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NAM S&T Newsletter

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From the Dg'S Desk

Warmest greetings to esteemed readers!!

The NAM S&T Centre in partnership with the Pardis Technology Park (PTP), Tehran, Iran organised an International Training Workshop on 'Commercialisation of Technology' during 23-26 May 2016 at the PTP, which was attended by 26 professionals from 20 NAM countries (Cambodia, Cuba, Ghana, India, Iran, Iraq, Kenya, Malaysia, Mauritius, Nigeria, Oman, Pakistan, Palestine, South Africa, Sri Lanka, Tanzania, Togo, Venezuela, Zambia and Zimbabwe) who are engaged in R&D, policy making and implementation of technology transfer and commercialisation activities, for up-gradation of their skills and sharing experiences. The Resource Persons for training component of the activity were from Austria, Belgium, Germany, Iran, Switzerland and the USA.

On 14th May 2016 the NAM S&T Centre at its premises organised a get together of 11 RTF-DCS Fellows from Cameroon, DRC Congo, Ethiopia, Mongolia, Myanmar, Nepal, South Africa, Palestine and Sudan affiliated with the institutions located in and around Delhi for formal introduction and interaction. Their Indian Research Supervisors from the International Centre for Genetic Engineering and Biotechnology (ICGEB), National Institute of Solar Energy (NISE), All India Institute of Medical Sciences (AIIMS), Jawaharlal Nehru University (JNU), Indian Agriculture Research Institute (IARI); National Institute of Malaria Research (NIMR), and Acharya Narendra Dev College and South Campus, University of Delhi, and also an official of the Department of Science & Technology (DST), Government of India joined the event.

The 2nd NAM S&T Centre - DST (South Africa) Minerals Processing and Beneficiation Training Programme aimed at capacity building in this area in the NAM countries was inaugurated at MINTEK, South Africa on 13th May 2016, in which 20 trainees from 13 Non-Aligned Movement (NAM) member states are being hosted by South Africa for three months duration.

On 10th June 2016 I had the privilege of interacting with the sponsors of the UNESCO UNISA Africa Chair in Nanosciences & Nanotechnology (U2ACN2), University of South Africa in Pretoria over videoconferencing during its 1st Mid-Term Peer Review. The performance of U2ACN2 was judged par excellence.

Happy Reading!

(Arun P. Kulshreshtha)

Centre Organised

INTERNATIONAL TRAINING WORKSHOP ON COMMERCIALISATION OF TECHNOLOGY

TEHRAN, IRAN, 23-26 MAY 2016

Developing countries have begun to recognise the central role played by commercialisation in raising the quality of life of the people. A key element in the process of commercialisation of technology in a developing country is the consultation between the government, institutions and industry, which need to include the specific technological needs and human / material resources of the country. The transfer and commercialisation of technology and related policy issues is one of the identified thrust areas of the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) for capacity building and exchange of information and expertise among the developing countries.

Keeping the above in view, the NAM S&T Centre in partnership with the Pardis Technology Park (PTP) of Tehran organised an International Training Workshop on 'Commercialisation of Technology' during 23-26 May 2016 at PTP, which

Commercialisation of Technology Training Workshop, Tehran, Iran, Inaugural Session: (L to R) Prof. Dr. Arun P. Kulshreshtha, Dr. Ali M. Birang and Mr. AminReza Khaleghian

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brought various stake holders, viz. scientists, experts and professionals engaged in R&D, policy making and implementation, to a common platform for up gradation of their skills and sharing views and experiences in the transfer and commercialization of technology.

The Opening Ceremony commenced with a welcome note by Mr. Amir Mehmanchi, Public Relations & International Expert of PTP. Mr. AminReza Khaleghian, Director General for International Affairs & Public Relations of PTP gave a brief address after which Prof. Dr. Arun P. Kulshreshtha, Director General, NAM S&T Centre addressed the audience and presented the genesis of the event touching upon the basic issues related to technology transfer and commercialisation and also gave a short description of the activities of the inter-governmental organisation headed by him. The Chief Guest, Dr. Ali M. Birang, Deputy of International Affairs and Technology Exchange, Vice-Presidency for Science and Technology, Islamic Republic of Iran in his Inaugural Address remarked about the Nanotech and the law which the government had passed in 2013 that supports the knowledge and scientific development of the country. He also shared his experiences from the past.

The Tehran Training Workshop was attended by 26 senior professionals from 20 NAM countries, including Cambodia, Cuba, Ghana, India, Iraq, Kenya, Malaysia, Mauritius, Nigeria, Oman, Pakistan, Palestine, South Africa, Sri Lanka, Tanzania, Togo, Venezuela, Zambia and Zimbabwe and the host country Iran. The Resource Persons for the training component of the event were from Austria, Belgium, Germany, Iran, Switzerland and the USA.

The 23 foreign participants were from Cambodia [Mr. Teav Rongsa, Director, GS-NSTC (National Science and Technology Council), Ministry of Planning, Phnom Penh]; Cuba [Dr. Armando Rodríguez Batista, Director, Ministry of Science, Technology and Environment, Havana]; Ghana [Mr. Edem Cudjoe Bensah, Head / Sr. Researcher, Kumasi Polytechnic, Kumasi]; India [Dr. Raj Kumar Sharma, Scientist-E, International Multilateral & Regional Cooperation (IMRC), Department of Science & Technology (DST), Government of India, New Delhi and Ms. Ritu Kumari, Research Associate, NAM S&T Centre]; Iraq [Dr. Thanaa Hussein Abd Al-Badri, Head of Multimedia Department, Ministry of Science and Technology (MOST), Baghdad Al-Jadriah]; Kenya [Dr. John Muyega Ayisi, Deputy Director, Ministry of Education, Science & Technology, Nairobi]; Malaysia [Mr. Ahmad Syahir bin Mohd Nasir, Principal Assistant Secretary, Innovation and Commercialisation Division, Ministry of Science, Technology and Innovation (MOSTI) Putrajaya]; Mauritius [Mr. Mohammad Reza Soodin, Research Officer, National Computer Board, Port Louis]; Nigeria [Mr. Igili Andrew Ojo, Chief Scientific Officer, Federal Ministry of Science and Technology, Abuja; Dr. Mrs. Mercy Sule Bassi, Deputy Director & Head of Advance Materials, Raw Materials Research and Development Council (RMRDC), Abuja; Dr. Danazumi Mohammed Ibrahim, Director General/CEO, National Office for Technology Acquisition and Promotion (NOTAP), Abuja; and Mr. Samuel Ojonimi Eneanya Acting Director, NOTAP, Abuja]; Oman [Ms. Sheikha Nasser Ali Al Akzami, Deputy Director, Innovation & Entrepreneurship Department, Sultan Qaboos University, Al Khodh]; Pakistan [Dr. Syed Shahid Hussain, Executive Director, Commercialization Cell, Ministry of Science & Technology, Islamabad]; Palestine [Mr. Zaki S.S. Afaghani, Administrator and Finance Director, Palestinian Incubator for Energy (PIE), Jericho]; South Africa [Mr. Elijah Mokhethi, Head, Energy, Technology Innovation Agency, Menlyn, Pretoria]; Sri Lanka [Mrs. R. Wijialudchumi, Secretary to the Government, Ministry of Science, Technology and Research, Colombo]; Tanzania [Dr. Mafunda Dugushilu, Director, Innovation, Entrepreneurship & Competitiveness, Tanzania Commission for Science and Technology (COSTECH), Dar es Salaam]; Togo [Dr. Edjame Kodjovi Sidéra, Senior Lecturer, WASCAL University, Lome]; Venezuela [Prof. Dr. Anwar Salem Hasmy Aguilar, Professor, Simon Bolívar University and President, National Observatory for Science,

Group photo of Commercialisation of Technology Workshop, Tehran, Iran, May 2016

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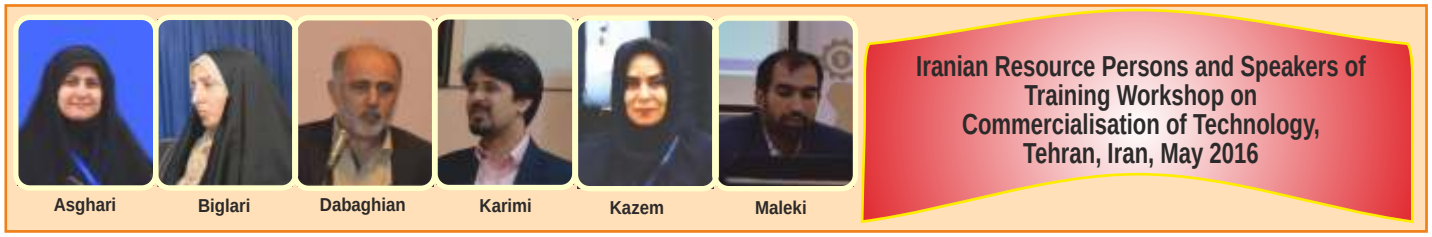
Technology and Innovation, Ministry for Higher Education, Science and Technology, Caracas]; Zambia [Mr. David Shula Mpundu, Manager, Technology & Marketing, National Technology Business Centre, Lusaka]; and Zimbabwe [Prof. Wilson Parawira, Executive Dean, Faculty of Science, Bindura University of Science Education, Bindura]. The NAM S&T Centre was represented by its Director General, Prof. Arun Kulshreshtha and Mr. Madhusudan Bandopadhyay, Senior Expert.

Eight Resource Persons, who made technical presentations during the Training Workshop, were Prof. Rainer Hasenauer, Professor of Marketing, Vienna University of Economics and Business, Austria; Prof. Charles M. Giacoma, Director General, European Institute for Export Compliance (EIFEC), Brussels, Belgium; Prof. Dr. Bertram Lohmüller, Director, Steinbeis Global Institute Tübingen; Dr. Ali Maleki , Faculty Member, Sharif University, Tehran, Iran; Mr. Mahmoud Karimi, CEO, Simorgh Investment Group, Iran; Mr. Seyed Hosein Dabaghian, Deputy of Investment, Innovation and Prosperity Fund, Behzad, Iran; Prof. Arash Golnam, System Dynamics Modeler, Greenwood Strategic Advisors and Lecturer, Business School Lausanne (BSL), Chavannes, Switzerland; and Prof. Michael O'Duffy, CEO, Centre for Software Engineering, The STARS Group, USA.

The overall programme of the Training Workshop was conducted in eleven technical sessions and the Plenary Concluding Session. Two sessions of the event were conducted in the Conference Hall of the Tehran International Fairground.

The presentations made by the Resource Persons were by Prof. Rainer Hasenauer of Austria on 'Commercialization'; by Prof. Charles M. Giacoma of Belgium on 'Studying the Commercialisation of Indigenous Model'; by Prof. Dr. Bertram Lohmüller of Germany on 'From Idea to Innovation'; by Dr. Ali Maleki of Iran on 'Innovation Survey In Iran'; by Mr. Mahmoud Karimi on 'Innovation Marathon (Iranian Experiences: From Start-up to IPO)'; by Mr. Seyed Hosein Dabaghian on 'Venture Capital Success Factor'; by Prof. Arash Golnam of Switzerland on 'System Dynamics and Technology Diffusion'; and by Prof. Michael O'Duffy of the USA on 'Innovation Start-Up'.

The presentations made by the participants from the NAM countries were on 'LYLY Rice Crackers - A "Lucrative Trademark of Vivid Creation" by Mr. Teav Rongsa; 'Cuban National Innovation System' by Dr. Armando R. Batista; 'Promoting Renewable Energy Technology Transfer to Ghana' by Mr. Edem C. Bensah; 'Public R&D Funding - The Indian Scenario for Lab to Market Ecosystem' by Dr. R.K. Sharma; Current Status of Biotechnology Commercialisation in India' by Ms. Ritu Kumari; 'Difficulties in Technology Transfer and Commercialisation of Public Funding Projects: Iraqi Projects Practices Case Study' by Dr. Thanaa H. Abd Al-Badri; 'Initiatives to promote Commercialisation of Research



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Outputs from Kenyan Universities' by Dr. John M. Ayisi; 'Malaysia Commercialisation Year' by Mr. Ahmad Syahir bin Mohd. Nasir; 'Technology Transfer and Commercialisation of Technologies in Mauritius' by Mr. Mohd. Reza Soodin; 'Commercialisation of Technologies: Experience by FMST Committee on Commercialisation of Technologies in Nigeria' by Mr. Igili A. Ojo; 'Commercialisation of Research and Development Results in Nigeria: The Experience with Copper Sulphate Production' by Dr. Mrs. Mercy Sule Bassi; 'The Role of Government in supporting Technology Commercialisation in Nigeria' by Dr. Danazumi Mohd. Ibrahim; 'The Socio-economic Imperatives of Intellectual Property (IP) Protection in Technology Commercialisation' by Mr. Samuel O. Eneanya; 'Technology Transfer at Sultan Qaboos University: Challenges and the Way Forward' by Ms. Sheikha Nasser Ali Al Akzami; 'Research, Innovation and Commercialisation: Current Status in Pakistan' by Dr. Syed Shahid Hussain; 'Palestinian Incubators: Challenges and Opportunities' by Mr. Zaki S.S. Afaghani; 'From Innovation to Commercialisation' by Mr. Elijah Mokhethi; 'Innovation Eco System Development in Sri Lanka' by Mrs. R. Wijialudchumi; 'Commercialisation of Technologies from R&D Institutions in Tanzania: Major Drivers and Barriers' by Dr. Mafunda Dugushilu; 'What Technologies Togo can Commercialize and for What Kind of Population?' by Dr. Edjame K. Sidéra; 'Knowledge Transfer in Venezuela through a Participatory and Community Based Approach' by Prof. Anwar Hasmy; 'Challenges to Technology Transfer and Commercialisation - Case of NTBC in Zambia' by Mr. David Shula Mpundu; and 'Proposed Manual on Set of Incentives and Policy Instruments aimed at Promotion of Innovations and Commercialisation of Research and Development for the Government of Zimbabwe' by Prof. Wilson Parawira. The co-organiser of the Training Workshop Mr. M Bandyopadhyay from the NAM S&T Centre also made a presentation on 'Mechanisms for Transfer and Commercialisation of Technologies: Institution - Industry Links and Technology Business Incubators'.

The Plenary Session was chaired by Prof. Arun Kulshreshtha (DG, NAM S&T Centre). Extensive discussion took place on a draft 'Tehran Resolution on Transfer and Commercialisation of Technology', which in the end was unanimously adopted by the participants for its submission to the concerned ministries, agencies and other authorities in their countries. The Certificates of Participation were handed over to the Workshop participants by Mr. Amir Mehmanchi of Pardis Technology Park (PTP) and Prof. Kulshreshtha. The Session concluded with the Vote of Thanks by Mr. Mehmanchi. Some of the participants also thanked the local organisers for the fine arrangements made and conducting the Training Workshop.

During the workshop the participants sponsored by the NAM S&T Centre got an opportunity to visit the Innovation & Technology Exhibition (INOTEX 2016) and Milad tower in Tehran city.

Tehran Resolution

On Transfer and Commercialisation of Technology in Developing Countries

WHILE EXPRESSING GRATITUDE to the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) for organising the International Training Workshop on **"Commercialisation of Technology"** at Tehran, Iran from 23rd to 26th May 2016;

EXPRESSING APPRECIATION to the Pardis Technology Park, Tehran for co-organising and hosting this International Training Workshop;

RECOGNISING that a large number of technologies developed by researchers in academic and R&D institutions do not get transferred to the industry for commercialisation;

HAVING CONSIDERED that there is a need for cooperation in Science and Technology among NAM and other developing countries on mechanisms for Technology Transfer and Commercialisation;

HAVING DELIBERATED on various aspects of technology transfer, innovation and commercialisation of the newly developed technologies;

WE THE PARTICIPANTS OF THE WORKSHOP, representing the governments, institutions and agencies from Cambodia, Cuba, Ghana, India, Iran, Iraq, Kenya, Malaysia, Mauritius, Nigeria, Oman, Pakistan, Palestine, South Africa, Sri Lanka, Tanzania, Togo, Venezuela, Zambia and Zimbabwe;

UNANIMOUSLY RESOLVE AND RECOMMEND AS FOLLOWS:

1. Besides broader objectives of education and research, academic and research institutions should be supported to facilitate the transfer of technology and knowledge into the wider economy.
2. Academic and research institutions should adopt in-house mechanisms for Technology Transfer and Commercialisation;
3. Business incubators, Science Parks and similar entities should be established to provide infrastructural facilities and other services to entrepreneurs;
4. A public fund similar to Venture Capital should be made available for the creation of technology based enterprises and spin-offs;
5. National priorities should be taken into consideration while formulating policies for technology import to reduce Science & Technology gaps between North and South. The local hi-tech and indigenous innovation should be given preference.
6. Entrepreneurship and Intellectual Property Right (IPR) awareness programs should be promoted in all academic institutions.

THUS, RESOLVED AT TEHRAN, ISLAMIC REPUBLIC OF IRAN ON THIS DAY, THE 26TH OF MAY TWO THOUSAND AND SIXTEEN

GET-TOGETHER OF RTF-DCS FELLOWS IN NEW DELHI, INDIA

On 14th May 2016 the NAM S&T Centre organised at the premises of the Centre a get together of all the RTF-DCS Fellows who are currently affiliated with the institutions situated in Delhi and nearby locations along with their Indian Research Supervisors for a formal introduction and interaction and also for them to know more about the Centre.

Eleven RTF-DCS Fellows, who attended the get-together were Mr. Toghueo Kouipou Rufin Marie, Research Assistant, University of Youndé, Cameroon; Mr. Dongang Nana Rodrigue Roman, Research Assistant and PhD Student, Institute of Medical Research and Medicinal Plants Studies (IMPM), Cameroon; Mr. Wontchui Tanze Thierry, Ph.D. Student, Department of Physics, University of Ngaoundere, Cameroon; Mr. Rubabura Kituta Jean Augustin, Fellow Researcher, Research Centre in Natural Sciences (CRSN-Lwiro), DRC Congo; Mr. Tilahun Mekonnen Negassa, Lecturer- Researcher & PhD Student, Institute of Biotechnology, Addis Ababa University, Addis Ababa, Ethiopia; Ms. Pagmaa Baldorj, Researcher, Mongolian Academy of Sciences, Institute of General and Experimental Biology, Ulaanbaatar, Mongolia; Dr. Hnin Thae Mon, Associate Professor, University of Technology, Myanmar; Mr. Krishna Prasad Subedi, Physics Lecturer, Amrit Campus, Kathmandu, Nepal; Mr. Alireza Kiyaei, Researcher, University of Cape Town, South Africa; Dr. Louai Abdalla Mohammed Abdalla, Assistant Professor, University of Gezira, Wadmedani, Sudan; and Mr. Ghassan A. O. Tayh, PhD Researcher, El-Manar Universiy, Tunis, Tunisia (He is a citizen of Palestine).

The Research Guides and other Indian scholars accompanying the researchers were Dr. Dinkar Sahal, Staff Research Scientist, Malaria Research Group, International Centre for Genetic Engineering and Biotechnology (ICGEB); Dr. Tanushree Kaul, Research Scientist, ICGEB; Dr. Pradeep Chandra Pant, Scientist 'E'/Director (HRD and Innovative Projects), National Institute of Solar Energy (NISE), Ministry of New and Renewable Energy; Dr. Pratik Kumar, Professor & Head, Medical Physics Unit, Institute Rotary Cancer Hospital, All India Institute of Medical Sciences; Prof. Ramakrishna Ramaswamy, Professor, Jawaharlal Nehru University (JNU); Dr. Vartika Mathur, Assistant Professor, Department of Zoology, South Campus, University of Delhi; Dr. S. Subramanian, Principal Scientist, Division of Entomology, Indian Agriculture Research Institute (IARI); Dr. Vineeta Singh, Scientist - C, National Institute of Malaria Research, Indian Council of Medical Research (ICMR); Ms. Garima, Department of Zoology, South Campus, University of Delhi; and Ms. Payal Das, SRF, Acharya Narendra Dev College, University of Delhi. On behalf of the Department of Science & Technology (DST), Government of India, sponsors of the RTF-DCS scheme, Mr. Raj Kumar Sharma, Scientist-E (Director Grade), International Multilateral & Regional Cooperation (IMRC) attended the programme.

Prof. Dr. Arun P. Kulshreshtha, Director General, NAM S&T Centre welcomed the visiting foreign scientists and congratulated them at having been selected as Fellows under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme for their research training in India. He also thanked the Indian research supervisors for extending their help in implementing this important Destination India Fellowship programme. He then briefly spoke on the background, objectives and functions, programmes and achievements of the NAM S&T Centre.

Mr. R.K. Sharma from DST, Government of India mentioned about various schemes and programmes of the Department of Science & Technology on International Multilateral and Regional Cooperation in Science & Technology.

Mr. M. Bandyopadhyay, Senior Expert, NAM S&T Centre provided the genesis of the RTF-DCS programme and informed the visitors about the procedures followed for inviting the applications and for selection of the candidates. He expressed hope that the visit of the foreign scientists to India under the RTF-DCS scheme will be fruitful in the fulfilment of their research objectives.

The foreign scientists thanked the NAM S&T Centre for giving them the opportunity to work in prestigious research institutions in India which will greatly help them in their career. The Indian scientists expressed happiness that the NAM S&T Centre and DST have come together to start such a useful fellowship programme and offered to extend their cooperation in implementing this activity in the future years.

Group Photo of RTF-DCS Fellows with their Indian Research Supervisors

Science and Technology News in the Developing World

Argentina: Fossil of Herbivorous Crocodile

A new species of prehistoric crocodile has been found in Argentina by the researchers of Argentina's National Scientific & Technological Research Council (CONICET). It was small, lived 80 million years ago, and was not carnivorous. Unlike the modern crocodile, *Llanosuchus tamaensis* was probably omnivorous/herbivorous, as indicated by the characteristics of its fossilized teeth. Its name derives from *llanos*, the semi-arid plains of northern Argentina. A description of the new crocodyliform was published in the journal Cretaceous Research. Researchers from the University of Campinas's Geoscience Institute (IG-UNICAMP) in Brazil studied the sedimentology of the deposits containing the fossil to understand the environment inhabited by *L. tamaensis*. Crocodiles, alligators and gharials offer a dim portrait of a glorious past. Crocodilians are now confined to the world's riverbanks and wetlands, although a single marine species subsists in Australia. For almost 100 million years during the Jurassic and Cretaceous eras, however, the Crocodylomorpha super order coexisted and competed for food with dinosaurs on land and with mosasaurs and pliosaurs in the oceans. Among the hundreds of extinct species whose fossils have been identified, the notosuchian suborder is perhaps one of the most interesting. It evolved in Gondwana, the ancient supercontinent that broke up approximately 180 million years ago into the land masses now known as Africa, South America, Australia, Antarctica, the Indian subcontinent, and the Arabian Peninsula. The notosuchians, or southern crocodiles, were exclusively terrestrial. They had elongated paws and erect limbs, and moved more like quadrupeds than their sprawling cousins. There were two groups of notosuchians, one comprising fierce hunters. The animals in this group were much larger and totally carnivorous. The largest and most voracious was *Baurusuchus*, 3m long and weighing 400 kg. It lived 90 million years ago in the environs of Bauru, São Paulo State, Brazil. Alongside the large carnivorous dinosaurs, *Baurusuchus* was the top-tier predator in the Bauru Basin, a biome that contained rivers and lakes but was dry and hot. The Bauru Basin was found throughout south-eastern Brazil in the Upper Cretaceous, between 90 and 80 million years ago. The other group of notosuchians is considered more advanced on the basis of its feeding habits. Why a group of carnivores becomes herbivorous is a complicated question. In the case of notosuchians, the reasons are unknown, but clearly a common ancestor abandoned the carnivorous voracity characteristic of crocodilians to become an omnivore or partial herbivore. Its descendants spread through central and southern South America, from Bolivia to Argentina, evolving into the dozen species that have been identified to date. *L. tamaensis* is the most recent example. The greatest diversity of advanced notosuchians was probably in São Paulo State, where seven omnivorous or partially herbivorous species have been discovered: *Caipirasuchus paulistanus*, *C. montealtensis* and *Morrinhosuchus*, all found in Monte Alto; *Adamantinasuchus*, in Adamantina; *Caryonosuchus*, in Presidente Prudente; *Mariliasuchus*, in Marília; and *Armadillosuchus*, in General Salgado, which has the differentiated teeth of an omnivore and a bizarre beauty; its bony shield-like body armour resembles that of an armadillo. The advanced notosuchians had two other traits in common besides dentition. None of them was large. They ranged from midsize, up to 2 m long in the case of *Armadillosuchus*, to small; *Llanosuchus*, for example, was only 80 cm long – half the size of an iguana or tegu lizard. Another peculiarity of the group is skull shape. These animals had a very short snout, almost like a beak or small shovel, which they probably used to dig holes for burrows. *Mariliasuchus* is believed to have had burrowing habits. The evidence is the existence of paleoburrows in the same rock strata in which *Mariliasuchus* fossils were found. The discovery of a new species of advanced notosuchian in northwestern Argentina is paleoenvironmentally significant. Analysis of paleosols in the Los Llanos Formation, where *Llanosuchus* was found, indicated that the climate there was semi-arid 80 million years ago, despite high levels of rainfall. They reached about 700 mm per year, which is a lot and means that there was vegetation in the area. The rainfall must have been concentrated in a single season, and for most of the year the weather was very warm and dry. Temperatures will probably have exceeded 50°C much of the time, possibly even reaching 60°C during the warmest and driest part of the year. The climate was semi-arid derives from several factors, including signs of evaporation retained by the paleosols in the area and an abundance of calcium carbonate ($CaCO_3$) nodules. The notosuchians were also well adapted to the arid and semi-arid climate in the later Cretaceous. No one knows whether this helped them survive the great mass extinction that wiped out the large dinosaurs, with the exception of birds, 65 million years ago. In any case, the notosuchians did not make it to the modern era. The last known species disappeared in the Miocene Epoch referring to a span of geologic time from 5.3 million to 23.0 million years ago.

Source: Agência FAPESP Newsletter, 13th April 2016

Brazil: Electronic Device detects Molecules linked to Cancer, Alzheimer's and Parkinson's

A biosensor developed by researchers at the National Nanotechnology Laboratory (LNNano) in Campinas, São Paulo State, Brazil, has been proven capable of detecting molecules associated with neurodegenerative diseases and some types of cancer. The device is basically a single-layer organic nanometer-scale transistor on a glass slide. It contains the reduced form of the peptide glutathione (GSH), which reacts in a specific way when it comes into contact with the enzyme glutathione S-transferase (GST), linked to Parkinson's, Alzheimer's and breast cancer, among other diseases. The GSH-GST reaction is detected by the transistor, which can be used for diagnostic purposes. The biosensor was developed as part of a FAPESP-funded thematic project entitled 'Development of Novel Strategic Materials for Integrated Analytical Devices' that focuses on the development of point-of-care devices by researchers in a range of knowledge areas using functional materials to produce simple sensors and microfluidic systems for rapid diagnosis. Platforms like this one can be deployed to diagnose complex diseases quickly, safely and relatively cheaply, using nanometer-scale systems to identify molecules of interest in the material analysed. In addition to portability and low cost, the advantages of the nanometric biosensor include its sensitivity in detecting molecules. This is the first time organic transistor technology has been used in detecting the pair GSH-GST, which is important in diagnosing degenerative diseases, for example. The device can detect such molecules even when they're present at very low levels in the examined material, thanks to its nanometric sensitivity. The system can be adapted to detect other substances, such as the molecules linked to different diseases and elements present in contaminated material, among other applications. This requires replacing the molecules in the sensor with others that react with the chemicals targeted by the test, which are known as analytes. LNNano's Functional Devices & Systems Division has developed several platforms for chemical, physical and biological sensing in areas of strategic importance both at home and abroad, such as health, environment and energy. The goal is to have a series of solutions in the shape of point-of-care devices to respond with agility to a wide array of requirements. These include outbreaks of disease or the need to detect contaminants such as lead and toxins in water samples. The team is also working on paper-based biosensors to lower the cost even further and to improve portability and facilitate fabrication as well as disposal. Paper offers a number of advantages as a platform for analytical devices. It is a natural

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polymer, widely available everywhere, lightweight, biodegradable, portable, and foldable. The challenge is that paper is an insulator in its usual form. A technique has been developed to make paper conductive and capable of transporting sensing data by impregnating cellulose fibres with polymers that have conductive properties. The technique is based on in situ synthesis of conductive polymers. For the polymers not to remain trapped on the surface of the paper, they have to be synthesised inside and between the pores of the cellulose fibres. This is done by gas-phase chemical polymerisation: a liquid oxidant is infiltrated into the paper, which is then exposed to monomers in the gas phase. A monomer is a molecule of low molecular weight capable of reacting with identical or different molecules of low molecular weight to form a polymer. The monomers evaporate under the paper and penetrate the pores of the fibres at the sub-micrometer scale. Inside the pores, they blend with the oxidant and begin the polymerisation process right there, impregnating the entire material. It is like filling a room with balloons. If they don't fit through the door when inflated, the alternative is to inflate them inside the room. The polymerised paper acquires the conductive properties of the polymers. This conductivity can be adjusted by manipulating the element embedded in the cellulose fibres, depending on the application for which the paper is designed. Thus the device can be electrically conductive, allowing current to flow without significant losses (imagine paper antennas, for example), or semiconductive, interacting with specific molecules and functioning as a physical, chemical or electrochemical sensor.

Source: Agência FAPESP Newsletter, 18th May 2016

Caribbean: New Project on Caribbean Disaster Emergency

The Caribbean is a region prone to different natural hazards such as earthquakes, hurricanes, floods, tsunamis and others. Most countries in this region are Small Island Developing States (SIDS) which can be disproportionately affected by disasters due to their unique vulnerabilities. Climate change exacerbates the effects of disasters. The Caribbean Disaster Emergency Management Agency (CDEMA) and the United Nations Office for Disaster Risk Reduction (UNISDR) announced the project 'Strengthening Regional Disaster Risk Reduction Strategies and Capacities for Resilience in the Caribbean', that is supported by the Austrian Development Agency (ADA), during the Disaster Risk Reduction Development Partners Meeting which took place on 7th April 2016 in Barbados. The purpose of the project is reinforcing disaster risk reduction and creating a resilience culture in the Caribbean, which will contribute to strengthening DRR monitoring capacities at national and regional levels in the Caribbean; increased knowledge and capacities for local resilience and community safety through enhanced capacities and commitment for safe schools and enhance risk-sensitive business investment. The project of this nature is important due to its contribution to the timely implementation of the Sendai Framework, applying an inclusive approach to disaster risk reduction involving key actors at regional, national and local level. Harmonisation of the 2014-2024 Comprehensive Disaster Management Strategy indicators and monitoring system with the Sendai Framework for Disaster Risk Reduction will facilitate national and regional reporting to both frameworks and is showcasing a good practice in the Americas region. This initiative is co-funded by European Commission Directorate General for Humanitarian aid and Civil Protection (ECHO). The partnership on this project will directly contribute to the delivery of the Caribbean Comprehensive Disaster Management Strategy 2014-2024 which is the roadmap being utilised by CARICOM Member States towards the realisation of the Safer More Resilient and Sustainable Communities. This project is in keeping with the philosophy of Comprehensive Disaster Management of engaging all sector of our society in the effort to build a culture of safety. The initiative will assist CDEMA to further its previously established programme for Safe Schools in the Caribbean and strengthen efforts to engage with the private sector on Disaster Risk Management Issues. The partnership between CDEMA and UNISDR is a model of how a global organisation can successfully collaborate with a regional or sub-regional organisation by finding common threads that allow the expression of shared goals and a common rallying theme of resilience.

Source: CARDI Agriculture in the News, 3-9 April 2016

Chile: New Law to foster Recycling

At the third stage of its passage through the chamber, the Chilean Parliament passed the Promotion of Recycling and Extended Producer Responsibility Act. This historic event in Latin America makes Chile a pioneer in the region in terms of legislation to facilitate effective public policy in the area of recycling. This new Act seeks to formalise the recycling industry in Chile by making the manufacturers and distributors of certain products responsible for organising and financing waste recovery and management of these products at the end of their lifecycle. Producers and importers of certain “priority products” must assume this responsibility, and the Act sets out collection and recovery targets for the different products. There are six 'priority products': lubricating oils, electrical and electronic equipment, batteries, accumulators, containers, packaging, and tyres. These products were designated as such due to the fact that they are mass consumption products with a significant volume, apart from lending themselves to enforceable regulation. The legislation to promote recycling will create more green jobs and entrepreneurs. Information will be provided and eco-labelling implemented to highlight environmentally friendly products. Chile currently recycles just 10% of its waste and this law will triple the recycling rate. The Ministry of the Environment will have new waste management responsibilities in the following areas: certification, labelling, deposit refund systems, eco-design, source separation and selective waste collection, environmentally rational waste management mechanisms, and waste prevention mechanisms.

Source: FuturENVIRO Newsletter, 14th April 2016

China: Discovery of Protein boosting Rice Yield by 50 Percent

The researchers from Nanjing Agricultural University in China and John Innes Centre (JIC), Norwich, Norfolk, England have developed rice crops with an improved ability to manage their own pH levels, enabling them to take up significantly more nitrogen, iron and phosphorous from soil and increase yield by up to 54 percent. They found that the rice gene OsNRT2.3b, which creates a protein involved in nitrate transport, can switch nitrate transport on or off, depending on the internal pH of the plant cell. When this protein was over-expressed in rice plants, they were better able to buffer themselves against pH changes in their environment. This enabled them to take up much more nitrogen, as well as more iron and phosphorus. These rice plants gave a much higher yield of rice grain (up to 54 percent more) and their nitrogen use efficiency increased by up to 40 percent. This new technology has been patented by PBL, the John Innes Centre's innovation management company, and has already been licensed to 3 different companies to develop new varieties of 6 different crop species.

Source: Crop Biotech Update, 8th June 2016

India: Neem Leaves to make Platinum Nanoparticles

Nanoparticles of noble metals such as gold, silver and platinum are widely used to fabricate electronic and biomedical devices. Since toxic chemicals are employed in the synthesis of these nanoparticles, they can be harmful to human health. However, by using neem leaf extract, researchers from the School of Biotechnology and Health Sciences, Karunya University, Coimbatore, India have produced platinum nanoparticles from chloroplatinic acid. This method is an eco-friendly way to make platinum nanoparticles, which are potentially useful in the

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bioelectronics and chemical industries. To devise a safe way to synthesise platinum nanoparticles, the researchers prepared neem leaf extract by dissolving finely cut dried neem leaves in deionized water. They then added the extract to chloroplatinic acid solutions, which changed colour from light yellow to black on heating, indicating the formation of platinum nanoparticles. The nanoparticles were between 5 and 50 nanometres in diameter. The rate of platinum nanoparticle synthesis increased with increasing reaction temperature. The plant extracts contained various organic compounds such as terpenoids that aided nanoparticle synthesis. Terpenoids are surface-active molecules that helped to stabilise the nanoparticles. This process is a very simple and cost-effective method for making platinum nanoparticles that can be used in various medicinal and catalytic applications.

Source: Nature India update, 6th April 2016

India: Porous Sponge for Wound Dressing

Researchers from CSIR - Central Leather Research Institute (CLRI), Chennai and Nagaland Central University, Dimapur in India have synthesised a porous sponge blending a natural gum polymer with gelatine that can be loaded with an antibiotic, making it potentially useful for dressing wounds. Artificial scaffolds containing natural polymers play vital roles in treating wounds since they aid the cell growth. To make a biocompatible scaffold for wound dressing, the researchers prepared the sponge by blending gelatine with the gum kondagogu, which had been extracted from a plant. They then explored the sponge's properties, including its ability to release the antibiotic ciprofloxacin, aid cell growth and protect against disease-causing bacteria. The sponge exhibited increased swelling with increasing gum content. Its uniformly porous surface facilitated cell infusion and nutrient uptake which are the prerequisites for cell proliferation in wounds. Furthermore, chemically modifying the sponge lengthened its gelatine molecules, making the sponge thermally stable. A drug-release study showed that the sponge released ciprofloxacin in two distinct phases: after an initial burst, it released the drug slowly, releasing 95% of the drug after 48 hours. The sponge inhibited the growth of two disease-causing bacteria: *Staphylococcus aureus* and *Escherichia coli*. In addition, it was found to be non-toxic to cultured mouse embryonic fibroblast and specific human skin cells, suggesting it could be used in clinical set-ups.

Source: Nature India update, 18th May 2016

India: Stain Removal Technology

The Facilitation Centre for Industrial Plasma Technologies (FCIPT), a division of the Institute for Plasma Research (IPR) in Gandhinagar, India has manufactured a technology wherein a cloth can be rendered stain proof. FCIPT has developed nano particle powder where titanium metal is vaporised with plasma to form titanium dioxide (TiO_2). These nano particles, when mixed with alcohol and sprayed on clean clothes will be an excellent stain remover. The TiO_2 nano particles get trapped between fibres of the cloth and form a protective coat. The moment a tough stain like say turmeric enriched curry falls on the nano-treated shirt or top, one just has to leave it in the sun for two to three hours and the stain vanishes instantly. According to scientists, the nano particles, once sprinkled, remain for more than 20 washes. FCIPT is also set to enter into a memorandum of understanding (MoU) with Man Made Textile Research Association, Surat, India to apply in-line plasma treatment in textile manufacturing.

Source: Times of India, 9th May 2016

Indonesia: Launch of National Science & Technology Research Fund

Indonesia has earmarked US$60 million a year for science and technology research, allowing researchers to plan beyond the national budget's one-year cycle. Indonesia's multi-million-dollar funding scheme to boost science and technology marks a milestone for the country's scientific development following decades of poor infrastructure support. The Indonesian Science Fund (ISF) will earmark around US$60 million a year to fund 200 research proposals. The ISF will grant US$100,000 for each successful research proposal, similar to the practice of the US National Science Foundation which allots around US$200,000 per research grant. An initial US$10 million was allocated this year. The main aim of the ISF is to create the right scientific culture in Indonesia, meaning that the focus on frontier research rather than on applied ones. Now for the first time Indonesian scientists will have a funding source apart from the national budget (of which the proportion going to science is a very low 0.08%) compared to the science budgets of Asian economic giant and research powerhouse South Korea (3.7%) and Indonesian neighbours Singapore (2%) and Malaysia (1.13%). And also for the first time, they will get multi-year research grants. The amount will be increased, up to $300,000 per successful research proposal. As a start, the Ministry of Finance has committed to provide $9 million in 2016 for research on life sciences, health and nutrition. Indonesia's limited national budget flows through tangled branches of government agencies prone to corruption practices, resulting in the poor performance of science and technology in the country. Research funding has been rigid, which is not compatible with scientific research culture. Because of that, no one can have a career as a good scientist in Indonesia. The money really depends on Indonesian national budget that has a one-year cycle. For example, the budget is released in March and the scientists must make a report in October. The AIPI collaborated with Indonesia's ministries of finance and national development planning as well as international partners - the US Academy of Science, the Australian Academy of Science and the United Kingdom's Newton Fund - to create the ISF, a funding body independent from the government bureaucracy. ISF research proposals will be reviewed by the AIPI as well as scientific bodies abroad such as the UK's Medical Research Council. The first funding source of the ISF will be from the Indonesian Endowment Fund for Education, a programme under the finance ministry. Funds will also be raised from the private sector and international donors. The ISF is also the result of US science diplomacy with Indonesia. During Indonesian President's US state visit in October 2015, the ISF was cited in his joint statement with the US President as the centrepiece of US-Indonesia scientific collaboration. The new funding agency will not support applied science. Instead it will pay for 'frontier research' on the Universe, Earth, climate, the life sciences, health, nutrition, materials and computational science. The new programme might encourage the best Indonesian scientists scattered across the developed world to come back. It should encourage those in Indonesia to do better science. It will certainly grow scientific excellence in the country. Unlike applied science, the goal is not to use research as a tool, but for it to become a valuable and self-sustaining pursuit in its own right. The ISF is intended to create a system in which scientists can work independently, without the need for international support, to assess the scientific questions of their own land and to contribute to the universal quest for knowledge. It offers an opportunity for our scientists to stand on their own feet. The importance of basic science in poorer countries is recognised beyond Indonesia. The African Academy of Science is working with funders including the Wellcome Trust and the Bill & Melinda Gates Foundation to boost basic research in health care. Last month, about $31 million was awarded to scientists from Côte d'Ivoire, Kenya, Senegal and Uganda who are conducting research on emerging infectious diseases, neonatal and population health, and the elimination of malaria. It is too early to make predictions, but perhaps one can be optimistic that a new focus on basic research will produce a lasting change in science in the global South. Basic science may not give an instant result but it will give a deeper understanding about the world that changes all the time. And it will generate knowledge, which as policymakers from across the world insist, is at the heart of the modern economy.

Source: Nature, 2nd June 2016

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Past Scientific Associates of NAM S&T Centre

Dr. Manjari Manisha

Dr. Manjari Manisha joined the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) in May 2009 in the capacity of Research Assistant and continued her association with the Centre till August 2011. Her primary responsibilities included involvement in planning, implementation, evaluation and assessment of scientific programmes undertaken by the Centre. She made a significant contribution to the work on the international workshop on 'Nanotechnology – Present Status and Future Prospects in Developing Countries' organised by the Centre at Tehran, Iran in May 2009. Dr. Manjari was also actively engaged in the planning, coordination and implementation of various Fellowships offered by the Centre to the deserving candidates in the developing countries as part of its activities to promote the South-South Cooperation. Besides this, she was deeply involved – right from the compilation of manuscripts from the authors from various countries to the printing stages – on the publication of a highly valuable book titled 'Sustainable Rainwater Harvesting and Ground Water Recharge in Developing Countries - HRD and Technology Transfer' brought out by the NAM S&T Centre under a Group of 77 (G-77) funded multilateral project under its Perez Guerrero Trust Fund (PGTF); rendered valuable service on other NAM S&T Centre publications titled 'Nanotechnology – Present Status and Future Prospects in Developing Countries', 'South-South Co-operation for Technology Transfer and Development of Small and Medium Enterprises(SMEs)' and 'Application of Science & Technology for Occupational Villages Development'; and compilation of the material for the quarterly Newsletter of the NAM S&T Centre. In May 2011, she attended an International Conference on ***"Equity and Access to Medicine: Role of Innovation and Institutions***" organised by RIS and Indian Council of Medical Research at New Delhi. Public health and policy has been the prime area of research for her and she has published a number of notable papers on Water & Sanitation in different journals of repute.

Dr. Manjari has been awarded Senior Research Fellowship by CSIR and is now pursuing Ph.D. in Public Health from Academy of Scientific & Innovative Research - National Institute of Science, Technology and Development Studies (***AcSIR-NISTADS***).

Ms. Mayuri Aggarwal

Ms. Mayuri Aggarwal worked in the NAM S&T Centre from August to October 2008 in the capacity of a Research Assistant. During her tenure in the Centre Ms. Aggarwal was actively engaged in planning, implementation, evaluation and assessment of the scientific programmes of the Centre and substantially contributed to the Rainwater Harvesting and Groundwater Recharge Project partially supported by the Group of 77 (G-77) Perez-Guerrero Trust Fund for Economic and Technical Cooperation among Developing Countries (PGTF) for its implementation by the NAM S&T Centre. Ms. Aggarwal was also involved with the coordination of holding an International Roundtable on 'Sustainable Utilisation of Energy and Biodiversity Resources for Wealth Creation and Development' held at Kampala, Uganda during 9-14 March 2009. She also compiled the material for the publication of the NAM S&T Centre titled 'Cleaner Production and Energy Conservation for Sustainability', which was brought out as follow up on an international workshop organised by the Centre in Cochin, India in June 2008.

While working in the Centre, Ms. Aggarwal was awarded a scholarship from the Department of Biotechnology, Ministry of Science and Technology, India that gave her an opportunity to undergo Industrial training at MGL, Gurgaon, India hence helping her to initiate her career as a Research Assistant. Moving from NAM S&T Centre, she acquired skills in HealthCare, Life Sciences and Pharma Research that led her gain expertise as an Analyst. With the business acumen to partner with the HealthCare Sector strengthened her to work as Business Analyst in Product Management at MGL and Implementation of Products across the globe.

Currently, Ms. Aggarwal is working as an Associate Product Manager with Product Management Team at hCentive Technologies, Inc., Noida, India, that provides cloud-based HealthCare technology products and solutions for the U.S. Health Care market. Her profile involves spending time in gathering business and product requirements to communicate the product strategy to various stakeholders, help coordinate and support the different teams across globe that go into product creation - business, engineering, design, sales, marketing and support teams, hence delivering the requirements to relevant stakeholders.

Ms. Aggarwal profusely recognised the role played by the NAM S&T Centre in her career development in the following words:

".....Working with NAM S&T Centre, especially Arun Sir and Bando Sir; experiencing their energy and drive towards the Organization has always inspired me. The opportunity to work with such a wonderful people has been invaluable. Working at NAM S&T Centre is like being with family; it doesn't ever feel like 'work'. This organization gave me the scope to innovate and apply creative ideas. It taught me to take the responsibilities as an independent researcher, hence honing my personality. This has given me a lot of satisfaction and determination to help grow both professionally and personally....."

NAM S&T Centre - U2ACN2 Research Associateship

Project Completion Report of Dr. Ahmad Bilal, Pakistan

Dr. Ahmad Bilal, Senior Scientific Officer / Deputy Director, PCSIR, Ministry of Science & Technology, Pakistan was sponsored by the NAM S&T Centre under its U2ACN2 Research Associateship scheme 2015 to carry out research at the Department of Biotechnology, University of the Western Cape, Cape Town, South Africa in collaboration with iTEMBA Labs on a project titled 'Evaluation of Anti-bacterial Activity of Different Preparations of Black Seed (*Nigella sativa*) and Other Spices against Selected Pathogens' under the supervision of Prof. Malik Maaza from 1st April to 30th May 2016.

Development of antibiotic resistance is a major cause of concern today in the treatment of various infectious diseases. Despite major advancement in modern allopathic medicines, the belief that the herbal medicines are effective and safe is increasing day by day. Therefore, safe alternative ways to combat the infections and contaminations is the focus of research throughout the world. Synthetic drugs also block receptor sites and hence attempts are being made to control the use of synthetic drugs and develop new drugs from natural resources like medicinal plants. Medicinal plants/ herbs/ spices are important therapeutic aids for various ailments. Among various medicinal plants, Black Seed (*Nigella sativa*) is emerging as a miracle herb with a rich historical and religious background. *Nigella sativa* has been extensively studied for its biological activities, pharmacological and therapeutic potential and shown to possess wide spectrum of activities including antibacterial properties.

Keeping in view the above mentioned facts, this project was designed to check different preparations of *Nigella sativa (Ns)* along with few commonly used spices for the antibacterial properties. This short research project may help in development of a natural/herbal effective antibacterial drug with minimal or no side effect. Moreover, this will lead to 2-3 publications in Journals of international repute.

Joint NAM S&T Centre – ZMT Bremen Fellowship

Project Completion Report of Ms. Noha Imam, Egypt

Ms. Noha Imam, Assistant Lecturer, National Institute of Oceanography and Fisheries, Egypt was sponsored by the NAM S&T Centre under its ZMT Fellowship scheme for 2015 to carry out research in Tropical Coastal Marine Ecology and Biogeochemistry at ZMT, Bremen, Germany on a project titled 'Radon and Radium Isotopes as Tracers of Submarine Groundwater Discharge' under the supervision of Dr. Nils Moosdorf from 5th December 2015 to 4th March 2016.

The goals of the work presented were on the use of naturally-occurring radioisotopes application tracers (e.g., radium isotopes, ^{222}Rn, salinity, pH) to examine SGD (submarine groundwater discharge). Radon and radium isotopes have been shown to be effective tracers of SGD because they are concentrated in groundwater relative to surface water, and the decay rates of the ^{222}Rn and the short-lived radium isotopes are on the same temporal scale as the processes in question. The main idea of the work was to make a model to estimate the groundwater discharge into lake by the difference measurement of the radon concentration between the groundwater sources and the lake and in addition, how to divide the inputs and outputs of the lake to design the model approach special into the lake. These ideas were applied in the collected samples from the Burullus lake (inside Egypt) to estimate the salinity balance of the groundwater discharge inside Egypt. However, this method did not give correct estimation in some areas like the Nile Delta because the quality of the groundwater in this area may be strongly affected by the impact of the sea level rise combined with changes of Nile river flows, leading to an increase in the salinity levels of groundwater.

Keeping in view the above mentioned facts, this project was designed to estimate the quantity of groundwater discharge into Burullus Lake, using a simple model box approach using radon as a natural geochemical tracer for studying groundwater discharge into lakes as thoroughly described by Schmidt and Schubert (2007). The relevant radon input terms in Burullus Lake are (i) groundwater discharge, (ii) in situ Radon production from decaying ^{226}Ra dissolved in the water column, (iii) input via diffusion or physical mixing (bioturbation, sediment resuspension) of Radon by Radium decay in the sediments, and (iv) Radon influx from drains of agricultural activity. The output terms are (i) Radon decay ;(ii) Radon loss to the atmosphere and (iii) Radon loss to sea whereas there is outflow from the lake towards Mediterranean sea in specific months due to the different height between lake surface and sea surface. The Radon concentration with the CR-39 detectors in one of the Solid-state nuclear track detectors (SSNTDs) was measured.

Participation of Centre's Scientists in Scientific Event

30th April 2016 **Ms. Geeta**, Research Associate attended '**SEEM National Energy Awards 2nd Edition and Technical Sessions on PAT & EE**' at the Institution of Engineers (India), New Delhi.

Distinguished Visitors To The Centre

H.E. Major General V. Namgyel, Ambassador (3rd from L) and **Mr. Kinga Singye**, 2nd Secretary, Embassy of the Kingdom of Bhutan in India

Mr. Hojjat Mousazedah, Attaché and Head of Technical Cooperation Section, Embassy of the Islamic Republic of Iran in India

Mr. Shamsulhaq Nayebkhil, Desk Officer of NAM, Ministry of Foreign Affairs of the Islamic Republic of Afghanistan

Delegates of Midlands State University, Gweru, Zimbabwe

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Mexico: Solar-Powered, Glow-In-The-Dark Cement for Roads

For the past several years, solar road has grown popular because it is a different way of lighting a road. However, regular glow-in-the-dark materials do not last long because they are made of plastic that easily degrades after only several years of exposure to the sun. Researchers of Michoacan's University of San Nicolas Hidalgo (UMSNH) in Morelia, Mexico have created cement that emits light without the need for batteries or solar cells and can last for a hundred years. They were working on the project for nine years and one of the challenges while working on the project was the cement's opaque material that prevents the light to pass through its interior. So they proceeded to modify the cement's micro-structure to remove the crystals. This resulted in a translucent gel that absorbs solar energy and lights up when it is dark. The cement emits only a green or blue colour but its light intensity could be adjusted depending on where the material will be applied or used. The light produced by the cement is not dependent on direct sunlight because it can also 'recharge' even during gloomy days. The material can continuously emit light for 12 hours. The cement is also environmentally safe because its materials are from dust, sand or clay, and its only residue is water steam. The research result is also applicable for use in plaster and creates a beautiful effect against a dark background. The researchers have received recognition from the Newton Fund In the UK, given by the Royal Engineering Academy of London, which chooses global success cases in technology and entrepreneurship. Due to their patent (the first one for Michoacan's University), others have surfaced worldwide.

Source: Tech Times, 12th May 2016

Visitors To The Centre

5th April 2016	**Dr. Antony Mamuse**, Dean of Mining Sciences and Other Delegates of Midlands State University, Gweru, Zimbabwe
18th April 2016	**H.E. Major General V. Namgyel**, Ambassador and **Mr. Kinga Singye,** 2nd Secretary, Embassy of the Kingdom of Bhutan in India
6th May 2016	**Mr. Hojjat Mousazedah**, Attaché and Head of Technical Cooperation Section, Embassy of the Islamic Republic of Iran in India
30th May 2016	**Mr. Shamsulhaq Nayebkhil,** Desk Officer of NAM, Ministry of Foreign Affairs of the Islamic Republic of Afghanistan, Kabul, Afghanistan

NAM S&T Centre - DST (South Africa) Minerals Processing and Beneficiation Training Fellowship

Second NAM S&T Centre - DST (South Africa) Minerals Processing and Beneficiation Training Programme, MINTEK, South Africa

The Second NAM S&T Centre - DST (South Africa) Minerals Processing and Beneficiation Training Programme was inaugurated at MINTEK, South Africa on 13th May 2016. In the second year of this Training Programme aimed at capacity building in Minerals Processing and Beneficiation in the NAM countries South Africa is hosting 20 delegates from 13 Non-Aligned Movement (NAM) member states for a period of three months. It is a collaborative programme between the NAM S&T Centre, the Departments of Science & Technology (DST) and Mineral Resources, Government of South Africa and MINTEK, South Africa, which is being implemented and hosted at MINTEK, a leading provider of minerals processing and metallurgical engineering products and services to industries worldwide. The training is expected to help the NAM S&T Centre countries to play a role in the new beneficiation drive to benefit their economic growth, industrialisation, skills development, technology transfer and innovation.

During the inaugural of the Training Programme Mr. Alan McKenzie, General Manager, Technology, MINTEK welcomed the training programme participants. Mr. Beeuwen Gerryts, Chief Director: Technology Localisation, Beneficiation and Advanced Manufacturing, DST addressed the audience, which was followed by the inaugural speech by Prof. Arun P. Kulshreshtha, Director General, NAM S&T Centre in videoconferencing mode. H.E. Mr. S.O. Abdu, Eritrean Ambassador in South Africa also addressed the audience. At the conclusion Dr. John Siame of TheCopperbelt University, Kitwe, Zambia presented the Vote of Thanks.

Developing countries, including South Africa, despite having large mineral resources, do not fully exploit these due to a lack of skills in adding value by advancing modern and innovative research and technology. For example, most African countries still export minerals including gold and platinum only as ores without significant downstream processing that leads to value addition. Mining and minerals beneficiation is important in providing invaluable contributions to downstream industries, which hold the key to a country's industrial growth. Mining is also an important source of foreign exchange, tax revenue, infrastructure creation and employment generation in developing countries, such as those affiliated to the NAM S&T Centre.

The focus of this Training Programme on processing options and technologies is meant for experts already working in the policy space, but who have limited exposure to modern, advanced and new ways of minerals processing and beneficiation. As such, the emphasis is on basic minerals and mining research, as well as advanced minerals processing and mining, analytical capabilities and advanced beneficiation.

The participants of the Training Programme from Botswana, Egypt, Eritrea, India, Malaysia, Nigeria, Pakistan, South Africa, Sri Lanka, Sudan, Uganda, Zambia and Zimbabwe, will be exposed to MINTEK's mineral processing techniques and undergo in-service training. Policy-makers and government officials will receive training on how to formulate policy and implement it in the minerals processing and beneficiation field. The beneficiation and technology focus will provide participants with the options best suited to their needs and the level of processing advancement in their respective countries.

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