traditional agricultural techniques have not solved and that GM technology has promised to tackle but without much enthusiasm or success. In fact, little on the horizon suggests that these critical humanitarian goals will soon be met by either old or new technologies.

That’s just one reason why all scientific avenues should continue to be explored in addressing global food-related concerns. After all, we live in a high-tech world where one-third of the world’s population remains fed by low-tech subsistence farming techniques. Eighty percent of the

agricultural land on the Indian subcontinent, for instance, is in the hands of farmers who own plots of less than 10 acres. First and foremost, these farmers need seeds with stable genetic inheritance preserved over several generations. GM seeds developed to date have failed to meet this essential precondition.

In the final analysis, GM technology may hold some promise for increasing the global food supply but that promise is not cost-free and it offers no guarantee that it will ever be fully successful. Put another way, GM technology is not the devil but it is no saintly scientific solution either. ■

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*For the full text of Transgenic
Plants and World Agriculture, see
the Royal Society homepage
www.royalsociety.org or the
TWAS website www.twas-online.org.*



SPEAKING WITH VARGAS

JOSÉ I. VARGAS EXAMINES HIS TENURE AS TWAS PRESIDENT
— AND LOOKS TO THE ACADEMY'S FUTURE AS WELL.

José I. Vargas, who had been president of the Third World Academy of Sciences (TWAS) since 1996, resigned from the post this spring (see "Vargas Steps Down," *TWAS Newsletter*, April - June 2000).

During Vargas's tenure, both TWAS and the Third World Network of Scientific Organizations (TWNSO), where he has served as president since 1996, have substantially strengthened their positions as leading voices for the promotion of scientific research and science-based development in the South. On the organizational front, TWAS membership increased from 451 when Vargas assumed office, to 543 today. On the financial front, the TWAS endowment fund nearly doubled from just over US\$2.5 million to just under US\$5 million; equally important, the Italian parliament is now on the verge of signing legislation to provide a permanent funding base for the Academy that will reach more than US\$1.2 million annually by next year. On the international front, this spring the members of the InterAcademy Panel (IAP), a group of 80 scientific academies from around the world (including the academies of Brazil, China, India



and the United States) voted to move the IAP secretariat to Trieste, where TWAS will serve as its host.

Meanwhile, membership in TWNSO, which consists largely of ministries of science and technology, continues to climb upward. It now totals 155 institutions in 74 countries. The 1998 publication of *Profiles*

of Institutions for Scientific Exchange and Training in the South, a four-year project directed by TWNSO in collaboration with the South Centre, represents the most comprehensive description of the capabilities of scientific institutions in the developing world in print. Approximately 5000 copies of the monograph have been distributed to scientific institutions around the world.

Grants from the United Nations Development Programme (UNDP) Special Unit for Technical Cooperation (SU/TCDC), the United Nations Environment Programme (UNEP) Global Environment Facility (GEF), and the World Meteorological Organization (WMO), each designed to highlight successful applications of science and technology and to promote networks of scientific institutions in the South, are helping to improve the dialogue on the role of science

in society at a critical juncture in the long, largely troubled, history of science-based development in the developing world.

Vargas is the first to admit that he has not been alone in the success of TWAS and TWNSO. As he has said on many occasions, the progress that the two organizations have achieved in advancing their goals is largely due to the enthusiasm and commitment of their membership and the hard work and dedication of the organizations' secretariat. At the same time, members of TWAS and TWNSO have been quick to express their gratitude to Vargas for the masterful job he has done

in raising the effectiveness and visibility of the organizations that he has so ably headed for the past four years.

In late July, the editor of the *TWAS Newsletter* conducted an hour-long phone interview with Vargas, who spoke from his office in Paris, where he now serves as the Brazilian Ambassador to United Nations Educational, Scientific and Cultural Organization (UNESCO). During the broad-ranging conversation, Vargas reminisced about his efforts on behalf on TWAS and TWNSO and spoke about the work that he thinks still needs to be done. What follows are extended excerpts. ■



What were the circumstances under which you assumed the presidency of TWAS and TWNSO? What were some of your early actions? What impact did these actions have on the Academy?

I became president of TWAS and TWNSO at the prodding of Nobel Laureate (Physics 1979) Abdus Salam, who founded and then led both organizations from their very beginnings. Chronic health problems in the early 1990s prevented Salam from continuing in his leadership capacity. He believed that my experience with UNESCO (where I had served on the executive board) and with the Brazilian government (where I

was serving as the minister of science and technology) would assist me well in my capacity as president of TWAS and TWNSO. From the start of my term, I never viewed my work as anything more than fulfilling the mandate that Salam had set for the organizations, which primarily entailed promoting scientific excellence in the developing world. Salam, in fact, had already put in place many of the mechanisms for achieving this mandate. For example, the number of Academy members was increasing by some 25 or so each year by the mid 1990s. Under my tenure, we have simply maintained this rate of growth without compromising the quality of scientists who are elected. The

ever-growing number of prominent scientists from the South who are members of TWAS has been — and remains — the heart and soul of the organization. I am happy to report that this fundamental aspect of the Academy has become both deeper and broader during my tenure — not because of anything I did *per se* but because the quality of scientific research continues to improve in a number of countries throughout the South. As a second order of business, both TWAS and TWNSO — through their scholarship, fellowship and training programmes; research seminars, workshops and conferences; and sponsorship and promotion of centres of excellence — have emerged as significant players in South-South cooperation. TWAS and TWNSO's principal mandates, which were also initially articulated by Salam, have been goals that I have continued to advance with the help of the membership and secretariat. I consider the publication of the *Profiles of Institutions for Scientific Exchange and Training in the South* in 1998, which represented an update of a 1994 edition of a monograph whose publication Salam spearheaded, to be a major accomplishment. With descriptions of more than 400 institutions in the South, the book has quickly become a valuable reference for science policy makers and scientific researchers around the world. In addition, the TWAS/TWNSO general conferences in Brazil in 1997 and in Senegal in 1999 provided important platforms for the exchange of information and insights among scientific researchers and administrators. Although discussions were sometimes less focused than I would have liked, the events have proven indispensable for those interested in the state of both scientific research and science policies in the South. Finally, one area where I think my presence has made a significant difference is in the growth of the TWAS endowment fund, which I believe is the key to the Academy's future well-being and independence. When I assumed the presidency, the fund had been in existence for several years. Contributions, which had rushed in during the fund's early years, had plateaued by the early 1990s at about US\$2.5 million. Today, I am happy to report that the fund is nearly halfway towards

it US\$10-million goal. My close ties to Fernando H. Cardoso, a TWAS fellow (1984), who has served as Brazil's minister of foreign affairs and then finance and who is now the nation's President, help to explain why the endowment has grown. Cardoso's tireless efforts on the Academy's behalf have opened doors for TWAS to high-level governmental officials that never may have been opened without him. Now that the endowment's coffers have reached a respectable level, exclusively with contributions from the developing world, it's time to ask our friends and colleagues in the North for assistance in reaching our ultimate US\$10-million target. Preliminary groundwork for such an effort has taken place over the past two years, and I am confident that some Northern nations will soon be forthcoming with contributions.

The ever-growing number of prominent scientists from the South who are members of TWAS remains the heart and soul of the organization.

Which decisions during your tenure as president of TWAS and TWNSO do you consider the most significant? Which decisions fell short of your expectations?

Beyond the areas discussed above, including maintaining the high standards of the Academy's membership and advancing the goals of the Academy's endowment fund, I think I am most proud of how TWAS and TWNSO have strengthened their partnerships with like-minded organizations both in the South and North. For example, I am delighted with the role that TWAS played in the World Conference on Science, held in Budapest, in 1999. The Academy organized two major thematic sessions, "Science in Response to Basic Human Needs" and "Science for Development." In addition, more than 25 TWAS fellows gave presentations, including four who gave opening ceremony addresses — myself, M.S. Swaminathan (founding fellow), Lydia Makhubu (fellow 1988) and Miguel A. Virasoro (fellow 1994). I think TWAS helped to make a difference in Budapest by raising the level of developing world participation. As a result, many of the conference recommendations were directed towards the concerns of scientists and scientific institutions in the South. I am also delighted to report that at a recent meeting that I, the Academy's

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new president, C.N.R. Rao, and the executive director, Mohamed Hassan, had with the newly appointed director general of UNESCO, Koïchiro Matsuura, the DG informed us that UNESCO's contribution to TWAS activities with UNESCO would no longer be part of the organization's "extra-ordinary" budget but included in the "ordinary" budget. This support, which will total about US\$160,000 every two years, will ensure the future of our joint activities and make it possible to provide much needed assistance to one of the developing world's greatest assets: its young scientists. The Italian government's imminent decision to provide a permanent funding base for TWAS, which will guarantee our long-term future, is a sure sign of the healthy relationship between the Academy and the Italian government. And, the recent decision to move the secretariat of the InterAcademy Panel (IAP) to Trieste, with TWAS as its host, promises to open new and fruitful avenues of cooperation between North and South — an encouraging development not only for TWAS but for the global scientific community. Having said all that, however, I must admit that TWAS, and particularly TWNSO, have fallen short of my fondest expectations when it comes to addressing concrete problems that require solid scientific information and analysis as basic prerequisites for intelligent decision making. We have talked a great deal about information sharing and networking but have yet to devise a successful strategy for ensuring the growth of either on a consistent basis. We have sought to promote centres of scientific excellence in the South and have even had a hand in raising their profile, but most of these centres remain outside the policy arena, particularly when it comes to issues of critical importance to the social and environmental well-being of average citizens. Likewise, we have discussed the need to pay particular attention to the problems of sub-Saharan Africa but have not made much of a difference in the world's most troubled region. As a result, I wish



both institutions, and especially TWNSO, could devise and implement more effective strategies for using science to tackle critical everyday problems. One way to become more effective may lie in concentrating more on the mechanics of successful policy making — for example, organizing workshops on how to put together a legislative package for the promotion of science; or how to create a long-term scientific plan for institutional development; or how to forge stronger links between science and other sectors of society. Another way to become more effective may lie in taking on smaller, more focused aspects, of a problem — for example, instead of examining issues related to the whole of sub-Saharan Africa, choose a subregion there and select a particular issue, and then target resources and programmes to address the problem comprehensively. In other words, TWNSO — when developing its activities — may want to choose a few topics and confine its interest to a limited geographical area — and then marry one to the other. Such a strategy might enable us to have more meaningful impacts on the ground than we have had thus far. I don't want to minimize the considerable success of either TWAS and TWNSO but our efforts to date have often been more beneficial for scientists and scientific communities than for the societies in which they live and work.

What does the future hold for you? How do you plan to remain active in TWAS?

I plan to assist TWAS and TWNSO in any way I can from my new position as the Brazilian ambassador to UNESCO. As I have in the past, I will encourage closer ties between TWAS, TWNSO and UNESCO. The deeply rooted relationship that UNESCO enjoys with both organization bodes well for the future. I have recently been appointed president of UNESCO's Latin American and Caribbean Group, which consists of 33 Latin American and Caribbean countries, as well as coordi-



nator of its working group of sciences. I will be coordinating a similar group within UNESCO's G-77. Consisting of 130 member states, the G-77 is the largest contingent of countries representing the interests of the developing world in the UN system. TWAS, as many Academy members know, recently became the first scientific organization to receive a G-77/UNDP award for the promotion of science and technology for sustainable economic growth in developing countries. I hope we can build upon this recognition to create closer ties between TWAS and G-77 over the next few years. I have also been asked to serve as chairperson of the Community of Portuguese Language Countries in UNESCO, which includes my home country of Brazil. Representatives from this seven-member group have expressed interest in collectively exploring issues related to the impact of globalization on cultural diversity. Science, as we all know, has always been a universal pursuit but the research agenda in each country can never escape taking place within a cultural context. This is a theme that TWAS has explored in the past and will continue to explore in the future. For example, the relationship between science and culture will be the theme of a major session at the upcoming TWAS general meeting in Tehran to be held this October. I am hopeful that TWAS and UNESCO's Community of Portuguese Language Countries can meet together to explore this and other areas of mutual concern in the near future. In fact, I plan to invite

I plan to assist TWAS and TWNSO in any way I can from my new position as the Brazilian ambassador to UNESCO.

the Academy's executive director to speak to the group at one of its upcoming meetings that are held monthly in Paris. At the same time, I am pursuing options for having *Profiles of Institutions for Scientific Exchange and Training in the South* translated into French, Portuguese and perhaps several other languages. We all know that English is the language of science, but publishing science-related reports, articles and monographs in native languages will help reduce the advantage that scientists from English-speaking nations currently enjoy both in conducting research and having their research results published. For these reasons, I have voiced my strong support for the United Nations University project to use the internet for real-time translations of scientific publications into 15 languages. More than 100 researchers from around the world — linguists, physicists, computer scientists — have worked on the project. Technology is now on the horizon that could break the Anglo-Saxon hold on science. The implications for TWAS and TWNSO are enormous and the United Nations University real-time translation project deserves the full support of both organizations. I could go on and on. But simply and briefly stated, the answer to your question is that I don't intend to go away. I look forward to continuing to work closely with the entire network of scientific institutions in Trieste in my new capacities as we all strive to advance the noble cause of science-based development in the South. ■



TALKING SCIENCE... GETTING RESULTS

DESIGNED AS A PARTNERSHIP FOR PARTNERSHIPS, THE TWAS/ICSU/UNESCO LECTURESHIP PROGRAMME PROVIDES A PLATFORM FOR SOUTH-NORTH CO-OPERATION ON CRITICAL SCIENTIFIC ISSUES OF COMMON CONCERN.



Like all the other capacity building programmes sponsored by the Third World Academy of Sciences (TWAS), the lectureship programme, organized in co-operation with the International Council for Science (ICSU) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), is driven by a desire to improve the quality of research among scientists in the developing world. However, this programme has a unique twist: Instead of providing scientists in developing countries with opportunities to study abroad, the lectureship programme encourages scientists from the developed world to travel to universities and research institutions in the South. Lecturers, often internationally recognized in their fields, are extended an invitation by a host institution in the developing world. Once an arrangement is in place, TWAS and the programme cosponsors agree to pay for travel costs, while the host institution agrees to cover the lecturers' daily living expenses. To date, more than

200 lecturers have visited institutions in the South to give talks and hold discussions on a variety of cutting-edge research issues, ranging from astronomy to hydrology to seismology. As the following article suggests, these initial encounters often help nurture long-term collaboration among scientists who share common research interests.

Diana Anderson, head of educational services at TNO BIBRA International Ltd., in the United Kingdom, has spent much of her career studying public health risks posed by the potentially adverse impacts of environmental pollutants — everything from cigarette smoke to factory emissions.

“These pollutants,” she says, “may have a toxic effect on human cells that could lead to a host of disorders, including cancer.” The research challenges are daunting — for example, distinguishing genetic pre-

disposition from adverse environmental exposures; pinpointing a carcinogen's mechanism of toxicity; and deciphering the thresholds at which once-healthy cells begin to die or unhealthy cells begin to proliferate. It's all part of a complex puzzle that sometimes carry life and death consequences.

Meanwhile, Alok Dhawan, a scientist from the Industrial Toxicology Research Centre (ITRC), in Lucknow, India, has been concerned with similar issues ever since he graduated from Lucknow University, with a doctorate in biochemistry, in 1991.

"People in India," Dhawan says, "like people everywhere, are exposed to a range of environmental pollutants often threatening to their health and well being." These risks rarely make the news unless there is a tragic event involving many people, such as the incident that took place in Bhopal, India, in 1984, when emissions of poisonous gas at a chemical plant killed several thousand people living nearby.

"The dangers," Dhawan notes, "are often much more subtle than that and, as a result, often go unnoticed. In fact, in many instances, we really don't know either what the dangers are or where they may be most troublesome."

Anderson's and Dhawan's careers initially crossed paths when Dhawan went to work at BIBRA in 1994. His visit was made possible through funding provided by the Indian National Science Academy/Royal Society (UK) exchange programme. Dhawan remained at the facility for 3 months during which time he first learned about 'comet assays' that medical researchers use to identify and assess DNA damage in human cells.

"These assays, which draw on advanced knowledge in genotoxicology and molecular epidemiology, are based on some of the most up-to-date techniques in the field of toxicology," notes Dhawan. "The insights the assays provide," he adds, "allow scientists to know more about the impact that pollutants are having on the health and vitality of our cells." In fact, genotoxicologists — scientists who study the effect of agents on DNA — have come to rely on comet assays as a major new tool for better understanding the baffling array of factors, both natural and environmental, that affect our molecular make-up and sometimes those of our offspring as well.

Dhawan's initial foray into this research area, based on his travels to the United Kingdom, have since become a major focus of his research — thanks in part to the intellectual exchanges that have taken place with Anderson. Meanwhile, Anderson has enjoyed a strong relationship with Indian research institutes dating back to 1986 when she was asked to lecture at the Indian Environmental Mutagen Society in Madras. She then spent nearly three weeks at the Industrial Toxicology Research Centre (ITRC), speaking about research and organizing training sessions on genetic and reproductive toxicology. Anderson returned to India in 1994 and again in 1997.

“My journey to ITRC in January 2000 felt like a home coming of sorts,” explains Anderson. “I was able to see several old colleagues and introduce myself to young Indian researchers who were eager to hear about the recent events in the field.”

In all, during her one-week stay, she gave two lectures assessing the health risks faced by workers exposed to chemical pollutants and she led a host of discussions, both formal and informal, on the same subject. “The staff at ITRC were not only interested in my laboratory research but wanted to know how they could better disseminate their findings to government, industry and academia.”

“Anderson's visit felt like a homecoming for us too,” says Dhawan. “Diana is an ex-officio member of our research community and we were glad to have her with us again. She brought along a lot of new research ideas and laboratory applications that we hope to integrate into our educational and training activities in the months ahead.”

Prahlad K. Seth, the Director of ITRC, puts Anderson's visit in this perspective: “The TWAS/ICSU/UNESCO lectureship programme has given our

researchers opportunities to share ideas with some of the world's most prominent scientists. During her visits, Anderson, for example, has discussed the latest methodological issues in genotoxicity with some of India's most eminent researchers in the field.

The effort fits in nicely with other partnerships that we have developed,” Seth continues, “for example, with the Council of Scientific and Industrial Research-*Deutscher Akademischer Austauschdienst* (CSIR-DAAD) exchange programme that has been forged between India and Germany. All together, these initiatives are helping us build a critical mass of expertise in variety of related fields, including genetic toxicology, xenobiotic metabolism and pulmonary toxicology.”

Dhawan has developed two main areas of research. The first focuses on the different ways in which cytochrome P450 proteins express themselves inside the brain and the role that such expressions play in episodes of chemical toxicity within the brain.

“The second area of our studies, which relies on blood-related comet assays, sheds light on the potential damage to DNA in humans who are exposed to cigarette smoke, lead and other harmful pollutants.” Dhawan

hopes that these studies will help “uncover compounds that cause DNA damage and may act as mutagens and carcinogens, as well as those that may act as antimutagens and anticarcinogens. The latter may provide insights into potential anti-cancer compounds and therapies.”

On a more general level, “the research being conducted by Dhawan and his colleagues,” says Seth, “could eventually provide a scientific explanation for the different responses that various segments of India's population have to environmental insults. That fits into a growing effort in India to use science to address critical public health issues.” There are promising



signs, in terms of funding trends, research output and growing citizen awareness of its value, that science in India has reached a new, more sustainable level, of public support. But Seth cautions that “much more remains to be done and that programmes like TWAS’s lectureship programme are one way to help ensure that progress on all fronts continues.”

“There are three important steps that the scientific community in the developing world can take to help advance their own cause,” notes Seth. “First, it should draw up specific plans for addressing critical national problems — for example, plans for dealing with issues related to health, food, energy and the environment. Public support for science will only take place over the long term if science makes an earnest attempt to tackle problems that are important to the public.”

“Second, the scientific community in developing countries should identify areas of science in which it enjoys a strategic advantage due to its indigenous knowledge or unique resource base. That would allow the science to flourish without being squeezed by outside competition.”

“And third, scientific institutions in the Third World that gain a level of expertise within certain fields of study should share their knowledge with their counterparts in other developing countries both at an individual and institutional level. That’s what we have done at ITRC where we now offer training opportunities to both scientists and students interested in toxicology.”

Such partnerships extend to the North as well. As Anderson explains: “I applied for the TWAS lectureship programme because I believe it is essential to nurture the fruits of science and technology not just at the place of their discovery, but wherever they may be useful. The toxicology research and assays we have developed at my research centre are particularly important to Third World countries. Because I already had excellent contacts with scientists at ITRC, I knew that my return would be particularly productive.”

In the future, Anderson and Dhawan plan to actively continue their collaboration both in India and the United Kingdom. On the heels of receiving India’s Council for Scientific and Industrial Research (CSIR)

“Young Scientist Award” in 1999, Dhawan was granted a BOYSCAST (Better Opportunities for Young Scientists in Chosen Areas of Science and Technology) Fellowship from India’s federal Department of Science and Technology. The fellowship has enabled Dhawan to travel to the United Kingdom for a year to pursue research on issues related to human molecular epidemiology. Building on the knowledge and experience he has acquired in the past, Dhawan has focused on ways of determining whether populations have been exposed to hazardous chemicals that may prove detrimental to their long-term health.

During his stay, one of Dhawan’s objectives has been to refine his ability to use and analyze comet assays. Another objective has been to learn how to detect oncoproteins, which are probably early markers of cancer, in human plasma samples, and to identify damaged chromosomes using fluorescence *in situ* hybridization techniques in lymphocytes.

“Mastering such techniques,” observes Anderson, “could prove useful in uncovering early exposure to a host of pollutants. Equally important, once learned, the techniques can be easily transferred to laboratories in India where they can be put to work protecting the health of common people who might be at risk and don’t know it.”

And that’s just one more reason why the TWAS lectureship has proven to be more than just talk. The project’s co-sponsors — TWAS, ICSU and UNESCO — have together created a partnership that fosters partnerships among scientists and scientific institutions dedicated to advancing goals of common concern to common people. ■

“The TWAS/ICSU/UNESCO lectureship programme has given our researchers opportunities to share ideas with some of the world’s most prominent scientists.”

For additional information about the TWAS/ICSU/UNESCO Lectureships in Science and Sustainable Development programme, please contact  Helen Grant, Third World Academy of Sciences (TWAS), c/o the Abdus Salam Centre for Theoretical Physics (ICTP), 34014 Trieste, Italy; phone: +39 040 2240387; fax: +39 040 224559; e-mail: info@twas-online.org; or see the TWAS website at www.twas-online.org



TWAS IN TEHRAN

MINISTER MOSTAFA MOIN, ISLAMIC REPUBLIC OF IRAN, DISCUSSES THE STATE OF SCIENCE AND TECHNOLOGY IN HIS COUNTRY ON THE EVE OF TWAS 12TH GENERAL MEETING IN THERAN.

The 12th General Meeting of the Third World Academy of Sciences (TWAS) will take place in Tehran, Iran, between 21-26 October. More than 100 scientists from around the world are expected to attend. The government of the Islamic Republic of Iran will host the event, and the republic's president, Syed Mohamad Khatami-Ardakani, will give the opening address. In addition to reviewing the activities of TWAS and the Third World Network of Scientific Organizations (TWNSO) over the past year and honouring TWAS and TWNSO award winners for 1999, the meeting will seek to achieve the following goals:

- *Showcase the work of scientists and scientific institutions in the Islamic Republic of Iran to promote collaboration between Iranian scientists and their colleagues in other countries.*
- *Examine strategies for increasing the capacity of developing nations to take full advantage of unprecedented advances in biotechnology for economic development.*
- *Encourage a science-based dialogue among nations not only as a means of advancing science-based development worldwide but as a valuable tool for bridging the cultural divide among nations.*

The first two days of the conference, 21-22 October, will be devoted to the annual meetings of TWAS and TWNSO, including business sessions of the TWAS council, TWNSO general assembly and TWNSO executive board. The concluding two days of the conference, 23 -24 October, will be devoted to lectures, symposia and workshops, including talks by TWAS medal and prize winners. Among those who have agreed to participate in the conference are H. Schopper, retired director general of CERN (the European Laboratory for Particle Physics), Switzerland; A. Jalali, permanent delegate of the Islamic Republic of Iran to the

United Nations Educational, Scientific and Cultural Organization (UNESCO); Thomas R. Odhiambo, honorary president of the African Academy of Sciences; G.O.P. Obasi, Secretary General, World Meteorological Organization ((WMO); E. Norby, Secretary General, Royal Swedish Academy of Sciences; Yong Xiang Lu, President of the Chinese Academy of Sciences; José I. Vargas, former minister of science and technology, Brazil, immediate past president of TWAS and currently permanent delegate of Brazil to UNESCO; Y.W. Kan, professor, Department of Laboratory Medicine, University of California, San Francisco, USA; and A.H. Zakri, deputy vice-chancellor, academic affairs, Universiti Kebangsaan Malaysia.

In early fall, the editor of the TWAS Newsletter asked Mostafa Moin, Minister of Science, Research and Technology of the Islamic Republic of Iran, to present his views on the present and future role of science and technology in his home country and throughout the developing world, and to outline his thoughts on the goals of the conference and Iran's participation in the global scientific and technology community. In the following article, which is based on the interview, Moin focuses on the positive impacts that a revitalized system of higher education would have on Iranian society, not only in terms of the nation's educational well-being but also in terms of its economic prosperity, technical know-how and cultural values.

At the dawn of the third millennium, the potential growth and development of all nations rests on a foundation of science and technology. Those nations capable of acquiring and applying scientific and technological knowledge will be able to provide their people with unlimited opportunities to live honourable and proud lives. How prepared are

developing nations to meet the scientific and technological challenges of the future? A few indices reveal the state of the playing field. For example, developed countries have between 2500 and 5000 students for each 100,000 population compared to between 500 and 2000 students for each 100,000 population in developing nations (Iran has about 2100 students for each 100,000 population). Similarly, developed nations have between 2500 and 6700 researchers for each 1 million population; developing nations have between 150 and 2200 (Iran has about 340 researchers for each 1 million population). Developed countries spend between 3 and 4.6 percent of their gross national product (GNP) on research; developing countries spend between 0.25 and 8 percent of their GNP on research (in Iran, the percentage is 0.44 percent). Finally, the ratio of lecturers and instructors to students is 5 to 7 in developed countries, while the ratio lies between 5 and 24 in developing countries (in Iran, the ratio is 22 students for each lecturer and instructor). The Islamic Republic of Iran launched an aggressive programme for science-and technology-based development about a decade ago. A key component of this strategy has been to reform our university system in ways that draw institutions of higher education into closer collaboration with other sectors of society. International scientific indices, together with our own research studies, suggest that Iran is in the middle of the spectrum of developing countries when it comes to science and technology. But that places our nation well behind advanced and industrial countries in terms of a host of factors related to science and technology. In fact, studies conducted by Iranian researchers conclude that Iran is about 40 years behind advanced nations in the acquisition and application of scientific and technological knowledge. That gap will likely widen, not shrink, given the accelerated pace of scientific and technological progress in advanced countries. How do we intend to improve the state of our universities and thus the state of science and technology in

Iran? Through a variety of measures including:

- Increasing governmental and nongovernmental funding for universities.
 - Nurturing a healthy cultural environment within universities that is attentive to Islamic values.
 - Expanding access to universities, especially to women.
 - Offering more opportunities to attend university activities through evening classes, part-time curricula, and non-matriculating courses.
 - Focusing university curriculum on disciplines that reflect and respond to society's needs.
 - Devising quantitative measures for assessing the quality of higher education.
 - Building human resources and laying the groundwork for applications of science and technology to serve everyday problems.
 - Improving the nation's university infrastructure, especially its computer and internet facilities.
 - Encouraging regional markets to take advantage of current demands for home-grown technologies by tapping university expertise.
- Despite our desire to advance the frontier of science and technology, we realize that many obstacles remain in our path. Among the most critical impediments are:
- Lack of long-term planning for the development of higher education and the absence of systematic assessments of research capabilities and priorities.
 - Inadequate physical facilities and insufficient conceptual flexibility and dynamism in higher education that prevents the system from responding quickly to advances in science and technology and changing social needs.
 - Low levels of productivity among faculty, especially when it comes to the production of knowledge and services that society finds useful.
 - Poor reputation of Iranian universities in the global community of higher education.



Mostafa Moin

- Limited number of international relationships and programmes for international cooperation.
- Inefficient information systems for the exchange of data and findings among researchers, and the absence of a comprehensive system for the distribution of research results to a larger public.
- Too few centres of scientific excellence that can set the standards for others to emulate.

Globalization has made it necessary for all nations to embrace modern technologies. The future of developed and developing nations alike is driven largely by scientific and technological forces that now reach into every corner of every endeavour in every nation on earth. No nation, in fact, can hope to achieve its economic and social goals without a full understanding and appreciation of the power of science and technology.

Such forces have made the close relationships that have always existed among education, research and technology more intricate than ever. It has also required nations to think more deeply about development inputs and outputs than they have in the past. In short, processes and products have never been more closely intertwined and human resource capacity and economic and social well-being never more intimately connected. To overcome underdevelopment, developing nations must increase their scientific and technological know-how. That, in turn, requires developing nations to alter the rules, structures, relationships and outlooks responsible for the separation that has taken place between education, research and technology in many societies in the South. Nurturing a proper environment, which is infused with a new energy for scientific and technological development, is one of the major challenges facing Iran and other developing countries. The challenge extends beyond funding (however important it may be) into the realms of ideas, administration, management and policy. What developing nations must do is to develop a sensibility



towards science and technology that is consistent with their traditional cultural values and beliefs.

The first steps in this effort are straightforward.

We must launch detailed studies to evaluate the strengths and weaknesses of our nation's scientific and technical capabilities and provide sufficient financial resources to overcome the shortfalls that are preventing us from reaching our full scientific and technical potential. Subsequent steps, which include raising public appreciation and support for science and technology, will require more nuanced policies to succeed. Through all of these efforts, government must be actively engaged — indeed must take a leadership role. By encouraging investments in research and development, government can spark innovations in the production of goods and services that benefit people, thereby helping to build support for these endeavours. By supporting improvements in education at all levels, government can help develop the human resources needed to embrace and advance science and technology. By setting an agenda and preparing blueprints for progress, government can help ensure that the development of science and technology takes place in an efficient and timely manner. Finally, by setting a science and technology agenda that is tailored to the religious principles and morés of a nation, government can help weave scientific and technological developments into the fabric of the nation's traditional values, which may be the only way to guarantee that the advances of science and technology endure. ■



Syed M. Khatami-Ardakani

For detailed information about the TWAS 12th General Meeting in Tehran, please contact
 ❖❖❖ **TWAS**, c/o the Abdus Salam International Centre for Theoretical Physics (ICTP), Strada Costiera 11, 34014 Trieste, Italy; phone: +39 040 2240 327; fax: +39 040 224559; e-mail: tehran@twas-online.org, or ❖❖❖ **the Tehran Secretariat**, Office for International Scientific Cooperation, Ministry of Science, Research and Technology, PO Box 15875-4375, Ustad Nijatullahi Ave., Tehran, Iran, I.R.; phone: +98 21 889-1065; fax: +98 21 882 7234; e-mail: oisc@mche.or.ir.



NEW REGIONAL OFFICES FOR TWAS, TWNSO

NIGERIA AND PAKISTAN BOTH RECENTLY LAUNCHED REGIONAL FIELD OFFICES TO PROMOTE TWAS- AND TWNSO-RELATED ACTIVITIES. THE GOAL IS TO PROVIDE A CLOSE-AT-HAND FORUM FOR THE EXCHANGE OF INFORMATION RELATED TO SCIENCE-BASED DEVELOPMENT.



The governments of Nigeria and Pakistan have each opened regional field offices for the Third World Academy of Sciences (TWAS) and Third World Network of Scientific Organization (TWNSO).

The Nigerian office will be located in the capital city of Abuja, and the Pakistani office in the capital city of Islamabad. Each office will seek to facilitate the distribution of information concerning TWAS and TWNSO and, more generally, to serve as clearing houses for news and activities concerning science and technology in the developing world.

The Nigerian TWNSO office is housed in a downtown office building equipped with computers and full internet connections. The official ceremony marking the opening of the office took place on 15 June and was attended by the Minister of Science and Technology, Chief Ebitimi Banigo; TWAS

Executive Director Mohamed Hassan; TWAS Founding Fellow and Honorary President of the African Academy of Sciences T.R. Odhiambo; and TWAS Vice President and Secretary General of the World Meteorological Organization, G.O.B. Obasi.

“We plan to make the office a major regional hub for research and training activities in science and technology not only in Nigeria but in other nations throughout sub-Saharan Africa,” says Chief Banigo. “The ministry’s upcoming budget,” he adds, “will include funding for activities that will be organized by the TWNSO field office in 2001. Issues related to biotechnology and information technology in sub-Saharan Africa are likely to be the focus of our concern.”

As part of a broader strategy, Chief Banigo noted that the TWNSO field office in Nigeria would push for the creation of a regional network among

TWNSO member states in sub-Saharan Africa and seek to enhance the commitment of African nations to science- and technology-based development — in part, by encouraging the heads of African governments to declare that they will invest at least 2 percent of their gross domestic product (GDP) in science and technology activities. Chief Banigo also declared that the TWNSO field office would help both TWNSO and TWAS gain observer status within the Organization of African Unity (OAU).

Meanwhile, a memorandum of understanding signed by TWAS, TWNSO and COMSATS (the Commission on Science and Technology for Sustainable Development in the South), which calls for greater coordination in the dissemination of information on science and technology activities in Pakistan and other nations in the region, has led to the creation of a TWAS/TWNSO regional field office. Officially titled a “coordinating” office, the secretariat has been given office space in the headquarters of COMSATS.

Ishfaq Ahmad, Chairman of the Pakistan Atomic Energy Commission, who participated in the opening ceremony for the office in July, notes that “the coordinating office is designed to meet a long-standing need for the exchange of information among science and technology institutions throughout the region. I am convinced that such an exchange will lead to more effective science policies and programmes in the future.”

Hameed Ahmed Khan, executive director of COMSATS, expressed hope that the office “would strengthen the already strong relationship between TWAS/TWNSO and COMSATS.”

“The ultimate goal of the office,” Khan adds, “is not just to advance the study of science but to put science and technology to use for social and economic development.” ■

For additional information concerning the TWNSO field office in Abuja, Nigeria, contact
❖❖❖ **Federal Ministry of Science and Technology**, Federal Government Secretariat, Shehu Shagari Way, PMB 331, Abuja, Nigeria; phone: +234 9 5233397, 5235902, 5235764; fax: +234 9 5234590, 5233903.

For additional information about the TWAS/TWNSO/COMSATS coordinating office in Islamabad, Pakistan, contact
❖❖❖ **COMSATS**, H 55 Street 1, F-6/3, Islamabad, 44000, Pakistan; phone: +92 51 9204900; fax: +92 51 9216539; or e-mail: drhakhan@comsats.net.pk.



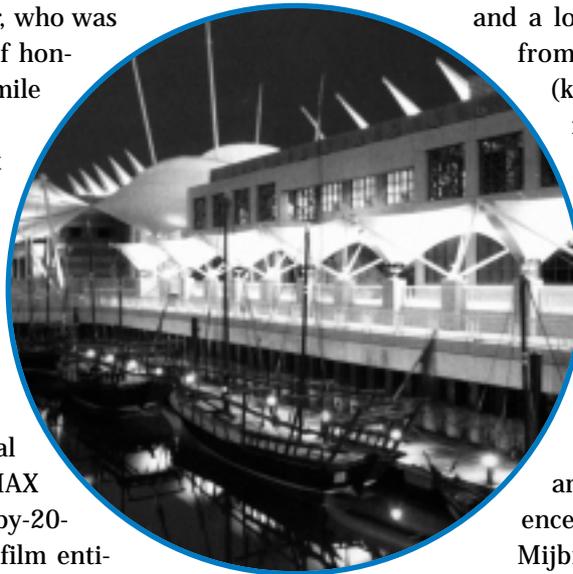
KUWAIT OPENS NEW SCIENTIFIC CENTRE

A RECENTLY COMPLETED 20,000-SQUARE-METRE SCIENCE FACILITY SEEKS TO EDUCATE CITIZENS OF ALL AGES ABOUT ARABIA'S UNIQUE COASTAL ENVIRONMENT — WHERE THE DESERT SANDS MEET THE SEA.

The Kuwait Scientific Center, a gleaming glass structure accented by earth tones and soaring canvas canopies, officially opened in April. The new centre, which resides on the edge of the Arabian Sea in Salmiya, commands an imposing view of Kuwait Towers and the Gulf.

The centre's opening ceremony was hosted by His Highness the Amir, who was accompanied by his guest of honour Lebanese President, Emile Lahud.

Funded by the Kuwait Foundation for the Advancement of Sciences (KFAS), which also supports the *TWAS Newsletter*, the centre includes the largest aquarium in the Middle East (that offers simulations of Arabian Gulf desert, coastal and sea habitats); an IMAX Theater with a 15-metre-by-20-metre screen showcasing a film entitled "The Living Sea" (that features music by pop singer Sting); and an interactive "Discovery Place," where young children are encouraged to learn about science through hands-on exhibits and demonstrations (which range from an image-altering funhouse for younger visitors to CD-Roms for older visitors illustrating and explaining the shocking movement of the Earth's tectonic plates during



earthquakes). The centre also has a restaurant and gift shop.

Daily programmes, meanwhile, are designed to present a wide variety of science-related activities that are both educational and entertaining. For example, recent demonstrations have included natural dye making, "the walk" of the centipede, and a look at "what makes ships go" from historic Kuwaiti sailboats (known as *dhow*s) to modern football-field size tankers.

As Ali A. Al Shamlan, KFAS Director General and TWAS Treasurer, noted in the opening ceremony for the centre, the facility is designed to place "Kuwaiti youth at the heart of modernism, yet fortify them with the wisdom of the past and arm them with faith and science."

Mijbil S. Al-Mutawa, Chairman and Managing Director of the Scientific Center, adds that it is "our sincere hope that the facility will prove a source of knowledge, an educational aid for the learner, a means toward better understanding of our environment and an incentive to conserve and respect that environment. We equally hope that it will be a resort offering joy and useful entertainment." ■



PEOPLE, PLACES, EVENTS

ROHATGI HONOURED

- TWAS Associate Fellow (1989)

Pradeep Rohatgi, distinguished professor and director of the University of Wisconsin-Milwaukee's Centre for Composite Materials, has been awarded the American Foundrymen Society's Hall Heroult Award for Scientific Merit. Rohatgi was honoured for more than 35 years of achievement in the field of



Pradeep Rohatgi

composites. His work on cast aluminium composites during the 1960s, which included such breakthrough syntheses as aluminium-graphite, aluminium-silicon carbide and aluminium-flyash, ranks among the most significant developments in the history of metal casting. Rohatgi also founded the University of Wisconsin-Milwaukee's Centre for Composite Materials in 1994. In less than a decade, the centre has emerged as one of the world's foremost international casting facilitates for research and training. Rohatgi received his undergraduate degree from Banaras University in India and his doctorate from the Massachusetts Institute of Technology (MIT) in the United States. Before joining the University of Wisconsin-Milwaukee, he was professor at the Indian Institute of Science in Bangalore and the India Institutes of Technology in Kanpur and New Delhi. He also founded

and directed the Council of Scientific Industrial Research at Trivandrum and Bhopal, in India. Rohatgi has published more than 400 articles, edited six books and received 12 U.S. patents — all in the field of composites. His major research areas include materials science and technology, solidification, materials policy and composites. The ceremony for the Hall Heroult Award for Scientific Merit took place in April during the American Foundrymen's annual conference.

RIAZUDDIN RECEIVES AWARD

- TWAS Fellow (1993)

Riazuddin, director of the newly created National Centre for Physics, Quaid-i-Azam University, Islamabad, Pakistan, has recently received two prestigious awards: the United Nations Educational, Scientific and Cultural Organization (UNESCO) Albert Einstein Gold Medal for Basic Science and the 13th International Khwarizmi Award from the Iranian Research Organization of Science and Technology. Both awards were conferred in Tehran, Iran, in early February. Riazuddin, who was born in Ludhiana, India, received his academic training from M.A.O. College, Government College, and Punjab University in Pakistan, and the University of Cambridge in the United Kingdom. During his long and distinguished career, he has worked at universities and research centres in the United States, Saudi Arabia, the United Kingdom, and Pakistan. Among his most noteworthy accomplishments are the founding of the Institute of Physics at Islamabad University and, more recently, the launching of the National Centre

for Physics at Quaid-i-Azam. Riazuddin is a fellow at the Pakistan Academy of Sciences and a member of the New York Academy of Sciences. His major field of interest is theoretical particle physics, in particular the study of gauge theories, heavy quark spin symmetry and particle interactions.

RENE FAVALORO. 1923-2000

- TWAS Fellow

Rene Favaloro, 77, died on 26 July. He was elected to the Academy last year and had been invited to attend the induction ceremony at the TWAS 12th General Meeting scheduled to take place in Tehran, Iran, this October. Favaloro was born in La Plata, Argentina. He received his medical degree from the University of La Plata in 1949 and was subsequently trained as a surgeon at the University of La Plata and Cle-



Rene Favaloro

veland Clinic in the United States. Favaloro, who founded and then directed the Favaloro Foundation's Institute of Cardiology and Cardiovascular Surgery in Buenos Aires, was a pioneer in the study of coronary bypass surgery. His work, in fact, was instrumental in making bypass surgery a safe and reliable procedure that is now used worldwide to save an estimated one million lives each year. Favaloro was



also a key figure in efforts to train a new generation of cardiovascular surgeons in Latin America. Among his numerous inventions are the use of internal mammary arteries for grafting and the creation of tunnelling instruments for the implantation of mammary arteries during bypass surgery. Favalaro also made critical contributions to the surgical treatment of acute aortic dissections and aortic aneurysms. He was the author of five books and more than 350 articles and the recipient of many international awards and honours.

PRIZE FOR ENVIRONMENT

- Nominations from individuals and institutions are invited for the first-ever Zayed International Prize for the Environment. The prize will be given in honour of His Highness Sheikh Zayed Bin Sultan Al Nahyan, President of the United Arab Emirates and Governor of Abu Dhabi. Worth US\$1 million (making it one of the largest environmental prizes in the world), the prize is part of a larger effort designed to promote sustainable development through environmental protection. In addition to administering the Zayed prize, the newly launched initiative will sponsor regional and international conferences and fora on environmental issues, publish a scientific journal, support scientific research, and help raise environment awareness through public lectures, seminars and workshops. For additional information, please contact The Zayed International Prize for the Environment, PO Box 28399 Dubai, United Arab Emirates, phone +971 04 332 6666; fax +971 04 322 6777, or e-mail: zayedprz@emirates.net.ae. Nomi-

nations may also be completed on the web at www.zayedprize.org.ae.

DIVERSITY PLUS

- GRCS, Inc./DIVERSITY has issued a call for nominations for the William L. Brown Award for Excellence in Genetic Resources Conservation and Use. The international award, which carries a cash prize of US\$10,000, will be given annually to a person or an organization that has played an important role in advancing efforts to conserve genetic diversity. Details on the nomination process may be found at <http://www.diversitymag.org>.



C.N.R. Rao

RAO RECOGNIZED

- TWAS President and Founding Member **C.N.R. Rao** has recently received two honours. He has been elected a foreign member of the Academy of Sciences of France, making him one of only two Indian scientists currently belonging to this exclusive 65-member organization. The induction ceremony took place in Paris early this summer. Rao also has received the Royal Society's prestigious Hughes Medal. The medal recognizes original discoveries in the physical sciences, in particular discoveries related to electricity and magnetism or their applications. Rao, who is the Linus

Pauling Research Professor of the Jawaharlal Nehru Centre for Advanced Scientific Research in Bangalore, India, is a member of the Royal Society in London, the U.S. National Academy of Sciences, the Russian Academy, the Japan Academy, Academie Europea, the Pontifical Academy, and the American Philosophical Society. He has received more than 20 honorary university degrees.

KIND WORDS

- **B. Ananthanarayan** from the Centre for Theoretical Studies, Indian Institute of Science, Bangalore, India, recently wrote the Academy and the Abdus Salam International Centre for Theoretical Physics (ICTP) to express his sincere thanks to the ICTP-TWAS Donation Programme. "At our Centre for Theoretical Studies," Ananthanarayan noted, "we are maintaining a departmental library primarily in the areas of particle physics, field theory and mathematical physics. We acknowledge the kind assistance of the ICTP-TWAS Donation Programme in handling shipping costs for journals being gifted away by libraries in Switzerland, France, Belgium and elsewhere, which has enabled the Centre for Theoretical Studies to expand its journal collection in these areas."

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 543 members from 75 countries, 61 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 (TWNSO), 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.twnso.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