



# S&T Newsletter



A Quarterly of the  
Centre for Science and Technology of the Non-Aligned  
and Other Developing Countries (NAM S&T Centre)

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## FROM THE DG'S DESK

Warmest greetings to our esteemed readers!!



The 3<sup>rd</sup> Meeting of the Bureau of the 13<sup>th</sup> Governing Council (GC) of the NAM S&T Centre was held in Cairo, Egypt during 6-7 September 2016. The Meeting was inaugurated by H.E. Prof. Ashraf Al-Shihy, Hon'ble Minister of Higher Education and Scientific

Research of Egypt.

I am also pleased to inform our readers that in pursuance of our objectives to promote South-South Cooperation in Science and Technology, the Centre concluded a Memorandum of Understanding (MoU) with the International Science, Technology and Innovation Center for South-South Cooperation (ISTIC) under the auspices of UNESCO on 8<sup>th</sup> August 2016 in Kuala Lumpur, Malaysia.

In partnership with the ISTIC; Ministry of Science, Technology and Innovation (MOSTI) of Malaysia; United Nations Education, Science and Cultural Organization (UNESCO); and Islamic Educational Scientific and Cultural Organization (ISESCO), the Centre organised an International Training Programme on 'STI Policy and Management for Developing Countries (ITPS)' in Kuala Lumpur, Malaysia on 8-12 August 2016. The Vice-President of the NAM S&T Centre, Hon'ble Dato' Dr. Mohd. Azhar bin H.J. Yahya, Secretary General MOSTI inaugurated the ITPS, which was attended by 29 senior professionals from 23 NAM countries. Eminent Malaysian experts were the Resource Persons for the training component of this event.

Like previous four years, the Centre is continuing to implement the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme in this year too. An Expert Committee held its meeting on 30<sup>th</sup> August 2016 to select 50 researchers for the award of the Fellowship in various fields of science and technology out of 231 applicants from 36 developing countries for their 6-months' affiliation with the Indian academic or R&D institutes of eminence.

The Centre has announced the organisation of its 4<sup>th</sup> Triennial International Workshop on 'Evolving Energy Models in Emerging Economies - Post COP 21' jointly with the Society for Energy Engineers & Managers (SEEM), India at Ahmedabad, India on 12-14 December 2016. Interested scientists and professionals are welcome to apply before 4<sup>th</sup> November 2016.

Happy Reading!

  
(Arun P. Kulshreshtha)

## 3<sup>rd</sup> Bureau of 13<sup>th</sup> Governing Council (GC) of NAM S&T Centre held at Cairo, Egypt on 6-7 September 2016

The third Bureau meeting of the 13<sup>th</sup> Governing Council (GC) of the NAM S&T Centre was held at the Academy of Scientific Research & Technology (ASRT) of Egypt in Cairo, Egypt on 6<sup>th</sup> and 7<sup>th</sup> September 2016.

Besides the Bureau Members (India, Malaysia and South Africa), the Opening Ceremony of the Meeting was attended by the Host Country (Egypt),



Inaugural Session: H.E. Prof. Ashraf Al-Shihy, Hon'ble Minister of Higher Education and Scientific Research of Egypt (C)

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## Centre Organised

### INTERNATIONAL TRAINING PROGRAMME ON STI POLICY AND MANAGEMENT (ITPS)

KUALA LUMPUR, MALAYSIA, 8-12 AUGUST 2016

It is well known that science and technology is a strategic driver contributing toward a shift from relatively lower end economic performance into high value added activities. Unfortunately, the governments and industry professionals as well as those in non-governmental organisations (NGOs) in a large number of developing countries face problems in meeting the challenges from the fast pace of technological changes, whereas for designing the blueprints and strategic implementation frameworks in order to provide a planned transformation within countries and organisations it is absolutely critical to have experts who understand the dynamics of science and technology within the context of economic and market development.



Inaugural Session: (L to R) Dato' Dr. Samsudin Tugiman, Hon'ble Dato' Dr. Mohd. Azhar bin H.J. Yahya, Dr. Ismail Abdel Hamid and Prof. Dr. Arun P. Kulshreshtha

With the above in

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representatives and Ambassadors / senior diplomats of the embassies in Cairo of nine other member countries of the Centre (D.R. of Congo, Kenya, D.P.R. of Korea, Malawi, Mauritius, Myanmar, Palestine, Peru and Zambia) as well as the Ambassadors / senior diplomats of the embassies in Cairo of five non member countries (Bosnia and Herzegovina, China, Côte d'Ivoire, Italy and Liberia).

Prof. Dr. Mahmoud M. Sakr, President, ASRT welcomed the delegates and stated that even though Egypt had earlier hosted the Centre's GC Meetings four times, this was the first occasion for the country to host the Bureau Meeting, which is an indication of Egypt's commitment to and belief in the Centre and the role it plays in fostering S&T among its member countries. He mentioned that the Non Aligned countries face similar problems and challenges and the mobilised efforts of the Centre can invigorate scientific and technological cooperation as a key instrument to solve chronic and difficult problems hindering the progress and sustainable development of our nations. Development of scientific and technological research is a must to push forward the stability and security as well as provide job opportunities, hence the social and economic wellbeing of the member countries.

Ms. Mmampezi Chaba, Focal Point, NAM S&T Centre, and Chief Director, Multilateral Cooperation and Africa, International Cooperation and Resources, Department of Science & Technology (DST), Government of South Africa conveyed that South Africa is committed to the role being played by the NAM S&T Centre towards South-South cooperation and acknowledged the impressive accomplishments of the Centre with 100 scientific programmes having been organised with more than 5000 participants and seven fellowship schemes being implemented in various fields.

Mr. Raj Kumar Sharma, Scientist-E (Director Grade), International, Multilateral & Regional Cooperation (IMRC), Department of Science & Technology (DST), Government of India, congratulated the Director General, NAM S&T Centre for excellent performance of the Centre under the changing geopolitical scenario with optimum utilisation of available resources and partnership arrangements with other organisations in spite of meagre finances.

Prof. Madya Dr. Ramzah Dambul, Deputy Secretary

General, Ministry of Science, Technology and Innovation (MOSTI), Malaysia said that the NAM S&T Centre is a very good platform to ensure peace and prosperity all over the world through constructive cooperation and implementation of programmes in diverse areas of S&T.

Prof. Dr. Arun P. Kulshreshtha, Director General, NAM S&T Centre expressed his gratitude to the Government of Egypt, and more specifically to Prof. Dr. Mahmoud M. Sakr, President, ASRT for agreeing to host the Bureau meeting and thanked him for the excellent hospitality extended to the delegates. He made a presentation on the objectives and functions of the NAM S&T Centre and its role in developing partnerships and promoting South-South and North-South cooperation through S&T, and explained with graphical representations how the expenditure made by the Centre on scientific activities has been consistently growing over the last decade as compared to the administrative expenditure, which has been achieved through excellent partnership arrangements, improved management practices and efficient financial control.

H.E. Prof Ashraf Al-Shihy, Hon'ble Minister of Higher Education and Scientific Research of Egypt inaugurated the meeting. He said that Egypt has been one of the founding members of the non aligned movement along with India and the former Republic of Yugoslavia and the three visionary leaders from these countries had a futuristic dream to create a movement where politics had no place. He said that it is our duty as scientists to address the common problems and challenges of our countries and work hard to achieve the prosperity of our nations through collective efforts and cooperation. He further added that our main objective is the social and economic wellbeing of our people, and the chronic and difficult problems hindering the progress of our nations must be solved. The Hon'ble Minister mentioned that Egypt fully realises the role of S&T, and its government provides all the policy efforts needed to facilitate international cooperation, whether on a bilateral or multilateral level. He added that the NAM S&T centre is a good example of multilateral cooperation and Egyptian scientists have always participated in the different programmes of the Centre, and so did the scientists from other member countries. He expressed confidence that the discussions held during the Meeting will lead to implement important programmes that would foster cooperation among the member countries.

The Hon'able Minister released three publications of the Centre, 'The Science, Technology & Innovation Policy Making for Developing Countries' (Eds. Budzanani



Group Photo of the Bureau Meeting Delegates



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Tacheba of Botswana, Adnan Judeh of Palestine and Maryam Shaeri of Iran), 'S&T Diplomacy and Sustainable Development in Developing Countries' (Eds: Abdul Haseeb Arabzai of Afghanistan, Tahereh Miremadi of Iran and Sadhana Relia of India) and 'Drug Discovery from Herbs: Approaches, Innovations and Applications' (Eds: Tijen Talas Ogras of Turkey, Shameim Ahmed Adam of South Africa, and Subba Rao V. Madhunapantula and B. Suresh of India).



The delegates also recommended acceleration of greater efforts for greater participation in the NAM S&T-Industry Network through out-of-the-box thinking and new ideas to induct more new Network partners. For this a Task Force was constituted under the leadership of Malaysia assisted by Palestine and South Africa, with a provision for any other interested member country also to join the Task Force, to work out revised guidelines for the Network with the introduction of new elements aimed at attracting new Network members and generating more programmes and finances for the Centre.

The delegates noted with satisfaction the overall achievements of the Centre since its inception and various scientific activities undertaken, Fellowship programmes implemented and publications brought out during the period since the last meeting of the Bureau held in Kampala in September 2015, and also the Centre's role in the promotion of STI among the NAM member countries. Further, the delegates congratulated the DG of the Centre for achieving an impressive output in spite of very meagre financial resources. In particular, they noted with appreciation the clear statements prepared on the scientific achievements and year-wise income and expenditure of the Centre and applauded the Centre for efficient financial management, as a result of which the percentage of expenditure on scientific activities has been progressively increasing over the years.

The Working Level Discussion of the Bureau Meeting attended by the delegates from South Africa (President), India and Malaysia (Vice-Presidents), Egypt (Host Country), Mauritius, Myanmar, Palestine and Peru, and the DG / officials of the NAM S&T Centre Secretariat was chaired by Ms. Mmampei Chaba, Focal Point, NAM S&T Centre in South Africa.

The delegates noted that with the induction of the State of Palestine as a new member of the Centre after the 2<sup>nd</sup> Bureau Meeting of the 13<sup>th</sup> GC held in Kampala, the present membership strength of the Centre has become 48. While welcoming Palestine as a member of the Governing Council of the Centre, the Chairperson emphasised upon the need to encourage other developing countries to join the Centre and desired that the delegates of the Bureau meeting may collectively and individually make efforts in this direction.

After the Bureau Meeting, a field trip was arranged for the participants to visit the Giza Pyramids and other places of interest in Cairo. Formal lunch was also hosted by Prof. Dr. Mahmoud M. Sakr, President, ASRT in honour of the visiting delegates.

## New Initiative

### MEMORANDUM OF UNDERSTANDING (MOU) BETWEEN NAM S&T CENTRE AND ISTIC



MOU signing in the presence of Dato' Dr. Samsudin Tugiman FASc, Chairman of the ISTIC Governing Board and Dato' Dr. Mohd. Azhar bin H.J. Yahya, Secretary General, Ministry of Science, Technology and Innovation and Vice-President, NAM S&T Centre (2<sup>nd</sup> from R)

In pursuance of its objectives to promote South-South Cooperation in Science and Technology, the NAM S&T Centre has concluded a Memorandum of Understanding (MoU) with the International Science, Technology and Innovation Center for South- South Cooperation (ISTIC) under the auspices of UNESCO, Kuala Lumpur, Malaysia. Like the NAM S&T Centre, ISTIC too acts as an international platform for South-South cooperation in science, technology and innovation and as part of its objectives, it also contributes towards capacity building in science and technology through the conduct of technology and knowledge transfer programmes incorporating both specialized and project-orientated training. The MoU was signed by Prof. Dr. Arun P. Kulshreshtha, Director General, NAM S&T Centre and Dato' Dr. Sharifah Maimunah Syed Zin FASc, Director, ISTIC at Kuala Lumpur, Malaysia on 8<sup>th</sup> August 2016.

Under the MoU, the two agencies have in principle agreed to provide a general framework to facilitate collaboration and cooperation by organising joint programmes on STI Policy such as conferences, training workshops, seminars, etc in Malaysia and other NAM countries; helping to establish relations and cooperation with other science and technology centres in their respective regions; inviting mutual management and staff for technical visits to S&T centres; jointly support for promoting and

performing the activities that have been defined by UNESCO which include organising training workshops on STI development and management, organizing technical visits, arranging match-making meetings, organising technical exhibitions, etc.; and provide Virtual Collaboration between the two agencies in different fields including introducing the activities of each agency on the website of the other.

(Contd. from Page 1 - Trg. Programme on STI Policy & Mgmt., Malaysia)

view, the Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre) in partnership with the International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC), Malaysia under the auspices of UNESCO; Ministry of Science, Technology and Innovation (MOSTI) of Malaysia; United Nations Education, Science and Cultural Organization (UNESCO); and Islamic Educational Scientific and Cultural Organization (ISESCO) organised an International Training Programme on STI Policy and Management for Developing Countries (ITPS) in Kuala Lumpur, Malaysia on 8–12 August 2016, which brought various stake holders, viz. scientists, experts and professionals from various countries with emerging economies to hone up their skills on STI Policy. The main objective of the training programme was to impart necessary knowledge and skills to participants in the development and management of a national STI policy in support of social-economic transformation.

The Opening Ceremony commenced with a welcome note by Dato' Dr. Sharifah Maimunah Syed Zin FASc, Director, ISTIC. After a brief address of Dato' Dr. Samsudin Tugiman FASc, Chairman of the ISTIC Governing Board 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 STI policy and technology transfer and also gave a short description of the activities of the inter-governmental organisation headed by him. Dr. Ismail Abdel Hamid Representative of Islamic Educational Scientific and Cultural Organization (ISESCO) also expressed his views on better understanding of STI Policy and Management.

The Training Workshop was inaugurated by Honourable Dato' Dr. Mohd. Azhar bin H.J. Yahya, Secretary General, Ministry of Science, Technology and Innovation and Vice-

President, NAM S&T Centre. He remarked about the Science and technology policies that supports the knowledge and scientific development of the country and shared his experiences with the audience..

The programme was attended by 29 senior professionals from 23 NAM countries, including Bangladesh, Cambodia, Cuba, Egypt, India, Indonesia, Iran, Iraq, Myanmar, Nepal, Nigeria, Pakistan, Palestine, Saudi Arabia, South Africa, Sri Lanka, Sudan, Suriname, Tajikistan, Uganda, Venezuela, and Zimbabwe and the host country Malaysia. The Resource Persons for the training component of the event were from Malaysia.

The foreign participants were from Bangladesh [Ms. Iffat Ara, Assistant Professor, Department of Geography and Environment, Jahangirnagar University, Savar]; Cambodia [Mr. Man Pheareak, General Secretariat of National Science and Technology Council, Ministry of Planning, Phnom Penh]; Cuba [Ms. María Esther Cruells Freixas, Main Specialist, Science Technology and Innovation Division, Ministry of Science Technology and Environment, Havana]; Egypt [Prof. Zakaria Fouad Fawzy Hassan Abdalla, Professor, National Research Centre, Giza]; India [Ms. Sunaina, Research Associate, Centre for Science & Technology of Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi; Ms. Anuradha Madhukar, Principal Scientist International S&T Affairs Directorate, Council of Scientific and Industrial Research (CSIR), New Delhi; and Mr. Akhilesh Mishra, Scientist D, Policy Research & Planning Coordination & Performance Management Division, Department of Science & Technology, Government of India, New Delhi]; Indonesia [Dr. Ary Syahriar Dean, Faculty of Science and Technology, University al Azhar Indonesia, Jakarta Selatan]; Iran [Mr. Esmail Abdi, R&D Manager, Research Institute of Science, Technology and Industry Policy (RISTIP), Tehran and Dr. Keyvan Asghari, Manager, Commercialization and Technology Transfer Office, Isfahan Science & Technology Town (ISTT), Isfahan]; Iraq [Mr. Ali Abdulazez Ali Albeez,



Group Photo of STI Policy and Management (ITPS) Training Programme, Kuala Lumpur, Malaysia, 8-12 August 2016



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 Ara Bangladesh	 Pheareak Cambodia	 Freixas Cuba	 Abdalla Egypt	 Madhukar India	 Mishra India	 Sunaina India	 Syahriar Indonesia	 Abdi Iran	 Asghari Iran
 Albeer Iraq	 Myat Myanmar	 Pokharel Nepal	 Buga Nigeria	 Peter Nigeria	 Shaikh Pakistan	 Qussas Palestine	 Salim S. Arabia	 Letaba South Africa	 Liyanagedara Sri Lanka
 Dilrukshi Sri Lanka	 Badwi Sudan	 Premvati Suriname	 Mamadsho Tajakistan	 Collins Uganda	 Rojas Venezuela	 Dupwa Zimbabwe	 Kulshreshtha Bandyopadhyay NAM S&T Centre Representatives		

**Foreign Speakers of  
STI Policy and Management (ITPS) Training Programme,  
Kuala Lumpur, Malaysia, 8-12 August 2016**

Head, Energy Planning and Management Center, Ministry of Sciences and Technology]; Malaysia [Mrs. Uwarani A/P Krishnan, Assistant Secretary, National Oceanography Directorate and Dr. Md. Fauzi bin Md. Ismail, Unit RSE, Strategic Planning Section, Planning Division, Ministry of Sciences, Technology and Innovation, Putrajaya]; Myanmar [Ms. Nyeint Nyeint Myat, Director, Department of Technology Promotion and Coordination, Ministry of Education, Naypyitaw]; Nepal [Prof. Jiba Raj Pokharel, Vice-Chancellor, Nepal Academy of Science and Technology (NAST), Kathmandu]; Nigeria [Dr. Mohammed Lawal Buga, Director, Technology Development Department, Raw Materials Research and Development Council (RMRDC), Abuja and Mr. Emmanuel Ochoche Peter, Senior Scientific Officer Department of Planning, Research and Policy Analysis, Federal Ministry of Science & Technology, Maitama, Abuja]; Pakistan [Prof. Muhammad Akram Shaik, Director General, Pakistan Scientific & Technological Information Center (PASTIC), Islamabad]; Palestine [Ms. Lama Qussas, Head, International & Regional Cooperation Department, Higher Council for Innovation and Excellence (HCIE), Ramallah]; Saudi Arabia [Dr. Alharbi Awadh Salim, Manager, Quality and Development Department, Saudi Quality Council, Jeddah];, South Africa [Mr. Petrus Letaba, Senior Specialist, The innovation Hub, National Advisory Council on Innovation (NACI) Secretariat, Pretoria]; Sri Lanka [Dr. Muditha Liyanagedara, Director/CEO, National Science and Technology Commission (NASTEC), Colombo and Ms.

P.R.M.P. Dilrukshi, Senior Scientific Officer /Head, Science and Technology Policy Research Division, National Science Foundation, Colombo]; Sudan [Ms. Hind Abdelraheem Eltjani Badwi, Agricultural Engineer, Ministry of Agricultural and Forest, Khartoum]; Suriname [Mrs. Adhin Usha Premvati, Head, Bureau International Relation, Ministry of Education, Science and Culture, Paramaribo]; Tajikistan [Prof. Ilolov Mamadsho, Director, Center of Innovative Development of Science and New Technologies, Academy of Sciences of Tajikistan, Dushanbe]; Uganda [Mr. Tumusiime Collins, Science Officer, International Liaison, Uganda National Council for Science and Technology (UNCST), Kampala]; Venezuela [Mr. Jorge Rodríguez Rojas, President, National Observatory for Science, Technology and Innovation, ONCTI, EDIF Forum, Caracas]; Zimbabwe [Mr. Ngoni Dupwa, Principal Science and Technology Officer, Ministry of Higher and Tertiary Education, Science and Technology Development, Harare]. The NAM S&T Centre was represented by its Director General, Prof. Dr. Arun P. Kulshreshtha and Senior Expert, Mr. M. Bandopadhyay.

Two Resource Persons, who gave the training lectures were Tan Sri Omar Abdul Rahman, Academician, President and CEO, MUST Ehsan Foundation, Malaysia University of Science and Technology, Malaysia and Mr. Adznir Mokhtar, Group Managing Director / Co-Founder & Principal Partner, PRIMA Asia Pacific Consulting (PAPC), who was the Coordinator of the Training Programme. Dato' Dr. Sharifah Maimunah Syed Zin FASc, Director, ISTIC also lectured

 Rahman	 Mokhtar	 Fauzi	 Krishnan	<p><b>Malaysian Resource Persons and Speakers of STI Policy and Management (ITPS) Training Programme, Kuala Lumpur, Malaysia, 8-12 August 2016</b></p>
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(Contd. from Page 5 - Trg. Programme on STI Policy & Mgmt., Malaysia)

during the training programme.

The overall programme of the Training Workshop was conducted at the Swiss-Garden Hotel in Kuala Lumpur in Group Activities and Group Projects for days 1-4. The presentations made by the Resource Persons on the first day were 'The Introduction to the Essentials of STI Policy' by Acad. Tan Sri Datuk Dr. Omar Abdul Rahman and 'Overview and Outline of the ITPS Training Programme' by Mr. Adznir Mokhtar. On subsequent days the topics were 'Introducing the 10 Components of the Technology Management Best Practice (TMBP)', 'Introduction to the STI Human Capital Pyramid', 'The Holistic Human Capital Development Model', 'Introducing Innovation and the National Innovation System' and 'From Introduction to the Total National Capacity in STI'.

The Participants of the Training Programme were divided into three groups. The Assigned topics were 'Hitech Export of Bt Cotton in Nigeria', 'Hitech Export of Cyber Security Software Development in India' and 'Hitech Export of Nanomedicine for Cancer Patients' respectively and presentations made by the participants using the different templates such as 'The Six Components of STI Policy'. The Responses and presenter

from each of the Group gave the presentation covering the topics such as 'STI for Policy', 'Policy for STI', 'STI and the Private Sector', 'STI and the Community', 'International Collaboration in STI', 'STI and Governance' and the 10 Components of 'The Technology Management Best Practice (TMBP)', 'Introduction to the STI Human Capital Pyramid', 'The Holistic Human Capital Development Model', 'Introducing Innovation and the National Innovation System' and 'From Introduction to the Total National Capacity in STI'. At the end of the session all three groups submitted their group reports.

The Plenary Session was chaired by Tan Sri Omar Abdul Rahman and Mr. Adznir Mokhtar. The Certificates of Participation were handed over to the Workshop participants by Dato' Dr. Sharifah Maimunah Syed Zin FASc, Director, ISTIC, who also gave the Vote of Thanks. All participants also thanked the local organizers for the fine arrangements made and efficiently conducting the Training Workshop.

During the workshop all the participants got an opportunity to visit Technology Park Malaysia and Petronas Twin tower in Kuala Lumpur city.

## Research Training Fellowship for Developing Country Scientists (RTF-DCS) 2014-15

### Bangladesh – Project Completion Report of Mr. Keshob Chandra Das



**Mr. Keshob Chandra Das**, Senior Officer, National Institute of Biotechnology, Bangladesh was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2014-15 to carry out research in the Discipline of Marine Biotechnology & Ecology at CSIR - Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, India on a project titled 'Study the Accumulation of Selected Heavy Metals and Polycyclic Aromatic Hydrocarbon (PAH) in Mullet Fish (*Mugil Cephalus*), collected from Different Coastal Localities of Gujarat, India' under the supervision of **Dr. S. Haldar** from 24<sup>th</sup> May to 19<sup>th</sup> November 2015.

Due to heavy industrial growth and development of chemical industries, coastal water of Gujarat is relatively more polluted. As a result, there is a chance of accommodation of different pollutants in the fish tissue samples. Therefore the aim of the research included study of the biochemical composition of mullet fish collected from different landing centres of Gujarat and also to evaluate the level of heavy metal and PAH concentration of the fish tissue samples.

Mullet fishes (*Mugil cephalus*) were collected from local market and landing centers of 6 coastal regions of Gujarat; Ghogla (20°43'25.7"N, 70°59'20.5"E), Salaya (20°47'48.6"N, 70°41'49.2"E), Veraval (20°54'10.1"N, 70°22'45.7"E), Mahuva (21°05'01.2"N, 71°45'56.7"E), Jafrabad (20°52'12.6"N, 71°21'55.6"E) and Ghogha (21°41'23.2"N, 72°16'27.6"E) in the duration July to August of 2015. After collection, morphometric measurements were taken immediately. Moisture content was measured by heating at 80°C as described by Dhananjayan V. and Muralidharan S. (2012) and the result was expressed in percentage. 2.0 g of homogenized tissue (collected both from dorsal and ventral part of fish) was used for the estimation of the protein and carbohydrate. Protein was estimated using folin reagent (Lowry et al., 1951) and carbohydrate estimation was done using Anthrone reagent with Sulfuric acid (Chen & Vaidyanathan, 2013). The lipid content was determined by gravimetric determination and for PAH analysis concentrated extract was analysed in GC-MS (Dhananjayan V. and Muralidharan S., 2012).

Heavy metal analysis was done by ICP-OES (Perkin Elmer, Waltham, MA; Optima 2000 DV) after acidifying the samples with concentrated nitric acid following the method described by Upadhyaya et al., 2014. ICP multi element standard solution (MERCCK, Germany) was used as standard.

The length of the fish samples collected from 6 coastal localities of Gujarat is ranging from 23.90 ± 0.46 to 29.43 ± 0.74 cm and the weight from 131.27 ± 8.55 to 246.80 ± 10.36 g. In this study, moisture contents of ventral, dorsal and gill tissues of all the samples collected were estimated separately and are ranging from 70.17 to 82.25%.

In this study the concentrations were calculated in respect of wet tissues. Here, the total carbohydrate content is ranging from 5.33 ± 0.44 to 7.92 ± 0.61 mg/g in ventral parts and 5.75 ± 0.31 to 8.95 ± 0.63 mg/g in dorsal parts of the fishes. Whereas the percentage of protein content is nearly similar in all the fishes collected, both in the ventral and dorsal parts and the range is 135.54 ± 13.58 to 19.58 ± 1.73 mg/g. But the lipid contents were varied significantly between ventral and dorsal tissues. The ventral parts have more than two times lipid than dorsal parts. Among all the fishes, in case of ventral tissues lowest lipid content (42.24 mg/g) was in Ghogla fishes and highest (155.44 mg/g) was found in Mahuva fishes. However, in case of ventral tissues lowest was found in (14.83 mg/g) in Jafrabad fishes and highest (68.58 mg/g) was in Mahuva fishes.

No PAH was found in any of the collected fish samples.

The capacities of heavy metal accumulation in fish tissues were calculated as mean concentration and measured in ventral, dorsal and gill tissues separately. In the present study 7 heavy metals such as As, Cd, Cu, Hg, Ni, Pb and Zn were analyzed. Here, as and Hg were not detected in any of the six locations. The concentration of other 5 such as Cd, Cu, Pb and Zn were recorded to be very high which are greater than Provisional tolerable daily intake (PTDI) (USFDA 1993; WHO 1998). However, negligible amount were recorded in case of Ni which was within the tolerance limit. The gill tissue Mullet collected from Mahuva and ventral tissues from Jafrabad showed remarkably high concentration of Cu comparing to other locations.

Samples were collected from different sampling locations and they are about 50 km away from each other. So, this study is able to deliver the amount of contamination in Mullet fish (*Mugil cephalus*) around the west coast of Gujarat. Since fish is the important food source for human, so results of this study provide information regarding how far the Mullet fish is safe for human health and its quality as daily food item. Here, the Mullet fish collected, is a good source of proteins and lipids but contaminated with heavy metals. High amount of heavy metals in daily foods may interfere with various body functions (Singh et al., 2011). For example, high concentration of Pd can cause dizziness and nervous damage (Gwaltney-Brant, 2002), Cd may affect DNA repair mechanism, interfere with energy metabolism of the body (Hartwig et al., 2002; Muller, 1986). High accumulation of Cu may lead to Anemia, liver and kidney damage, stomach and intestinal irritation, etc (Sing et al., 2011). The concentration of Cu found in our sample is higher than the Provisional tolerable daily intake (PTDI) WHO 1998, Martin et al, 2011). Chronic exposure to high doses of Zn may lead to the nausea, headache and skin irritation of the body (Fosmire, 1990). Polycyclic aromatic hydrocarbons (PAHs) are carcinogenic and cause of different human cancer but Mullet fish of Gujarat coast is safe in respect of PAH content.



## Research Training Fellowship for Developing Country Scientists (RTF-DCS) 2015-16 Research Project Completion Reports

### Cameroon – Project Completion Report of Mr. Toghueo Kouipou Rufin Marie



**Mr. Toghueo Kouipou Rufin Marie**, Research Assistant, Laboratory of Phytobiochemistry and Medical Plants Studies, University of Yaoundé, Cameroon was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2015-16 to carry out research in the Malaria Research Group, International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi, India on a project titled 'Exploring Endophytic Fungi from Cameroon Biodiversity for Production of Potent Antimalarial Agents' under the supervision of **Dr. Dinkar Sahal** from 11<sup>th</sup> January to 4<sup>th</sup> July 2016.

During the framework of this Fellowship, the effect of three different culture media, on the production of antiplasmodial metabolites by twenty seven different endophytic fungi isolated from three Cameroonian medicinal plant *Terminaliacatappa*, *Terminaliamantaly* and *Canangaodorata* was investigated. The antiplasmodial effect of ethyl acetate extracts of fungi was tested against Chloroquine sensitive (*Pf3D7*) and Chloroquine resistant (*PfINDO*) strains in 96 wells microtiter plate format using SYBR green fluorescence assay. Depending on the culture media, four (IC<sub>50</sub> 2.55-7.26 µg/mL), twelve (IC<sub>50</sub> 12.47-24.19 µg/mL) and eleven (IC<sub>50</sub> >25 µg/mL) fungi gave respectively very good, moderate and mild activity on potatoes dextrose broth. While fifteen (IC<sub>50</sub> 0.34-7.77 µg/mL), six (IC<sub>50</sub> 13-23.24 µg/mL) and six (IC<sub>50</sub> >25 µg/mL) was found with extracts from czapexdoh broth. From malt extract broth, four (IC<sub>50</sub> 1.62-6.69 µg/mL) and five (IC<sub>50</sub> 14.42-24.55 µg/mL) fungi gave very good and moderate activity while eighteen gave mild activity (IC<sub>50</sub> >25 µg/mL). Overall, of the 81 extracts obtained from 27 endophytic fungi grown in three different media tested against *Pf3D7* strain, good (IC<sub>50</sub> 0.34-7.77 µg/mL) to moderate (IC<sub>50</sub> 12.47-24.19 µg/mL) activity was shown by 23 extracts each while 35 displayed IC<sub>50</sub> >25 µg/mL mild activity.

### CAR - Project Completion Report of Mr. Mackpayen Auguste Oscar



**Mr. Mackpayen Auguste Oscar**, PhD Student, Option for Applied Physics Faculty of Science, Physics Department, University of Bangui, Central African Republic was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2015-16 to carry out research in the Indian Institute of Crop Processing Technology, Thanjavur, India on a project titled 'Conception of the Driers Solar to Coffee to High Energizing Performances in view of the Improvement of the Quality of the Merchant Coffee' under the supervision of **Dr. N. Venkatachalapathy** from 17<sup>th</sup> March to 21<sup>st</sup> August 2016.

The work was based on testing of a solar dryer constructed by using locally available materials *in situ*. Indirect solar dryer was designed and test in Indian weather conditions. The theoretical results showed that the thermal performance of the collector was sensitive to solar irradiation and ambient temperature. The experimental results were in good agreement with the theoretical values.

Two drying tests were carried out using green peas and turkey berry samples. The green peas samples reduced distributed masses on trays from 1300 (Tray1), 1330 (Tray2) and 1290 (Tray3) grams to 350 (Tray1), 380 (Tray2) and 400 (Tray3) grams in less than 18 hours. These results therefore approve the performance of the dryer and are consistent with those of the literature. The turkey berry samples reduced distributed masses on trays from 1140 (Tray1), 1130 (Tray2) and 1130 (Tray3) to 300 (Tray1), 310 (Tray2) and 310 (Tray3) grams in less than 18 hours.

The water activity ( $a_w$ ) and color value ensuring the proper packaging of the product was analyzed by Dew Point (Water Activity Meter 4TE) and Colorflex EZ. These checks posted activities values in the order of 44 %, 47% and 50% following the ascending trays. The results analyzed using EZ Colorflex showed the product values on each hurdle as follows: the first with ( $L^* = 31.54$ ,  $a^* = 3.89$ ,  $b^* = 14.88$ ), the second ( $L^* = 30.95$ ,  $a^* = 4.44$ ,  $b^* = 13.78$ ) and the last tray with ( $L^* = 23.44$ ,  $a^* = 5.00$ ,  $b^* = 9.66$ ).

The rapid rate of drying in the dryer reveals its ability to dry food items reasonably rapidly to a safe moisture level.

### Egypt – Project Completion Report of Mr. Mahmoud Abd El-Azim El-Sadany Gad Sallam



**Mr. Mahmoud Abd El-Azim El-Sadany Gad Sallam**, Agronomist, Regional Centre for Food & Feed, Agriculture Research Centre, Ministry of Agriculture, Egypt was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2015-16 to carry out research in the Institute of Nano Science and Technology, Mohali, Punjab, India on a project titled 'Assessment of Mycotoxins in Some Stored Grains from Different Localities in Egypt' under the supervision of **Dr. P. S. Vijayakumar** from 17<sup>th</sup> January to 10<sup>th</sup> July 2016.

The study aims to attempt for prevention or fortification wheat during storage by coating seeds with zinc coordinated zein as antimicrobial agent, to realising a level of safety storages of wheat for animal and human consumption. According to level for bacteria is above 90%, for spoilage molds it is above 70%. The result showed no negative effect of zein films on moisture content of wheat with different temperature (20°C, 40°C, 60°C) and different relative humidity. Wheat seed without coated and with coated, result detected the different structure on surface seeds after coating with zinc coordinated zein. The zein showed its characteristic 1655 peak corresponding to the C=O of amide 1 and 1524 peak corresponding to the C-N-H of the amide 2. The characteristic cellulose multiple peaks appeared for the

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wheat outer layer viz, the cellulose peaks at 978, 988, 1009, 1021, 1029, 1036  $\text{cm}^{-1}$  is prominent. This becomes undifferentiated after the zein coating. Whereas the wheat protein i.e. Gluten is present deep inside the seed endodermis and hence it is not expected to show its signal. Hence with the zein coating the amide 1 and amide 2 signals is appeared strongly. The sharp peak in the zein at 2941 and 2920  $\text{cm}^{-1}$  is contributed by the C-H stretching.

Bacterial counts do not show significant change with reference to control and zein coating from the initial bacteria mean concentration (87.5-90%) without coated (control) with (100%) of ( $6.4 \times 10^7$  CFU/ml or CFU/mg) to ( $5.6 \times 10^7$  CFU/ml or CFU/mg) when coated wheat seeds with Zein films only and, however with the zinc coordinated zein the bacteria significantly decreased to range 21.9-22.6% of ( $1.4 \times 10^2$  CFU/ml or CFU/mg) from the similar initial bacteria mean concentration

This result explains that zinc is known to be antimicrobial agent both as ionic and in nano oxide forms. Similar complexation of the  $\text{ZnSO}_4$  with the polymer, for the slow release of the zinc for the antimicrobial scaffold is already demonstrated for the Osteostimulation Scaffolds The zein film is proved to support the activity of the active ingredient like the silver ion, Lysozyme and antioxidant, so the antibacterial activity of the zinc will be maintained with the support of the zein. Mapping and element scan of zinc wheat seed without coated and with coated, that result detected increase the concentration of zinc on structure seeds after coating.

### Ethiopia – Project Completion Report of Mr. Zewdu Yilma



**Mr. Zewdu Yilma**, Lecturer, Department of Pharmacy, College of Health Sciences, Mekelle University, Mekelle, Ethiopia was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2015-16 to carry out research in the Department of Pharmaceutical Technology, Jadavpur University, Kolkata, India on a project titled 'Design and Development of Paclitaxel loaded PLGA Nanoparticles targeted against Liver Cancer' under the supervision **Prof. (Dr.) Biswajit Mukherjee** from 28<sup>th</sup> January to 21<sup>st</sup> July 2016.

Conventional chemotherapeutic agents are the mainstream of treatment strategies for liver cancer apart from surgical resection. However, high toxicity and poor specificity result in adverse effects that are not only painful but also responsible for fatal consequences. Paclitaxel (PTX) is a potent anticancer chemotherapeutic agent which is originally derived from the bark of the Pacific yew tree (*Taxusbrevifolia*) that is widely used in the treatment of solid tumors. Due to its poor solubility in conventional aqueous vehicles, the dosage form of paclitaxel, Taxol®, is formulated in a mixture of Cremophor EL (polyoxyethylated 35 castor oil) and dehydrated alcohol. However, Cremophor EL is known to cause serious side effects, such as hypersensitivity reactions. To overcome this drawback, significant efforts have been made to develop appropriate targeting system for cancer. Among the systems, nanotechnology based platform holds promise by focusing drug delivery to the target site and thus reducing drug accumulation at non-specific sites. Therefore, the present study was aimed to develop PTX loaded aptamer decorated nanoparticle targeted against liver cancer using a biocompatible and biodegradable polymer called (D, L-lactide-co-glycolide) (PLGA-50:50).

Using double emulsion solvent evaporation technique, drug loaded PLGA nanoparticles were formed and characterised for their size distribution, zeta potential, morphology, drug loading, loading efficiency, drug release, and *in vitro* cytotoxicity effect against Huh7 cancer cell line. A targeting ligand, aptamer, was also conjugated to the nanoparticles and checked using gel electrophoresis, to know whether it is conjugated or not. The prepared nanoparticles had a mean particle size of 222 nm with a zeta potential of about -13 mV. The results obtained by the FESEM and AFM examinations showed that the morphology of the prepared nanoparticles was spherical in shape with a smooth surface. Incorporation of TPGS in the formulation showed an increase in drug release compared to a formulation having no TPGS. *In vitro*, the drug loaded nanoparticles showed better cytotoxicity effect than the free drug. Gel electrophoresis study showed that the ligand-aptamer, had already conjugated with the nanoparticles. *In conclusion*, the study resulted a promising formulation which may be used as a potential drug delivery system for the targeted delivery to liver cancer.

### Ghana – Project Completion Report of Mrs. Roseline Esi Ahene



**Mrs. Roseline Esi Ahene**, Scientific Officer, Ghana Standard Authority, Ghana was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2015-16 to carry out research in Indian Institute of Crop Processing Technology, Tamil Nadu, India on a project titled 'Occurrence of Filamentous Fungi and the Use of Solar Drying in the Reduction of Aflatoxins in Ginger' under the supervision Dr. K. Singaravadivel from 10<sup>th</sup> January to 2<sup>nd</sup> July 2016.

The objective of the study was to assess the effect of solar and sun drying on the physico-chemical, microbiological and aflatoxin quality of sliced dried ginger and investigate the effect of using glass bottle as a packaging material in extending the shelf-life of the dried sliced ginger at ambient temperatures.

The occurrence of filamentous fungi in fresh and dried rhizomes of two ginger (*Zingiber officinale*) varieties from Ghana and India (Maran) and the use of solar drying to reduce aflatoxins were studied with spread plate method and HPLC respectively. Aflatoxins were quantitated by HPLC and identified by LC-MS and the India dried sliced samples were stored in glass bottles at ambient temperature for two months and microbial and aflatoxin analysis carried out on them. The two ginger varieties were both heavily laden with bacterial and fungal population however washing the fresh ginger reduced the microbial load to about half the population and even reduced more when the washed ginger were cut into slices and soaked in 10% vinegar for 1 hour implying vinegar has a positive effect on the reduction of microbial load in ginger. This reduced further when dried which can be adopted by the small-scale farmer. The aflatoxin content isolated from the fresh, dried and stored ginger was however higher than the maximum levels as required by both the Ghana and



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India Standards for ginger. The use of solar dryer did not reduce the level of Aflatoxins in this study as anticipated as compared to open-sun drying however the storage samples showed a slight decrease in both bacterial and fungal population from the initial dried population. There were 11 fungal species isolated with about 9 belonging to the filamentous fungal group and three species being *Aspergillus* (*A. flavus*, *A. fumigatus*, *A. niger*). There is the need for more work in the area of pre-treatments that will effectively reduce aflatoxin levels in dried and stored sliced ginger.

## Ivory Coast – Project Completion Report of Dr. Nene Si Semi Anthelme



**Dr. Nene Si Semi Anthelme**, Research Fellow, Laboratory of Animal Physiology, UFR Biosciences, University Felix Houphouet-Boigny, Ivory Coast was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2015-16 to carry out research in JSS College of Pharmacy Ooty, India on a project titled 'Evaluation of Subchronic Toxicity Studies of the Aqueous Stem Bark Extract of *Bridelia ferruginea* in Rats' under the supervision of **Dr. R. Vadivelan** from 19<sup>th</sup> January to 12<sup>th</sup> July 2016.

*Bridelia ferruginea* is a medicinal plant used for the treatment of many diseases like hypertension and diabetes. The aim of the present study was to assess the effects in the prolonged use of the aqueous stem bark extract of this plant in wistar rat after daily administration during 90 days.

This study was carried out according the protocol described by the OECD guideline 408 for testing chemicals. General behavior, mortality, animal body weight, food and water consumption were observed throughout the study period. At the end of the experiment, the blood was collected for hematological and biochemical parameters and some organs like liver and kidney were dissected for histopathological studies. *Bridelia ferruginea* used at the doses of 100, 200 and 400 mg/kg b.w, did not show any toxicity effects in rats after 90 days of daily treatment.

In experiment period, there were no significant changes in body weight. There were some significant changes ( $p < 0.05$ ,  $p < 0.01$ ,  $p < 0.001$ ) in food and water intake in both sex. *Bridelia ferruginea* did not modify hematological parameters significantly ( $p > 0.05$ ) in the test groups. The extract did not modify significantly, the lipid profile, kidney and liver function parameters.

The results obtained in this study, showed that the aqueous extract of *Bridelia ferruginea* did not cause any mortality. This extract did not modify the body weight, lipid profile, the liver and kidney functions in rats after daily administration for 90 days. It decreased the relative kidney weight in the high dose in female group and the histopathological analysis did not show any tissue damage.

## Research Training Fellowship for Developing Country Scientists (RTF-DCS) 2016-17

### Expert Committee Meeting

The NAM S&T Centre is implementing a fellowship scheme titled 'Research Training Fellowship for Developing Country Scientists (RTF-DCS)' since the financial year 2012-13 for a five year period 2012–2017. The scheme sponsored by the Department of Science and Technology (DST), Government of India aims at capacity building of young researchers of the developing countries in science and technology by giving them opportunity to affiliate themselves with premier academic and research institutions in India for a period of six months each with full financial support for their international travel, subsistence allowance, research contingency and domestic travel etc. In the last four years, this scheme was successfully implemented with 20 Fellows each having got affiliated with the Indian R&D and academic institutions in the years 2012-13 and 2013-2014, and 50 fellows in the year 2014-2015 and 2015-2016

An Expert Committee comprising the distinguished scientists was constituted by the NAM S&T Centre, viz. Prof. D. V. Singh, Distinguished Professor, Amity U., Former Vice Chairman AICTE, Former Director, CSIR-CRRI, Delhi; Prof. Indira Nath, Padmashri, Chevalier National Ordre du Merite (France), Former Head, Biotechnology Department, AIIMS; Prof. G.S. Roonwal, Inter-University Accelerator Centre, Delhi, Former Head, Geology Department, Delhi University and Director, Geo-Resources Centre, Delhi University South Campus; Prof. V.K. Jain, Amity Advanced Research & Studies (Materials & Devices) and Renewable and Alternative Energy Institutes, Formerly, Director Grade Scientist, Solid State Physics Lab, Delhi; Dr. S. Natesh, Centre for Policy Research, IIT Delhi, Formerly Senior Advisor DBT; Dr. Balram Sharma, Formerly Head, Plant Genetics Division, IARI; Dr. R.K. Bhatnagar, Forensic Scientist, Formerly, Advisor DST; Dr. Om P. Nangia, Director (Solar Energy), Former Solar Plant Head, BHEL; and Dr. S. Subramanian, Scientist, Division of Entomology, IARI to select the researchers from the developing countries for their 6-months' affiliation with the Indian Centres of Academic and R&D Eminence under the RTF-DCS scheme for the period 2016-17.

The Expert Committee held its meeting on 30<sup>th</sup> August 2016 and selected 50 researchers for the award in various fields of science and technology out of 231 applicants from 36 developing countries, who had already got acceptance from one or more Indian academic or R&D institutes for their 6-months' affiliation. The Expert Committee also prioritised the remaining 181 applicants, who may be awarded the Fellowship in case any of the 50 selected researchers is unable to accept the offer in the first instance.



Expert Committee Meeting for Selection of NAM S&amp;T Centre RTF-DCS Fellows for 2016-17

## Joint NAM S&T Centre – ZMT Bremen Fellowship

### Project Completion Report of Ms. Sadaf Nazeen, India



**Ms. Sadaf Nazeen**, Ph.D. Student, Jawaharlal Nehru University, New Delhi, India 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, Berman, Germany on a project titled 'Investigating the Sources and Fate of Organic Matter in the Sediments of Chilika Lake (India) using Elemental, Isotopic and Amino Acids Record' under the supervision of Dr. Tim Jennerjahn from 4<sup>th</sup> January to 31<sup>st</sup> March 2016.

A total of 100 sediment samples were analysed for elemental, stable isotopes and amino acids. The sediments were first dried for two days at 40°C in oven. Then they were ground in ball mill to make fine powder. For the measurement of total carbon and total nitrogen, an aliquot of 15 – 30 mg of dried powdered sediment samples were analysed on Carlo Erba NA 2100 elemental analyser. For total organic carbon (TOC) measurement, samples were weighed in silver cups and treated with 1N HCL and subsequently dried at 40°C overnight to remove the carbonates and measured on Carlo Erba elemental analyzer. Carbon ( $d^{13}C_{org}$ ) isotopic composition was determined by Thermo Finnigan Delta Plus gas isotope ratio mass spectrometer after high temperature combustion in a Flash 1112 EA elemental analyser. Samples were weighed in silver cups for  $d^{13}C_{org}$ . Prior to analysis, samples were treated with 1N HCl for the removal of carbonates.

For the analysis of amino acids the samples were weighed and transferred into ampullae and spiked with 4ml of 6N HCl and introduced with a slow flow of nitrogen gas. Next the ampullae were heat sealed to prevent oxidation and left in the oven at 110°C for 22 hours for hydrolysis. Next day 1ml of the acid was added and the samples were put into the multielevator. The acid was evaporated at 60°C and about 60mbar in multielevator. Once the acid has completely evaporated, 2ml of the buffer A, pH 2.65 was added into the tubes and everything inside was diluted. Then 800 µl of samples were transferred into vials and kept in a frozen condition until analysis.

The total organic carbon (TOC) ranged from 0.16 to 2.96% in cores from different sectors, whereas TN ranged from 0.016 to 0.33 % in the cores. The  $^{13}C$  values ranged from -19.006 to -22.132‰. The  $^{15}N$ ‰ ranged from 2.29 to 4.44‰. TOC/TN ranged from 7.17 to 10.63. The  $^{13}C$  values and TOC/ TN ratios in the sediment samples from cores are close to the phytoplankton and algal sources indicating towards plankton to be the major source of organic matter in Chilika Lagoon. The enrichment in  $^{13}C$ ‰ values and depletion in  $^{15}N$ ‰ could be a result of decomposition of macrophytes, sea grasses and other plant derived organic matter (OM).

### Project Completion Report of Dr. Thet Thet Nyein, Myanmar



**Dr. Thet Thet Nyein**, Lecturer, Biotechnology Research Department, Kyaukse, Mandalay Division, Ministry of Science and Technology, Myanmar 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 Biochemistry at ZMT, Bremen, Germany on a project titled 'Structure and Origin of Organic Matter in Mangrove Sediments' under the supervision of Prof. Dr. Martin Zimmer from 2<sup>nd</sup> September to 30<sup>th</sup> November 2015.

Recalcitrant organic matter stored under saline and anoxic conditions in mangrove sediments potentially contributes to climate change-mitigation through reducing CO<sub>2</sub> and N<sub>2</sub>O emission into the atmosphere upon decomposition processes. Such sediment organic matter (SOM) is derived from root exudates of the mangrove vegetation and the decay and composition of any kind of dead organic matter (detritus). How effective SOM is in preventing the evolution of climate-active gases (e.g., CO<sub>2</sub> and N<sub>2</sub>O) and retaining carbon and nitrogen below ground depends on its structure and recalcitrance which, in turn, is governed by its origin and history.

The sediment underneath nine different tree species common in the mangroves of Myanmar was analysed for microbial enzyme activity and characteristics of organic matter. Both cellulases and phenol oxidases exhibited similar activities in all sediments, but 3-4 species could consistently distinguish from each other through significantly lower or higher activities. Similarly, the C:N ratio of the organic matter, ranging from remarkably low values of 8 to 22, did not provide much evidence for species-specific effects on organic matter characteristics of the sediment. By contrast, the total organic content, ranging from 2 to 8 %, distinguished the sediments from underneath six out of the nine species as being rich versus poor in organic matter.

Detailed analysis of the chemical composition of the organic matter through (pyrolysis-) GC/MS revealed more than 200 products of organic matter-pyrolysis. However, none of the samples (or species) contained more 60 different compounds; most were characterised by less than 30, suggesting a high diversity of organic matter composition. Using Bray-Curtis-similarity of organic matter composition among samples and species and visualization through non-metric multidimensional scaling, we were able to clearly assign individuals of the same species to clusters of similarity for six out of nine species, and to distinguish them from the other species. Three species exhibited extensive overlap in the composition of the organic matter in sediments sampled close to their stems.

Next steps will be to improve the separation and identification of organic matter compounds and to assign species-specific organic compounds to species. This will, in the long run, enable us to identify the source of organic matter in mangrove sediments and differentiate mangrove tree species with respect to the structure and stability of sediment organic matter derived from these species.



## DG Meets and Visits

### VISIT TO MALAYSIA

Prof. Dr. Arun P. Kulshreshtha, Director General (DG), NAM S&T Centre accompanied with Mr. M. Bandyopadhyay, Senior Expert & Administrative Officer of the Centre visited Malaysia to organise and participate in the International Training Programme on 'Science, Technology and Innovation (STI) Policy and Management for Developing Countries (ITPS)' at Kuala Lumpur, Malaysia on 8-12 August 2016, during the course of which the following meetings and visits were held:

**Meeting with Dato' Dr. Mohd. Azhar bin H.J. Yahya, Secretary General, Ministry of Science, Technology and Innovation (MOSTI), Malaysia and Vice-President, NAM S&T Centre:** The meeting with Dato' Dr. Mohd. Azhar bin H.J. Yahya, Vice-President of the NAM S&T Centre was held in Swiss-Garden Hotel, Kuala Lumpur on 8<sup>th</sup> August 2016. It was a highly productive interaction as DG took the opportunity to brief the Vice-President on the forthcoming 3<sup>rd</sup> Bureau Meetings of the 12<sup>th</sup> Governing Council of the Centre in Egypt in September 2016 and seek his guidance on various matters.



Dato' Dr. Mohd. Azhar bin H.J. Yahya, Secretary General, Ministry of Science, Technology and Innovation and Vice-President, NAM S&T Centre (C)

**Visit to the Ministry of Science, Technology and Innovation (MOSTI) of Malaysia:** The DG accompanied with Mr. M.



Dr. Nor Azlina Ariffin, Under Secretary, International Division (C) and Senior Officials of the Division of the Ministry of Science, Technology and Innovation (MOSTI) of Malaysia

Bandyopadhyay visited the office of the Ministry of Science, Technology and Innovation (MOSTI) located at Putrajaya on 9<sup>th</sup> August 2016 and called on Dr. Nor Azlina Ariffin, Under Secretary, International Division and other senior officials of the Division. He made a power point presentation on the activities of the NAM S&T Centre and discussed various issues on the partnership of MOSTI with the Centre.

**Meeting with YM Ms. Tengku Nasariah Ibrahim, CEO, Petrosains Discovery Centre:**

The DG accompanied with Mr. M. Bandyopadhyay visited the Petrosains Discovery Centre located at Petronas Twin Towers in Kuala Lumpur and made a courtesy call on the CEO, YM Ms. Tengku Nasariah Ibrahim on 8<sup>th</sup> August 2016.



YM Ms. Tengku Nasariah Ibrahim, CEO, Petrosains Discovery Centre



Prof. Dr. Chandima Gomes, Head, Centre for Electromagnetic and Lightning Protection Research (CELP), Department of Electrical & Electronics Engineering, Universiti Putra Malaysia (UPM), Serdang (2<sup>nd</sup> from R) and Mrs. Nilanthi Gomes.

**Meeting with Prof. Dr. Chandima Gomes, Head, CELP, UPM:**

The DG accompanied with Mr. M. Bandyopadhyay met with Prof. Dr. Chandima Gomes, Head, Centre for Electromagnetic and Lightning Protection Research (CELP), Department of Electrical & Electronics Engineering, Universiti Putra Malaysia (UPM), Serdang, Selangor, Malaysia and discussed matters concerning the establishment of the Lightning Centres in various parts of the world in partnership with the NAM S&T Centre and on taking new initiatives in the field.

### VISIT TO EGYPT

Following the 3<sup>rd</sup> Bureau meeting of the 13<sup>th</sup> Governing Council (GC) of the NAM S&T Centre hosted by the Academy of Scientific Research & Technology (ASRT) of Egypt, Prof. Arun Kulshreshtha, DG, NAM S&T Centre accompanied with Mr. M. Bandyopadhyay, Senior Expert & Administrative Officer of the Centre visited Fayoum University on 7<sup>th</sup> September 2016, where they called on Prof. Dr. Mona H. Hetta, Dean, Faculty of Pharmacy - Pharmacognosy Department and discussed joint activities of mutual interest. Fayoum city is located ~90 km from Cairo and is the old capital city of Egypt from around 1800 years ago.



Prof. Mona Hetta, Dean, Pharmacology Department, Fayoum University

## SCIENCE AND TECHNOLOGY NEWS IN THE DEVELOPING WORLD

### Abu Dhabi: Pilot Device to store Solar Energy in Sand

Unlike traditional storage media used in thermal energy storage systems, such as synthetic oils and molten salts, sand is abundant in many regions of the world with plenty of sunshine, and it is also inexpensive to obtain. Researchers at the Masdar Institute of Science and Technology in Abu Dhabi are testing a pilot device that can store solar energy in sand to improve the efficiency of power plants and provide energy at night. The results showed a capability of storing thermal energy up to 800-1000 degrees Celsius. The technology uses gravity to drain sand from a higher basin into a lower one, heating up the sand grains with solar power during the transition. In the lower basin, the energy can be stored and withdrawn at low cost to provide extra energy if needed, for example during peak hours and at night-time. The hourglass idea inspired the system, as it uses two reservoirs connected to one another vertically across a narrow passage that allows the movement of 'cold' grains of sand from the upper reservoir to the lower 'hot' one. The sand is heated by running cold sand through a solar heat collector, where it is heated before being stored in a hot reservoir. This hot sand can be used to run electricity-generating turbines. The cycle is completed by returning the cooler sand to the upper cold sand reservoir. Two pilot models of the system have been tested in an effort to prove its efficiency and applicability on a large scale in big projects. The next step will be to test a more sophisticated model in preparation for its commercial marketing. These tests will involve researching the thermal stability of sand and its specific heat-absorption capacity. There have been several experiments around this technology in Europe and the United States. However, these have not rendered any results that can be made available or capitalised. There are challenges facing those experiments, the most important of which are the cost component of economic feasibility, and the method used to recover energy. Stored energy recovery process requires the presence of a fluid, either a liquid, air, or gas that is injected into the turbine. This process consumes a lot of energy, which raises the cost. More research and funding is needed to commercialise the technology. Securing funding poses a challenge as nearly US\$300,000 is needed to test the system in the pre-marketing stage.

*Source: Islamic World Academy of Sciences, 10<sup>th</sup> August 2016*

### Brazil: Male Hormone reverses Cell Aging in Clinical Trial

One of the processes associated with aging is progressive shortening of telomeres, DNA-protecting structures at the ends of chromosomes, like the plastic tips on shoelaces. Each time a cell divides, its telomeres get shorter. Eventually, the cell can't replicate anymore and dies or becomes senescent. However, telomerase can keep the length of telomeres intact, even after cell division. In practice, telomere length is a laboratory measure of a cell's 'age'. Some cells avoid aging by using telomerase to lengthen their telomeres through the addition of DNA sequences, thereby maintaining their capacity to multiply and 'stay young'. In an embryo, where tissue is still in the formative stage, telomerase is expressed by practically every cell. After this period, only cells that are constantly dividing, such as hematopoietic (blood-forming) stem cells, which can differentiate into a variety of specialised cells, continue to produce telomerase. Brazilian researchers from Hospital São José and University of São Paulo's Ribeirão Preto Medical School in collaboration with those at the National Institutes of Health (NIH) in the US have shown that sex hormones can

stimulate production of Telomerase, an enzyme naturally found in the human organism and closest of all known substances to a 'cellular elixir of youth'. The strategy was tested in patients with genetic diseases associated with mutations in the gene that codes for telomerase, such as aplastic anemia and pulmonary fibrosis. Aplastic anemia is one of the diseases that can be caused by telomerase deficiency. Bone marrow stem cells age prematurely and fail to produce enough red blood cells, white blood cells and platelets, making the patient dependent on blood transfusions and more susceptible to infections. A dearth of telomerase can also affect several organs including the liver and lungs, potentially leading to cirrhosis and pulmonary fibrosis, and is believed to increase the risk of some cancers by 1,200-fold. Clinical evidence that patients with aplastic anemia respond well to treatment with male hormones (androgens) has accumulated since the 1960s. It was shown by researchers in 2009 that androgens, which are converted into estrogens in humans, bind to female hormone receptors in the telomerase gene promoter region and thereby stimulate expression of the enzyme in cells. Instead of estrogen the researchers treated the patients with androgen, which has long been used as a drug in cases of congenital anemia and offers the advantage of stimulating an increase in the mass of hemoglobin (red blood cells) that estrogen cannot do. Treatment with the steroid danazol, a synthetic male hormone, was tested for two years in 27 patients with aplastic anemia owing to telomerase gene mutations. Some also suffered from pulmonary fibrosis, a disease characterised by progressive scarring of the lungs and a gradual decline in lung function. In a healthy adult, telomere length varies from 7,000 to 9,000 base pairs on average. A normal person's telomeres lose 50 to 60 base pairs per year, but a patient with telomerase deficiency can lose between 100 and 300 base pairs per year. In the patients, who received danazol, telomere length increased by 386 base pairs on average over two years. In addition, hemoglobin mass rose from 9 grams per deciliter (g/dL) to 11 g/dL on average. A person without anemia normally has between 12 and 16 g/dL, but the improvement observed in these subjects was sufficient to rid them of transfusion dependency. In the patients with pulmonary fibrosis, degeneration was halted. This can be considered significant progress in the case of a disease for which there is no treatment. On completion of the protocol, the medication was interrupted, and a fall was observed in all counts. Several patients resumed the medication with smaller doses, individually adjusted to minimise side effects. Like other anabolic steroids, danazol can be toxic for the liver and cause testicular atrophy in men and a degree of masculinisation in women. Some patients eventually dropped out of the trial with complaints of muscle cramps and swelling. In a new protocol currently in progress at the University of São Paulo's Ribeirão Preto Blood Center, the same kind of approach is being tested with nandrolone, an injectable male hormone. The study is supported by FAPESP and the National Council for Scientific & Technological Development (CNPq). The effects of nandrolone on the liver are far less severe than those of danazol, and the preliminary results are showing an improvement, at least from the hematological standpoint. Telomeres have yet to be evaluated. Another future possibility would be to study the development of drugs capable of binding to the estrogen receptor and stimulating telomerase production without the side effects of anabolic hormones. Although the results of the study suggest that drugs can be used to reverse one of the biological drivers of aging, it is not yet clear whether the benefits of treatment would surpass the risks in healthy people, especially if the treatment involved the use of sex hormones. Some groups, such as patients undergoing

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chemotherapy or radiotherapy, may benefit from drugs that stimulate telomerase in the future

*Source: Agência FAPESP, 13<sup>th</sup> July 2016*

### **Brazil: Nanoparticles that inactivate HIV**

In order to reproduce in a host organism, a virus must undergo a process of adsorption to host cells, whereby the receptors in the viral envelope become attached to complementary receptors on the cell membrane. Researchers at Brazil's National Energy & Materials Research Center (CNPEM) have developed a strategy to prevent viral infection by means of nanoparticles loaded with chemicals. The nanoparticles are engineered to attract viruses, bind to them, and occupy the available sites that can adsorb to cell receptors. When the surface of a virus is occupied by chemicals from the nanoparticles, it cannot infect host cells. This innovative viral inactivation strategy was developed as part of the research project on 'Functionalisation of Silica Nanoparticles: Increasing Biological Interaction', supported by FAPESP and is the first to demonstrate viral inactivation based on surface chemistry of functionalised nanoparticles. The researchers synthesised silica nanoparticles with different surface properties and evaluated their biocompatibility and antiviral efficacy. This steric effect, which relates to the fact that each atom in a molecule occupies a certain amount of space on the surface, prevents viruses from reaching their targets, the cells, and from binding to them, because the sites that can bind to the targets are already 'occupied' by nanoparticles. They performed in vitro assays on cell cultures to evaluate the nanoparticles' efficacy against human immunodeficiency virus (HIV) and vesicular stomatitis virus (VSV) in infected HEK293T cells (human embryonic kidney cells that express the large T antigen). Virus particles were engineered to express the green fluorescent protein (GFP) reporter gene, labeling infected cells for detection by fluorescence microscopy and flow cytometry. The innovation follows a strategy already implemented by the researchers to functionalise nanoparticles for the delivery of chemotherapy drugs at high concentrations to cancer cells, avoiding damage to healthy cells and minimising the adverse effects of chemotherapy. Mesoporous silica nanoparticles were again chosen because of their high surface reactivity, which enables effective functionalisation by the addition of chemicals through the pores. The chemical reactions induced in this manner are designed to attract specific viral proteins. After synthesis and chemical loading, the researchers characterised the nanoparticles by measuring their size and checking that they were correctly functionalised using techniques ranging from microscopy to analysis of zeta-potential to determine the nanoparticles' surface charge. They then correlated these data with the already known chemical properties of the viral envelope to increase the likelihood that the nanoparticles would become anchored in specific regions of the virus. They also deployed small angle X-ray scattering (SAXS) using the particle accelerator at the National Synchrotron Light Laboratory (LNLS), which belongs to CNPEM. The SAXS procedure entailed emitting radiation from the LNLS beamline to analyse the shape and spatial organisation of the functionalised silica nanoparticles. The functionalised nanoparticles were then incubated with the viral particles for a period. During incubation, they interacted because of their respective surface properties. The strong attraction created by the chemicals on the surface of the nanoparticles led the viruses to bind to them instead of binding to host cells. After functionalising the nanoparticles, analysing load and other properties, and incubating them with the viruses, the researchers

performed in vitro assays in which they infected HEK293T cells with HIV and VSV-G that had been prepared to express the fluorescent protein. They used fluorescence microscopy to track the infection process and detect uninfected cells. Flow cytometry, a technique that uses light to analyse the properties of cells or particles in a heterogeneous fluid, enabled them to count the number of cells that respond positively or negatively to exposure to the viruses. The findings showed that the nanoparticles reduced viral infection by up to 50%, demonstrating the efficacy of the strategy. The assays also showed cell morphology was maintained and not influenced by the nanoparticles. The strategy could be used to detect and eliminate viruses in blood bags before transfusion, for example. For this purpose, the researchers are studying magnetic nanoparticles that can bind to any viruses in the blood bag, inactivate them, and then be separated from the blood by a magnet, taking the viral particles with them. The affinity between the chemicals loaded onto the nanoparticles and the viruses could also be leveraged to facilitate the development of novel techniques for detecting HIV and other viruses.

*Source: Agência FAPESP, 7<sup>th</sup> September 2016*

### **Egypt: Farewell to Late Nobel Prize Scientist Ahmed Zewail**

Egyptian-born US based chemist Ahmed Zewail, the first Arab to win the 1999 Nobel Prize in Chemistry, Ahmed Zewail, aged 70, died on 2<sup>nd</sup> August 2016. He is credited with founding the field of femtochemistry, which probes the mechanics of chemical reactions using laser pulses lasting just tens of femtoseconds (1 femtosecond is  $10^{-15}$  s). He was working at the California Institute of Technology in Pasadena. He championed science education and research in his native country and founded the Zewail City of Science and Technology, a university that opened its doors to students in 2012. The Zewail City of Science and Technology, a campus outside Cairo comprises a non-profit university and several research institutes.

*Source: Nature, 10<sup>th</sup> August 2016*

### **India: Eggs get Longer Life with New Paper Tray**

Scientists at the Tamil Nadu Veterinary and Animal Sciences University in Chennai have increased the storage life of eggs by coating silver nanoparticles (AgNPs) on paper trays. The AgNPs-doped egg trays possessed strong antimicrobial activity against commonly found bacteria on egg shells - *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus*, and *Salmonella* species - thus making them suitable for prolonged storage without deterioration of egg quality. The research was prompted by recent reports of disease outbreaks associated with bacterial contamination of egg and egg products and high incidence of bacterial pollution in eggs stored in retail outlets on reusable trays. The researchers describe a new and cost-effective bactericidal paper egg tray preparation method using AgNPs capable of killing both Gram-positive and Gram-negative bacteria on surface and in solution. In the new method, the AgNPs, synthesised using chemical reduction, are added to a colloidal solution of chitosan (a polysaccharide derived from shellfish) and gelatin. The colloid containing the AgNPs is sprayed on paper trays and dried. The gelatin and chitosan act as adhesives to fix the AgNPs on to the tray. Tests showed that the shelf-life of the eggs stored in these trays improved by more than 14 days compared to eggs stored in conventional trays. The method is very easy and highly suitable for storing large-scale commercial eggs and opens up a new household material

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making use of nanotechnology.

*Source: Nature India Update, 26<sup>th</sup> July 2016*

### **India: Nanotherapy for Oral Cancer**

Researchers of the Department of Biosciences & Bioengineering of the Indian Institute of Technology, Bombay have enhanced the therapeutic efficacy of the anticancer drug sorafenib by encapsulating it with calcium carbonate nanoparticles and polyelectrolytes. This nanoparticle-coated drug is potentially more effective than the free drug in stopping the growth of oral cancer cells. Studies have shown that sorafenib can inhibit the proliferation of breast, colon, lung and liver cancer cells, even for those that are drug resistant. However, the effects of sorafenib on oral cancer cells are not well understood. To explore sorafenib's potential against oral cancer, the researchers trapped sorafenib in calcium carbonate nanoparticles and then coated them with two bilayers of polyelectrolytes - dextran sulfate and polyarginine. The nanoparticles initially released the drug rapidly and then slowly; after 48 hours, they had released 68% of the loaded drug. When nanoparticles coated with fluorescent dye were incubated with oral cancer cells, the scientists observed red fluorescence inside the cancer cells, suggesting that drug-loaded nanoparticles easily permeated the cancer cells. Sophisticated imaging techniques revealed that the nanoparticles stifled the growth of the cancer cells by destroying their cell membrane and nuclei. The sorafenib nanoparticles stopped the migration of cancer cells, thereby preventing them from becoming metastatic, suggesting that these nanoparticles could be used against deadly oral cancer.

*Source: Nature India update, 13<sup>th</sup> July 2016*

### **Kenya: Seed Storage Cold Room Facility to bolster Maize R&D**

Agriculture is the backbone of Kenya's economy and needs a strong seed system to enable breeders develop and disseminate improved seed varieties for farming and improved livelihoods. Diseases, insect-pests and climatic stresses including drought, and low soil fertility are reducing maize production, thus negatively impacting on the livelihood of maize smallholders in Africa. It is important to have a facility that will help breeding programmes to produce and store large quantities of valuable seeds with no loss in quality. A seed storage cold room facility to support maize research and improve livelihood of African smallholders was launched on 7<sup>th</sup> July 2016 in Kenya under a US\$100,000 project funded by Bill and Melinda Gates foundation and implemented by International Maize and Wheat Improvement Center (CIMMYT) and Kenya Agricultural and Livestock Research Organization (KALRO). The facility will help breeding programmes to produce and store large quantities of valuable seeds with no loss in quality and the cold room will help improve effectiveness and efficiency of our breeding work in Kenya and Africa. This new facility will boost the maize breeding work done by both KALRO and CIMMYT at the Kiboko station, Makeni county in Kenya, which serves as a major hub for maize breeding in Africa and expedite movement of improved maize germ plasm to national partners and seed companies across Africa and beyond. Cold rooms function like large-scale refrigerators and preserve seeds by maintaining low temperatures, thereby impeding environmental or biotic factors such as pathogens and insects from affecting seed viability for long periods.

*Source: SciDev.Net, 12<sup>th</sup> August 2016*

### **Kenya: Inaugural Africa Food Prize**

The Africa Food Prize is the preeminent award recognizing an outstanding individual or institution that is leading the effort to change the reality of farming in Africa — from a struggle to survive to a business that thrives. Dr. Kanayo F. Nwanze, President of the International Fund for Agricultural Development (IFAD), has been awarded the inaugural Africa Food Prize during the African Green Revolution Forum in Nairobi, Kenya on 7th September 2016. Dr. Nwanze was recognised for his visionary leadership and passionate advocacy to place African small holder farmers at the center of the global agricultural agenda, and for his demonstrated success in advancing policies, programs, and resources that have improved the lives of millions across the continent. At a press conference the Chair of Africa Food Prize said that Dr. Nwanze is a model for how a great leader can make a difference in the lives of people on the ground. Whether that leader is the head of a global institution, a head of state or a head of small organisation, Dr. Nwanze's accomplishments on behalf of African farmers are a reminder of what is possible when you combine passion, good ideas, commitment, focus, hard work and dedication.

*Source: Crop Biotech Update, 14<sup>th</sup> September 2016*

### **Sri Lanka: Mangroves respond to Conservation Plan**

In Sri Lanka there was a time when mangroves were cut for everything from firewood to clearing land for shrimp farms. Starting from the late 1980s, successive governments allowed large businesses to clear mangroves to set up shrimp farms. What saved the mangroves was the failure of shrimp farming through infections. But by then over 40 per cent of mangroves along the north-western coast were destroyed. The value of mangroves in protection shores was brought home when the December 2004 Asian Tsunami smashed into the Eastern coast of Sri Lanka. Mangroves are now protected areas and cutting them down is punishable by law. A year after Sri Lanka launched a mangrove conservation plan with funds from a U.S. conservation group about half of its 37,000 hectares of mangrove forests are in a various stage of revival. With US\$3.4 million from the California-based Seacology and manpower and other support from the Sri Lankan government, about 283 community organisations have been engaged in the work of conserving and replanting mangrove forests. The national conservation body, Small Fisheries Foundation, is the local implementing partner. Over the next four years 1,500 community groups will be looking after existing mangroves and also replanting an additional 3,000 hectares. The most important component of the programme is participation of the community which has to value the mangroves otherwise they will simply use them for anything they see fit. Adding to the efforts, the Sri Lanka Navy has deployed its personnel to help with the planting of over 36,000 mangrove trees. The island's first mangrove museum was opened in July 2016 in the north-western Chilaw district.

*Source: SciDev.Net, 22<sup>nd</sup> August 2016*

### **Vietnam: GM Maize harvested in Vietnam Field Trial Sites**

After three months of field trials which started in April 2016, Bt maize (MIR162) was harvested in Dak Lak and Ba Ria-Vung Tau Provinces in Vietnam. After the harvest, the seeds were destructed following the regulations implemented by the government. Representatives of the Ministry of Natural



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Resources and Environment, Ministry of Agriculture and Rural Development and other local agencies ensured that all biosafety guidelines in planting and harvesting GM crops under testing were followed. The trials were conducted by Syngenta Vietnam. On the other hand, Pioneer Hi-Bred Vietnam Company Ltd. and Agricultural Genetics Institute harvested Bt maize (MON810) from confined field trials at Van Giang Experimental Station, Lien Nghia commune, Van Giang district, Hung Yen province. Representatives from government agencies and local organisations supervised the harvest including the Department of Biodiversity Conservation, Department of Science, Technology and Environment, Biosafety Committee of the Ministry of Agriculture and Rural Development, Department of Agriculture and Rural Development of Hung Yen Province, and the Division of Natural Resources and Environment.

Source: *Crop Biotech Update*, 28<sup>th</sup> September 2016

## *DISTINGUISHED VISITORS TO THE CENTRE*



Mr. Carlos Jimenez, Minister and DCM and Mme Anne Maeda, Counsellor of Embassy of Peru, New Delhi

## *Past Scientific Associates of NAM S&T Centre*

### **Ms. Debanjana De**



**Ms. Debanjana Dey** joined the NAM S&T Centre on 15<sup>th</sup> June 2009 in the capacity of Research Assistant and continued her association with the Centre till 13<sup>th</sup> May 2010. Her responsibility in the Centre included the co-ordination of the organisation of various international workshops, conferences, roundtables and training programmes in important S&T areas and subjects that are of socio-economic importance for the developing countries. She had been particularly responsible for the implementation of the programmes like the International Workshop on Urbanisation, Land Use, Land Degradation and Environment at Denizli, Turkey held during 29<sup>th</sup> September - 1<sup>st</sup> Oct 2009 and International Conference on Empowering Women in Developing Countries through Better Healthcare and Nutrition at BITS, Pilani, Rajasthan, India held during 22-24 April 2010. She participated in an advanced training course on 'Intellectual Property Rights' organised by the Centre in association with the Technology Information Forecasting Assessment Council (TIFAC) and the Department of Science & Technology (DST), Government of India in July 2010 at Manesar, Haryana. She was also responsible for the compilation and preliminary scrutiny of scientific articles, research papers, and country status papers and assisting the editors to bring out two publications of the Centre, namely, (i) *Cleaner Production and Energy Conservation for Sustainable Development* edited by Jurgis Staniškis (Lithuania) and C. Jayaraman (India) and (ii) *Women Empowerment through Science and Technology Interventions* edited by Nirupama Prakash (India), Betty McLellan (Australia) and Barbara Wejnert (USA).

Currently, Debanjana is pursuing PhD from the Academy of Scientific and Innovation Research at the National Institute of Science, Technology and Development Studies (NISTADS), New Delhi. Her research area includes Science Technology and Society Studies, Innovation System, Biodiversity Sciences and Livestock Breeding Sciences and Policies. She acknowledged the role of the Centre in giving her the opportunity to be a part of the Centre's efforts on south-south cooperation in science and technology and helping her understand the science policy relationships which inspired her to continue further research in the subject.

## *Participation of Centre's Scientists in Scientific Events*

**August 9-10, 2016**

**Dr. Kavita Mehra**, Publication Advisor attended 8<sup>th</sup> Annual International G20 Conference on "Revitalizing Global Economic Growth: Views from G20 Countries" at the India Habitat Centre, New Delhi.

## Centre Announces

4<sup>th</sup> Triennial International Workshop  
Evolving Energy Models In Emerging Economies -  
Post COP 21

12-14 December 2016  
Ahmedabad, Gujarat, India



Organized jointly by:  
Centre for Science & Technology of the Non-Aligned and  
Other Developing Countries (NAM S&T Centre) and  
Society of Energy Engineers and Managers (SEEM)

Official Magazine  
Media Partner

## 4<sup>th</sup> Triennial International Workshop on Evolving Energy Models In Emerging Economies - Post COP 21 Ahmedabad, India, 12-14 December 2016

From various studies one is well aware of the rising temperatures of the earth and the individuals, communities and countries are seeking to cope with the consequences of this global climate change through the process of adaptation, which is not new but the time has come to provide practical guidance on adaptation and incorporate future climate risks into policy making. Development of a policy framework for Energy Models will set a much needed roadmap to support the processes that protect, and enhance, the human well-being in the face of climate change. Evolving Energy Models can be used by countries to both evaluate and complement existing planning processes to address climate change adaptation by using the information already available with them in climatically vulnerable systems such as agriculture, water resources, public health and disaster management. The aim is to define an approach for exploiting existing synergies and intersecting themes in order to enable better informed policy-making.

In order to provide an opportunity to the experts and professionals from the developing countries to brainstorm on developing a policy framework for Energy Models and other related issues, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) jointly with Society of Energy Engineers and

Managers (SEEM), India, announces the organisation of **4<sup>th</sup> Triennial International Workshop on "Evolving Energy Models in Emerging Economies – Post COP 21"** during **12-14 December 2016** in **Ahmedabad, India**.

Experts and scientists desirous of participating in the Workshop, excepting those from India, are required to submit their nomination form **electronically** directly to the NAM S&T Centre as early as possible but latest by **Friday, 4<sup>th</sup> November 2016**.

Applicants from India should submit their requests directly to the Society of Energy Engineers and Managers, Trivandrum, India.

**For further details, please see the Website of the NAM S&T Centre: [www.namstct.org](http://www.namstct.org).**

## Past Scientific Associates of NAM S&T Centre

### Ms. Isha Parmar



**Ms. Isha Parmar** was affiliated with the Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) as a Project Assistant during 26<sup>th</sup> May 2010 till 24<sup>th</sup> June 2011, and later again from 1<sup>st</sup> December to 31<sup>st</sup> January 2011. Ms. Isha was actively engaged in the planning, coordination and implementation of various international scientific programmes of the Centre, and also actively participated in the same. These included an international conference on 'Empowering Women in Developing Countries through Better Healthcare and Nutrition' organised by the Centre with the support from the United Nations Children's Fund (UNICEF) at BITS, Pilani, Rajasthan during 22-24 April 2010; an advanced training course on 'Intellectual Property Rights' organised by the Centre in association with the Technology Information Forecasting Assessment Council (TIFAC) and the Department of Science & Technology (DST), Government of India during 12-17 July 2010; and an international training programme on 'Energy Audit for Energy Professionals in Developing Countries' organised by the Centre jointly with the Centre for Energy Studies and Policy Analysis (CESPA), Trivandrum, India in Mumbai, India during 4-14 May 2011. She also attended an international symposium on Lightning Protection at Kathmandu, Nepal during 12-14 October 2011, where she presented a status paper on the subject, which was published in a book titled 'Lightning Protection' brought out by the Centre, which was edited by Prof. Shriram Sharma (Nepal). Ms. Isha significantly contributed to the preparation and updating of various data bases of the Centre and also assisted in the publication of books and newsletter brought out by the Centre. She was responsible for coordinating the work on the implementation of various Fellowship programmes of the Centre jointly with the Centres of Excellence in Germany and Pakistan. Ms. Isha also participated on behalf of the NAM S&T Centre in several workshops and conferences organised by various Indian and foreign agencies.

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