



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 14th Governing Council (GC) meeting of the NAM S&T Centre hosted by the Ministry of Science, Technology & Innovation, Government of Malaysia in Putrajaya, Malaysia during 5th-6th September 2017 was attended by 28 delegates from 16 member countries. H.E. Datuk Seri Panglima

Wilfred Madius Tangau, Hon'ble Minister of Science, Technology and Innovation of Malaysia formally inaugurated the meeting. Malaysia was unanimously elected to hold the office of the President, and India, Mauritius and Sri Lanka were elected as the Vice-Presidents of the GC. Besides taking policy decisions, the GC comprehensively reviewed the Centre's scientific activities and financial status.

The NAM S&T Centre in partnership with the Ministry of Higher and Tertiary Education, Science and Technology Development, Zimbabwe and the National Biotechnology Authority (NBA) of Zimbabwe successfully organised the 2nd Training Workshop on 'Industrial Biotechnology: Driving Value Addition and Beneficiation' at Harare during 22nd-24th August 2017. The event was attended by 68 scientists, experts and professionals from 18 developing countries, including Cuba, Egypt, The Gambia, India, Indonesia, Kenya, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, South Africa, Sri Lanka, Sudan, Tanzania, Togo, Zambia and the host country Zimbabwe and got concluded with the adoption of a Harare Resolution on the Training Workshop theme. During the event Hands-On Training programmes were conducted on Genomics, Tissue Culture and Malaria Research besides undertaking Biotechnology Industry familiarisation tours.

The Centre has announced the organisation of an International Roundtable on the Impacts of Extreme Natural Events: Science & Technology for Mitigation (IRENE) jointly with the National Science & Technology Commission (NASTEC), Sri Lanka and the Research Centre - Technology for Disaster Prevention, South Eastern University of Sri Lanka (RC-TDP, SEUSL) at Colombo, Sri Lanka on 13th-15th December 2017. Interested scientists and professionals are welcome to send their nominations for participation in this important event before 10th November 2017.

Happy Reading!


(Arun P. Kulshreshtha)

14th Meeting of the Governing Council (GC) of NAM S&T Centre Putrajaya, Malaysia, 5-6 September 2017

The 14th meeting of the Governing Council (GC) of the Centre for Science and Technology of the Non-Aligned and other Developing Countries (NAM S&T Centre) was hosted by the Ministry of Science, Technology & Innovation



INAUGURATION OF 14TH GOVERNING COUNCIL (GC) MEETING OF NAM S&T CENTRE, PUTRAJAYA, MALAYSIA, 5-6 SEPTEMBER 2017

(Contd. on page 2)

Centre Organised

International Training Workshop on Industrial Biotechnology: Driving Value Addition and Beneficiation Harare, Zimbabwe 22-24 August 2017

Industrial Biotechnology is one of the most promising new approaches to pollution prevention, resource conservation, cost reduction and creation of new markets while protecting the environment. Most of the countries, including those with emerging economies, acknowledge the role being played by this upcoming area in the conversion of natural resources into value added products of benefit



INAUGURATION OF THE TRAINING WORKSHOP ON INDUSTRIAL BIOTECHNOLOGY, HARARE, ZIMBABWE, 22-24 AUGUST 2017

(Contd. on page 4)

(Contd. from Page 1 - Governing Council Meeting, Malaysia)



INAUGURAL GROUP PHOTOGRAPH OF 14TH GOVERNING COUNCIL (GC) MEETING OF NAM S&T CENTRE, PUTRAJAYA, MALAYSIA, 5-6 SEPTEMBER 2017

(MOSTI), Government of Malaysia in Putrajaya, Malaysia on 5-6 September 2017. The meeting was attended by 28 delegates from 16 member countries and three representatives of the NAM S&T Centre including its Director General (DG), Prof. Arun P. Kulshreshtha. In addition, the Ambassadors and senior representatives from the Diplomatic Missions of 12 countries, viz. Cambodia, DPRK, Egypt, India, Iran, Iraq, Jordan, Palestine, Peru, Sri Lanka, Venezuela and Zimbabwe were present during the Ceremonial Opening and Inaugural Session. Datuk Wira Dr. Abu Bakar Mohamad Diah, Deputy Minister of Science, Technology and Innovation, Malaysia and senior officials from MOSTI and the invitees and participants of the 'Forum on Climate Change: Impact and Responses', which was organised in parallel with the GC meeting, also took part in the joint Opening and Inaugural Session.

Mr. Daan du Toit, Deputy Director General, International Cooperation and Resources, Department of Science & Technology (DST), South Africa and President of the 13th GC of the NAM S&T Centre welcomed the delegates and thanked His Excellency Datuk Seri Panglima Wilfred Madius Tangau, Hon'ble Minister of Science, Technology and Innovation of Malaysia for inviting the GC members of the Centre to the 14th GC meeting at Putrajaya, Malaysia. He mentioned that the NAM S&T Centre has been working for solidarity and partnership among the NAM and other developing countries with a number of programmes and activities on international cooperation in Science & Technology, and it had been a privilege for South Africa to take up the role of the President of the Centre in its 13th GC meeting held at Sandton City, South Africa in September 2013 in which several important policy decisions were taken, and during its tenure as the President, his country tried to assist the Centre in its functioning up to the fullest possible extent. He congratulated the NAM S&T Centre for a high level of consistent performance over many years under the excellent leadership of the DG, Prof. Arun Kulshreshtha and said that a report by the DG had been circulated to all the participants of the Inaugural Session giving the details of various partnerships and performance of the Centre over the last four years after the 13th GC meeting. He expressed confidence that with its resources and expertise, Malaysia would steer ahead the NAM S&T Centre to newer heights and help its member countries in achieving the Sustainable Development Goals (SDGs).

Datuk Seri Dr. Mohd. Azhar bin Yahya, Secretary General, Ministry of Science, Technology and Innovation (MOSTI), Malaysia welcomed the participants and distinguished representatives from the diplomatic missions of various

countries in Malaysia. He said that it was the first occasion that Malaysia was organising a meeting of the GC of the NAM S&T Centre which is the highest decision making body for the Centre to formulate common strategy for cooperation in Science and Technology and strengthen not only the bilateral relations but also multilateral cooperation, ensuring peace, prosperity and stability in the NAM countries. He stated that a Memorandum of Understanding (MoU) was signed between the NAM S&T Centre and the International Science, Technology and Innovation Centre for South-south Cooperation under the auspices of UNESCO (ISTIC) on 8th August 2016 that focuses on new spectrum of possible areas for collaboration and joint programmes in the field of STI. He further spoke on the national STI Policy of Malaysia and the emphasis of his Government on high technology, knowledge-based and capital intensive industries, bio-economy community development, MOSTI Social Innovation Programme, etc. He observed that through its activities, the NAM S&T Centre was able to promote, uplift and strategically sustain the STI in the developing countries and Malaysia would like to make use of its experience and success. He offered Malaysia's partnership with the Centre on capacity building programmes such as the Training Workshop on 'Technopreneurship for Developing Countries' and International Training Programme on 'STI Policy and Management for Developing Countries' to be organised by ISTIC.



14TH GOVERNING COUNCIL (GC) MEETING OF NAM S&T CENTRE, PUTRAJAYA, MALAYSIA, 5-6 SEPTEMBER 2017

(Contd. from Page 2 - Governing Council Meeting, Malaysia)

Before formally declaring the 14th GC meeting open, the Chief Guest, His Excellency Datuk Seri Panglima Wilfred Madius Tangau, Hon'ble Minister of Science, Technology and Innovation of Malaysia, in his inaugural address, welcomed the delegates and expressed happiness at having been present at such an auspicious occasion of the Ceremonial Opening of the GC meeting of the NAM S&T Centre. He acknowledged the leadership of Mr. Daan du Toit in steering the activities of the Centre during his tenure as the President of its 13th GC since 2013 which was evidenced by the successful organisation of 14 international capacity building programmes such as workshops, conferences and training courses by the Centre. He expressed appreciation to Prof. Dr. Arun Kulshreshtha, DG of the Centre and his team for the extensive work carried out by the Centre and its catalytic role in championing the cause of South-South Cooperation and collective self-reliance among non-aligned and other developing countries through the organisation of a wide range of high quality S&T programmes. He fondly recalled his visit to the NAM S&T Centre in New Delhi, India in April this year and appreciated how passionately the Centre has been playing its role in developing partnerships amongst scientists and institutions and promoting South-South and North-South cooperation in Science & Technology.

The Honourable Minister emphasised upon the significance of the Fourth Industrial Revolution and the role of Digital Innovations such as Big Data, the Internet of Things, open online courses, three-dimensional printing, digital automation and robotics & artificial intelligence, cyber security etc. and the need for the development of a knowledge based, high skilled talent pool, particularly the Science, Technology, Engineering and Mathematics (STEM) talent. He pointed out the need to develop a network to enhance collaboration in science, technology and innovation which could be applicable for the NAM Member Countries to build up a platform that could nurture the right ecosystem for sharing information, knowledge, experience and expertise. In this connection, he referred to the NAM S&T – Industry Network of the Centre and desired that two Malaysian S&T organisations, viz. the Scientific and Industrial Research Institute of Malaysia (SIRIM) and the Academy of Sciences of Malaysia (ASM) should be a part of this growing network in order to open up the possibility of future collaborative programmes. The Honourable Minister reiterated that Malaysia would extend its utmost support to the initiatives pursued by the NAM S&T Centre to foster science and technology cooperation among the developing countries, and with the spirit of 'prosper thy neighbours', Malaysia would continue to devote and be part of

an active global player through science diplomacy .

The Hon'able Minister released four publications brought out by the Centre after the 3rd Bureau meeting in Egypt in September, 2016, namely, 'Science & Technology Diplomacy and Sustainable Development in the Developing Countries' [Eds. Abdul Haseeb Arabzai (Afghanistan), Sadhana Relia (India) and Tahereh Miremadi of (Iran)], 'Lightning Impacts in Developing Countries of Africa and Asia' [Eds. Ronald L. Holle (USA) and Edmund Ataremwa (Uganda)], 'Minerals Processing: Technology, Challenges and Perspectives' [Eds. G. Padmanabham (India)] and 'Climate Events and Disaster Mitigation from Policy to Practice' [Eds. Joaquin Alejandro Linayo Rivero (Venezuela), Jayant K. Routray (Thailand) and Biswajeet Pradhan (Malaysia)].

The Working Level Discussion of the Governing Council Meeting was started under the Chairmanship of Mr. Daan du Toit, South Africa, President of the 13th GC of the NAM S&T Centre with the introduction of the delegates from Burkina Faso, Cambodia, Egypt, India, Indonesia, Iran, Iraq, DPR Korea, Malaysia, Mauritius, Palestine, Peru, South Africa, Sri Lanka, Vietnam, Zimbabwe.

During the meeting, the following were unanimously elected to hold the office of the Governing Council of the Centre until its 15th meeting:

Malaysia – President,

India - Vice-President

Mauritius - Vice-President

Sri Lanka - Vice-President

The delegates congratulated the newly elected President, Datuk Seri Dr. Mohd. Azhar bin Yahya and the representatives of India, Mauritius and Sri Lanka.

The newly elected President, Datuk Seri Dr. Mohd. Azhar bin Yahya, then took over the Chair and conducted the remaining part of the Agenda of the Working Level Discussion. He applauded the work of the Centre under the leadership of Mr. Daan du Toit, President of the 13th GC and assured fullest possible cooperation from his Government to ensure continuing success of the NAM S&T Centre in fulfilling its objectives of South-South Cooperation in Science and Technology. He further added that due to rapid changes in the world politics, it is necessary to revisit the objectives and functions of the Centre and prepare an action plan for the next 30 years so that the Centre does not lag behind.

The other delegates representing the newly elected Bureau, viz., Mrs. Sadhana Relia, Scientist G & Head, International Multilateral & Regional Cooperation Division, Department of Science & Technology (DST), Government of India; Mr. Vedanand Bhuroshah, Assistant Director, Ministry of Education and Human Resources, Tertiary Education and Scientific Research, Government of Mauritius; and Mr. Udaya R. Seneviratne, Secretary, Ministry of Science, Technology & Research, Government of Sri Lanka also made their brief remarks.

The GC took note of various scientific activities in diverse fields undertaken and publications brought out by the Centre during the period from September 2013 to



14TH GOVERNING COUNCIL (GC) MEETING OF NAM S&T CENTRE, PUTRAJAYA, MALAYSIA, 5-6 SEPTEMBER 2017

August 2017, i.e. since the last GC meeting. The GC noted with satisfaction the progress made in various Fellowship schemes of the Centre, under which 264 researchers got benefitted through their affiliation with the premier R&D institutes in respective host countries for carrying out their research work. The GC complimented the Centre for the international partnerships established with various organisations in different countries and the pivotal role played by the Centre in the establishment of the African Center for Lightning and Electromagnetics (ACLE) in Uganda, Zambia and other African Countries and the NAM S&T Centre of Excellence in Minerals Processing and Beneficiation (CEMPB) in Harare, Zimbabwe. The GC also expressed happiness to note that the contribution of the NAM S&T Centre was well recognised in the Declaration of the 1st S&T Ministerial Conference in Tehran in February 2015. In-principle approval was accorded by the GC to the scientific activities proposed by the Centre for implementation in the next couple of years.

The GC suggested that the newly elected office bearers and other members of the GC should make a personal communication with the non-member developing countries located in their respective regions urging them to join the Centre and further strengthen the efforts on South-South cooperation. The GC also requested the member countries to encourage the scientific and industrial organisations in their countries to join the NAM S&T – Industry Network.

The GC took note of the year wise income and expenditure of the Centre and was happy about the efficient financial management by the Centre. It was appreciated that notwithstanding the serious shortage of financial resources, the Centre has been able to control its expenditure on administrative overheads and utilise a major part of its meagre finances to carry out a large number of scientific activities in partnership with other organisations with sharing of costs. The GC expressed serious concern that the Centre had been facing severe financial constraints due to non payment of the membership subscription by a number of member countries and made a strong appeal to the non-paying member countries to expedite payment of their membership subscription dues to the Centre.

The delegates from Iraq, Palestine and Sri Lanka expressed interest to respectively host the 1st and 2nd meetings of the Bureau of the 14th GC and the 15th meeting of the GC in the coming years.

The DG of the Centre thanked the Government of Malaysia, and in particular, His Excellency Datuk Seri Panglima Wilfred Madius Tangau, Hon'ble Minister of Science, Technology and Innovation (MOSTI), Malaysia; Datuk Seri Dr. Mohd. Azhar bin Yahya, Secretary General and all the officials of MOSTI for making excellent hospitality arrangements for hosting the meeting.

DISTINGUISHED VISITORS TO THE CENTRE

31st July 2017	Mr. D.P. Joshi , IAS, Special Commissioner, Swachh Bharat Mission (Gramin), Government of the State of Gujarat, India
14th August 2017	Prof. Dr. Chandima Gomes , Professor of Electrical Engineering, Department of Electrical & Electronics Engineering, and Former Head, Center for Electromagnetics and Lightning Protection (CELP), Universiti Putra Malaysia (UPM), Serdang, Selangor, Malaysia; Former Chief Adviser, African Centres for Lightning and Electromagnetics (ACLENet), along with his wife

(Contd. from Page 1 - Biotechnology Workshop, Zimbabwe)

to humans. Novel biotechnologies for adding economic value to under-utilised biological resources in developing countries are capable of meeting specific developmental and biodiversity conservation goals. Industrial Biotechnology is among the most efficient and growing sectors today with enormous scope for innovation, research and development, and by innovative advancements in this area a country can achieve new heights in the fields of agriculture, medicine,

renewable energy, climate sustainability and many more.

Keeping the above in view, the NAM S&T Centre in partnership with the Ministry of Higher and Tertiary Education, Science and Technology Development, Zimbabwe and the National Biotechnology Authority (NBA) of Zimbabwe organised the 2nd Training workshop on 'Industrial Biotechnology: Driving Value Addition and Beneficiation'



GROUP PHOTO OF TRAINING WORKSHOP ON INDUSTRIAL BIOTECHNOLOGY, HARARE, ZIMBABWE, 2017

(Contd. from Page 4 - Biotechnology Workshop, Zimbabwe)



during 22-24 August 2017 in Harare which brought various stake holders, viz. scientists, experts and professionals engaged in R&D, policy making and implementation to a common platform for improving their skills and sharing views and experiences in various aspects of Industrial Biotechnology.

The Training Workshop was organised in the International Conference Centre of Harare in the same hall where the 8th NAM Summit was earlier held in September 1986. The Inaugural Session of the Workshop commenced with a Welcome Note by Prof. F.P. Gudyanga, Permanent Secretary, Ministry of Higher and Tertiary Education, Science and Technology Development of Zimbabwe. This was followed by a power point presentation by Dr. Mufandaedza Jonathan, Chief Executive Officer and Registrar, National Biotechnology Authority (NBA) of Zimbabwe on the NBA activities. Prof. C.J. Chetsenga of the University of Zimbabwe delivered a scientific keynote address on Biotechnology with specific reference to GM Crops. Prof. Dr. Arun P. Kulshreshtha, Director General, NAM S&T Centre presented the genesis of the event touching upon some important issues related to Industrial Biotechnology and its growth aspects and also gave a short description of the functions and accomplishments of the NAM S&T Centre aimed at South-South Cooperation. The Training Workshop was formally inaugurated by Hon. Dr. Godfrey Gandawa (MP), Deputy Minister of Higher and Tertiary Education, Science and Technology Development of Zimbabwe. The Ambassadors of South Africa, Malaysia and Cuba were also present on the podium. The proceedings of this Session were conducted by the Director of Ceremonies and concluded with a photo session.

The Harare Training Workshop was attended by 68 scientists, experts and professionals from 18 developing countries, including Cuba, Egypt, The Gambia, India, Indonesia, Kenya, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, South Africa, Sri Lanka, Sudan, Tanzania, Togo, Zambia and Zimbabwe.

The foreign participants were from Cuba [Mrs. Marisol Romeu Hernández, Head, Biotechnology Unit, Ministry of Science, Technology and Environment, Havana City]; Egypt [Dr. Mostafa M. Abo Elsouid, Researcher, Microbial Biotechnology Dept., National Research Center, Cairo]; Gambia [Ms. Bintou Dibba, Lecturer, University of The Gambia, West Coast Region, Brikama]; India [Dr. N. Y. Kadoo, Principal Scientist, Biochemical Sciences Division, CSIR-National Chemical Laboratory, Pune and Dr. Muktinath Mishra, Scientist (Synthetic Biology), Department of Biotechnology, CSIR-Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow]; Indonesia [Dr. Taryono, University Instructor,

Faculty of Agriculture, Universitas Gadjah Mada, Institut Pertanian Yogyakarta]; Kenya [Mr. Willis Abwao Adero, Research Scientist, Kenya Agricultural and Livestock Research Organisation (KALRO), Biotechnology Centre, Westlands, Nairobi]; Malaysia [Dr. Farizul Hafiz Kasim, Deputy Dean (Students Affairs & Alumni) / Senior Lecturer, School of Bioprocess Engineering, Universiti Malaysia, Arau, Perlis]; Mauritius [Mr. Gunshiam Umrit, Research Officer in Charge, Mauritius Cane Industry Authority, Reduit]; Myanmar [Dr. Win Min Than, Deputy Director, Biotechnology Research Department, Department of Research Innovation, Ministry of Education, Naypyitaw]; Nepal [Dr. Buddha Ratna Khadge, Secretary, Nepal Academy of Science & Technology, Khumaltar, Lalitpur]; Nigeria [Mrs. Deborah Asabe Ashigye, Chief Scientific Officer, Raw Materials Research and Development Council (RMRDC), Garki, Abuja]; South Africa [Dr. Konanani Justice Rashamuse, Director, Industrial Bioinnovation, DST Building No. 53, CSIR, Meiring Naude Road, Brummeria, Pretoria; Mr. F.K. Chikava, Discipline of Chemical Engineering, University of KwaZulu-Natal. Howard College Campus, Durban; Ms. K. Mugadza, School of Chemistry and Physics, University of KwaZulu, Natal, Durban; Mr. E.T. Marondedze, School of Chemistry and Physics, University of KwaZulu-Natal, Durban; and Ms. W.P. Mafunga, School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Pietermaritzburg Campus, Scottsville]; Sri Lanka [Mrs. Wasundara Divisekera, Research Scientist, Food Technology Section, Industrial Technology Institute, Baudhaloka Mawatha, Colombo]; Sudan [Dr. Abdelhelim Abdullahi Hamza Ahmed, Assistant Professor, Department of Microbial Biotechnology, Commission for Biotechnology and Genetic Engineering, National Center for Research, Khartoum]; Tanzania [Mr. Twahir Magoolo, Quality Assurance Officer, Laboratory Scientist, Medical Stores Department, Dar Es Salaam]; Togo [Dr. Glato Kodjo, Research Assistant, Plant Physiology and Biotechnology Laboratory, Department of Botany, University of Lomé, Lomé1] and Zambia [Prof. Lordwell Kampampa Witika, Senior Lecturer and Mineral Engineer, University of Zambia, School of Mines, Lusaka]. The NAM S&T Centre was represented by its Director General Prof. Dr. Arun P. Kulshreshtha and Ms. Keerti Mishra, Research Associate.

The overall programme of the Training Workshop was conducted in seven Technical Sessions, six Training Lecture Sessions, three Hands-On Training Sessions, two Biotechnology Industry Familiarisation Tours, Concluding Session and the Farewell Dinner that included the Awards Ceremony.

(Contd. on page 6)

(Contd. from Page 5 - Biotechnology Workshop, Zimbabwe)



The presentations made by the foreign participants were on 'Advances of Biotechnology in Cuba' by Mrs. Marisol Romeu Hernández; 'The Mathematical Language Of Biotechnology' by Dr. Mostafa M. Abo Elsouid; 'The Application of Biotechnology in Aquaculture: Strength, Weakness, Opportunities and Challenges in The Gambia' by Ms. Bintou Dibba; 'Engineering Fatty Acid Biosynthesis Pathway in Microbes for Production of LCPUFAs' by Dr. N. Y. Kadoo; 'Development of An Improved Bacterial Host for the Production of Anti-Malarial using Synthetic Biology Approach' by Dr. Mukti Nath Mishra; 'Promotion of Biotech Industry in India' by Ms. Keerti Mishra; 'The Use of In-vitro Derived Seedlings In Indonesian Cocoa Replanting Programme' by Dr. Taryono; 'Development of Frozen Yoghurt Supplemented with Date Pulp' by Mr. Mahdi Salih Hameed; 'Development of an Affordable, Rapid, Sensitive and Specific Field Based PCR Assay for Detection and Quantification of Newcastle Disease (NCD)' by Mr. Willis Abwao Adero; 'Lipase Production Potential of A Locally Insolated Extremely Halotolerant, Aspergillus sp. Strain using Agro-Industrial Wastes as Substrate' by Dr. Farizul Hafiz Kasim; 'Technology Development for the Biosynthesis of the Bioplastic Poly-(3-hydroxyalkanoate) using Sugarcane Harvest Residues' by Mr. Gunshiam Umrit; 'Study on the Antifungal Activities of Effective Fungi as a Control of Plant Pathogenic Fungi' by Dr. Win Min Than; 'Commercialization of Bioorganic Fertilizer for Sustainable Agriculture' by Dr. Buddhi Ratna Khadge; 'Current Status of Industrial Biotechnology in Nigeria' by Mrs. Deborah Asabe Ashigye; 'Bioinformatics for Biotechnology: a Fundamental Building Block to Exploit Natural Resources in Developing Countries' by Prof. Yaqoub Ashhab; 'Towards the Development of a Sustainable Bio-industry in South Africa' by Dr. Konanani Justice Rashamuse; 'Biopharming of HIV Neutralising Chimeric Antibodies' by Dr. Ofentse Jacob Pooe; 'Sri Lankan Finger Millet (Eleusinecoracana) Varieties as Potential Probiotic Source' by Mrs. Wasundara Divisekera; 'Isolation, Characterization and Molecular Identification of New Sudanese Streptomyces spp Producing Bioactive Secondary Metabolites in Sudan' by Dr. Abdelhelim Abdullahi Hamza Ahmed; 'Development of Medical / Pharmaceutical Industries under Public Private Partnership (PPP), A Case of Medical Stores Department, Tanzania' by Mr. Tahir Magoolo; and 'Using Biotechnology Tools to Enhance Sweet Potato Production in Togo' by Dr. Glato Kodjo.

The 27 papers presented by the participants of Zimbabwe

were 'Monitoring Starch and Sugar Changes in Maturing Sweet Potato Tubers and Cassava' by Mr. Kelvin T. Nyamajiwa; 'Development and Characterization of Food Products from Parinaricuratellifolia Fruit' by Dr. C. Benhura; 'Isolation of Streptomyces Species from Zimbabwean Agricultural Soils and Screening for Production of Vitamin B₁₂' by Mr. Tapiwashe Claudious Madeya; 'Applicability of Nanotechnology in Food Processing with references to Zimbabwe Industry' by Mr. Mgciniwethu Mazula; 'Optimization of Bio-Ethanol Production from Barley Waste Using Response Surface Methodology' by Mr. S. Manhokwe; 'Comparison of Droplet Digital PCR and Quantitative PCR in the Quantification of Spongoporasubterranea f. sp. subterranea in Soils from Sandveld, Limpopo and KwaZulu Natal Potato Fields' by Mr. Kenedy Simango; 'Using Analytics and Bio-informatics to improve Healthcare Delivery provide Bio-technology Services and Monitor the Bio-economy.' by Dr. Rufaro L. Nyabako; 'Unlocking the Potential of CRISPR Technology for improving Livelihoods in Africa' by Dr. Nyamusamba, Reagan Mudziwapasi; 'Synthesis of Hydraulic Brake Fluid from Jatropha Oil' by Dr. Damascus Masawi; 'Physicochemical Quality of Opaque Beer Industry Wastewater and Metagenomic Characterisation of Its Microbial Diversity' by Mr. Zephaniah Dhlamini; 'Achievements and Prospects of Industrial Biotechnology in relation to Biomining and Bioenergy in Zimbabwe: Review' by Mrs. Thamari Sengudzwa; 'A Comparative Investigation of the Reduction of Coliform Bacteria in Waste Water by Agaricusbisporus Pleurotus and Pleurotusostreatus' by Mrs. Eunita Chidziya; 'Prospects for Biocatalysis in Zimbabwe' by Dr. Musengi; 'Biotechnology in Zimbabwe, Opportunities, Challenges and the Way Forward' by Dr. Scelo Mguni; 'Status and Prospects of Industrial Biotechnology in Relation to Sustainable Production of Bovine Serum Albumin from Abattoir Waste in Zimbabwe' by Ms. Shumbeyi Muzondo; 'Opportunities of Industrial Biotechnology in the Pharmaceutical and Food & Beverage Industry in Advancement of Zimbabwean Industries: Review' by Dr. Travers Kudzai Chirova; 'Disaster Victim Identification using DNA isolated from Burnt Human Remains' by Ms. Anita Dube; 'Pesticidal Plant Use for Post-Harvest Grain Protection. A Case Study of Bikita District, Masvingo Province, Zimbabwe' by Mr. Munamoto Mabhegedhe; 'Molecular Characterisation of Newcastle Disease Virus (group VII) from Chickens in Zimbabwe' by Mr. Joshua Mbangwa; 'A Review on the Role of Tissue Culture in the Propagation of Planting Materials' by

(Contd. on page 8)

Harare Resolution

On INDUSTRIAL BIOTECHNOLOGY: DRIVING VALUE ADDITION AND BENEFICIATION, AUGUST 2017

WHILE EXPRESSING GRATITUDE to the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) for organising the 2nd Training Workshop on 'Industrial Biotechnology: Driving Value Addition and Beneficiation' in Harare, Zimbabwe from 22–24 August 2017;

EXPRESSING APPRECIATION to the Government of the Republic of Zimbabwe, the Ministry of Higher and Tertiary Education, Science and Technology Development and the National Biotechnology Authority (NBA) for co-organising and hosting the Training Workshop;

RECOGNIZING that Industrial Biotechnology is an enabling tool for NAM and other developing countries to reap multiple socio-economic benefits from natural resources and ensure environmental sustenance;

HAVING CONSIDERED the existence of vast opportunities and benefits for value addition and beneficiation in NAM and Other Developing Countries as well as the urgent need for the development, adoption, transfer and promotion of industrial biotechnologies;

ALSO COGNIZANT of the major constraints such as inadequate financial resources and R&D infrastructure to promote value addition and beneficiation in NAM and Other Developing Countries;

HAVING DELIBERATED on the underlying issues associated with the development, adoption, transfer and promotion of industrial biotechnologies for driving value addition and beneficiation in NAM and Other Developing Countries, consequently concluding that a systematic and holistic multi-stakeholder and multi-national collaborative approach be pursued in driving the value addition and beneficiation agenda in a sustainable manner;

WHEREAS IT IS RECOGNISED that environmental issues including, but not limited to climate change and greenhouse gas emissions, need to be taken into account when developing and implementing value addition strategies;

WE, THE PARTICIPANTS OF THE TRAINING WORKSHOP, representing the governments, institutions and agencies from Cuba, Egypt, The Gambia, India, Indonesia, Kenya, Malaysia, Mauritius, Myanmar, Nepal, Nigeria, South Africa, Sri Lanka, Sudan, Tanzania, Togo, Zambia and Zimbabwe;

UNANIMOUSLY RESOLVE AND RECOMMEND THE FOLLOWING:

- i. Research activities should be intensified in the applications of industrial biotechnology in a safe, sustainable and responsible manner, consistent with the provisions of legal frameworks within member states;
- ii. The governments and concerned agencies of the NAM countries should take appropriate measures to establish research development and innovation funds to support industrial biotechnology within NAM member states;
- iii. Value addition and beneficiation; intellectual property rights; and biosafety awareness should form an important component of the curriculum in the education system at all levels;
- iv. Beneficial collaborations and partnerships for generation and exchange of knowledge in the fields of industrial biotechnology among scientists and scientific organizations from NAM member countries should be promoted;
- v. Identify industrial biotechnology applications for value addition and beneficiation based on socio-economic potential in NAM member states;
- vi. Encourage the participation of all stakeholders (government, research institutions, private sector and civil society) in the development, utilization and commercialisation of biotechnologies in industries for sustained development;
- vii. Efforts should be made to establish a centre each for a short term (4–6 weeks) training course on Industrial Biotechnology in each of the NAM regions (Africa (Zimbabwe, Nigeria, Kenya and Tanzania), Asia (Malaysia, Nepal and Sri Lanka) and Latin America (Cuba)). In this regard, the NAM S&T Centre is requested to facilitate the international travel of the participants from its member countries.
- viii. Biennial Industrial Biotechnology Conferences under the aegis of the NAM S&T Centre are highly desirable. Nigeria and Kenya have offered to host such a conference subject to internal consultations.

AND FINALLY, given the importance and potential contributions of industrial biotechnology for attainment of sustainable socio-economic development in NAM S&T member states, the Workshop agreed to take urgent measures to establish a committee to work urgently with NAM S&T Centre to craft the roadmap with timelines for the implementation of the above for timely exploitation of the industrial biotechnology. In this regard, Zimbabwe offered to initiate this process, which was highly welcomed by the delegates.

THUS, RESOLVED AT HARARE, ZIMBABWE ON THIS DAY, THE 24TH OF AUGUST 2017

Participation of Centre's Scientists in Scientific Events

24-25 August 2017

Ms. Rashmi Srivatava, Research Associate attended the International Conference on 'South-South and Triangular Cooperation' organised by the Research and Information System for Developing Countries (RIS) in partnership with the Ministry of External Affairs, Government of India; United Nations; Forum for Indian Development Cooperation; and NeST (Network of Southern Think-Tanks) at India Habitat Centre, New Delhi.

5-6 September 2017

Mr. M Bandyopadhyay, Senior Expert & Administrative Officer and **Mr. Jayakumaran Madhavan Nair**, Public Relation Manager attended the 14th meeting of the Governing Council (GC) of the NAM S&T Centre held in Putrajaya, Malaysia.

(Contd. from Page 6 - Biotechnology Workshop, Zimbabwe)

Mrs. L.G. Muusha and Ms. Trish Nyarumbu; 'Evaluation of Genetic Diversity in Coffee Grown in Zimbabwe using Molecular Markers' by Dr. Chidoko P.; 'Bioprospecting for Industrial Enzymes from the Hindgut Metagenome of A Higher Termite' by Dr. Walter Tendai Sanyika; 'Closing the Loop: Making Fuels, Chemicals and Materials from Biomass as An Opportunity for the Agricultural Sector of South Africa' and 'Butanol Recovery from Fermentation Broths-A Technoecomic Assessment in the South African Context' by Prof. F.K. Chikava; 'Strides towards Bio-Based Economies through Integrated Biorefineries, A South African Sugar Industry Case Study' by Ms. Mafunga W.; 'Use of Biomass Precursors to produce Carbon Based Nanostructured Materials for Sustainable Energy' by Mr. K. Mugadza; and 'Strategies for the Separation of Carboxylic Acids from Fermentation Broths' by Mr. E.T. Marondedze.

Training Lectures were delivered by Prof. H. Matarira (University of Zimbabwe) on Medical Biotechnology; Dr. C. Kashangura (Tobacco Research Board) on Biotechnology Services; Eng. P. Muredzi (Harare Institute of Technology) on Food Biotechnology; Dr. E. Whingwiri (Zimbabwe Earthworm Farm) on Environmental Biotechnology; Dr. A. Phiri (Harare Institute of Technology) on Biochemicals and Bioenergy; Dr. J. Mufandaenda (NBA) on Biotechnology Ethics and Regulations; and Dr. D. T. Savadye (Scientific Industrial Research Development Centre) on Agriculture Biotechnology.

For their training the participants visited three Labs in small groups. These were the African Institute of Biomedical Science and Technology (AiBST), where Dr. J.Manasa conducted the programme on Genomics; University of Zimbabwe Biochemistry Department, in which Dr. F. Robertson held the programme on Tissue Culture; and the National Health Research Institute, where the programmewas conducted by Mr. P. Shumbaon Malaria Research.

As part of the training programme the visits of all the participants were also organised to Delta Breweries and the Harare Agricultural Show.

In the Concluding Session, extensive discussions were conducted by Mrs. R. Karimanzira of MHTSTD on a 'Harare Resolution on Industrial Biotechnology -Driving Value Addition and Beneficiation', which was finally unanimously adopted by the participants with a number of recommendations for its submission to the concerned ministries, agencies and other authorities in their countries.

The Certificates of Participation signed by Prof. F. P. Gudyanga and Prof. Arun Kulshreshtha were handed over by Dr. Johnathan Mufandaedza of NBA to the foreign and local participants and all others concerned with the Training Workshop during a Concluding Dinner hosted by the Zimbabwean organisers of the event.

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

Cameron - Project Completion Report of Ms. Tankeu Nzufe Francine



Ms. Tankeu Nzufe Francine, Ph.D. Student in the Department of Biochemistry and Physiological Sciences, Faculty of Medicine and Biomedical Sciences, University of Yaonde I, Cameroon was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2016-17 to carry out research in the Advanced Centre of Treatment, Research and Education in Cancer, Tata Memorial Centre, Mumbai, India on a project titled 'In Vitro Study of Anticancer Properties of *Syzygium guineense* var. *macrocarpum*' under the supervision of Prof. S.V Chiplunkar from 2nd March to 26th August 2017. The main objective of this research was to investigate the anticancer effect of crude extracts, fractions and pure compounds from *Syzygium guineense* var. *macrocarpum* on cancer cells of various anatomical origins.

Cancer is the most prevalent disease worldwide. Conventional methods of treatment are limited by their side effects. Natural products have proved their efficacy in anticancer drug development over last decades.

This study was designed to investigate the anticancer effect of crude extracts, fractions and pure compounds from *Syzygium guineense* var. *macrocarpum* on cancer cells of various anatomical origins. Water, ethanol, and aqueous-ethanol crude extracts as well as fractions and compounds from ethanolic extract were screened for their anti-proliferative effect on breast (MCF7 and MDA-MB231), cervical (HeLa and SiHa), leukemia (K562 and HL-60) and Colon (CoLo 205) cancer cells lines using SulfoRhodamine B (SRB) assay. Four fractions derived from crude leaf ethanolic extract were found to be good candidates for anticancer drug development against leukemia chronic leukemia according to National Cancer Institute (NCI) guidelines with GI 50 values of <1 µg/mL for two fractions and 11.8 and 18.4 for others. Similarly, two out of the four fractions were active against acute myeloid cell line HL-60 with GI 50 values of 1.7 and 13.7 µg/mL. The same fractions were the most active on other cell lines (breast, cervical and colon) with the GI50 values ranging from 33.2 -65.6 µg/mL.

The mechanism underlying the anti-cancer effect of active fractions was assessed by cell cycle analysis using flow cytometry. The active fractions exerted their anti-proliferative effect via G2/M and S phase arrest and apoptosis. The expression profile of pro-apoptotic protein Bax and anti-apoptotic BCL-2 in treated cells was studied by western blot analysis to gain insights on the apoptotic pathway. Results showed that the mitochondrial apoptotic pathway was triggered via up-regulation of Bax and Down-regulation of BCL-2.

To identify the compounds responsible of the anticancer effect, the phyto-chemical composition of active fractions was determined by Gas Chromatography/Mass Spectroscopy (GC/MS). Terpenes were found to be present in the fractions and suggested to be responsible of the anticancer activity.

Ivory Coast - Project Completion Report of Mr. Yapo Assi Louis Martial



Mr. Yapo Assi Louis Martial, PhD Student in Physics, Climate and Environment, Laboratory of Atmospheric Physics and Fluid Mechanics, Félix Houphouët Boigny University, Ivory Coast was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2016-17 to carry out research in the Indian Institute Human Settlements, Bangalore, India on a project titled 'Impact of Climate Change on the Intensity and Frequency of Climate Extreme Events in Ivory Coast' under the supervision of Dr. Amir Bazaz from 26th February 2017 to 20th August 2017. The main objective of this research was to study the impacts of climate change on the intensity and occurrence of weather and climate extremes events in Ivory Coast.

(Contd. on Page 9)

(Contd. from Page 8 - RTFDCS Reports - 2016-17)

African continent presents an increased risk of vulnerability due to the disturbances caused by the climate change. According to the fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC, 2007), the adaptation capacities of the continent remain low (CSC, 2013). Like most of African countries, Ivory Coast is vulnerable to the climate change. This is because of the recurrence of the so-called climate extreme events which have serious impacts on human being. The objective in this study is to understand how climate change impacts the intensity and frequency of climate extreme events and their projection in the future. For this end, we focused our study on nine Expert Team on Climate Change Detection and Indices (ETCCDI's) extreme precipitation indices, referred as moderate extremes to assess and project climate change in terms of intensity and frequency using nine Coordinated Downscaling Experiment (CORDEX) regional climate models' dataset. Our investigation is done especially during the Monsoon's season stages which are the pre-monsoon season (April-May-June), the mature monsoon season (July-August-September), the summer monsoon season (June-July-August-September) and the post monsoon season (October-November-December) in the past period or historical (1950-2005) and in the future period (2006-2100). For the future analysis (projection) of the extremes, we divided the future period into three sub-periods: the present-time (2006-2020), the near-future (2021-2050), and the distant-future (2051-2100) under two IPCC's Representative Concentration Pathway emission scenarios (rcp45 and rcp85). Analysis in the historical period (1950-2005) shows that, climate models do not exhibit the same spatial variability of the climate extreme precipitation during each monsoon's stages, when compared to the observations (GPCP and CPC). They exhibit less performance in simulating extreme precipitation events. But in the future periods an increase in some precipitation indices like the consecutive dry days (cdd), the highest one or five days precipitation (rx1day & rx5day), heavy and very heavy precipitation (r10mm & r20mm), simple daily intensity index (sdii) and the daily precipitation above 25 mm (pd25) is expected, whereas a decrease in consecutive wet days (cwd) and wet days indices (rr1) is expected in the future periods considering the multi-model ensemble. Trends estimation using the Mann-Kendall non-parametric test shows that the heavy precipitation index has a positive trend in the past and in the future periods in Ivory Coast during the post monsoon season.

Myanmar - Project Completion Report of Ms. Cho Mar



Ms. Cho Mar, Supervisor in Food analytical laboratory of the Research Department Myanmar Pharmaceutical Industries at the Ministry of Industry, Myanmar was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2016-17 to carry out research in CSIR- Central Food Technological Research Institute (CFTRI), Mysore, India on a project titled 'Study on Heavy Metals (Cadmium, Copper, Iron, Lead, Manganese, Nickel and Zinc) in Natural Honey' under the supervision of Mr. Devendra J. Haware from 15th December 2016 to 8th June 2017. The main objective of this research was to determine the heavy metals such as Cadmium, Copper, Lead, Iron, Manganese, Nickel and Zinc in honey samples.

Honey is a low-cost natural product that can be used for different purposes. Nowadays, honey is commercially used in various industries for product formation and this trend is increasing day by day as industrialists are finding honey to be a cheap source of sweetening agent without any side-effects as in case of synthetic sweeteners. Due to the variation of botanical origin honey differs in appearance, sensory perception and composition. Honey has good nutritive value. It is used as food in different parts of the world. Honey has the capacity to serve as a natural food preservative. Honey has been commercially used in cosmetics, medicines, foods and beverages and other healthcare supplements. Dried honey products are nowadays commonly used and are made by converting liquid honey through a drum/roller or spray drying process. Dried honey is mixed with sweeteners: Corn syrup, high fructose corn syrup, maltodextrins, non-nutritive sweeteners, sugar, sugar syrup and processing aids, drying aids, bulking agents, anti-caking agents: Calcium stearate, bran, dextrin, lecithin, soy flour, wheat starch.

As any other natural food, honey can be contaminated by the environment, e.g. by heavy metals, pesticides, antibiotics etc. The presence of essential metals in honey like Iron, Nickel, Copper and Zinc are very useful for the healthy growth of the body but metals like Cadmium, Lead and Mercury are toxic at very low concentration. Observed symptoms of such honey poisoning are vomiting, headache, stomach ache, and unconsciousness, delirium and nausea and sight weakness.

The present study indicated that all types of honey contain metals, and the metals concentrations vary among different regions because of some variables. Some geological and geochemical parameters may affect the honey chemistry. Worldwide there are no specific Maximum Residue Limit (MRL) levels for these heavy metals in honey. The present study of these heavy metals is crucial because of their potential hazardous effects not only on environments but also on human metabolism. The main sources of heavy metal ions are directly - foods and water, and indirectly - industrial activities and traffic in the investigated area, etc. The major objective of this study was to determine the heavy metals such as Cadmium, Copper, Lead, Iron, Manganese, Nickel and Zinc in honey samples. This investigation showed the good quality and safety of honey produced from Magway Division, Myanmar and Mysore, Karnataka State, India. Monitoring the level of heavy metals toxicity in the honey samples would help as certain the health impact of taking these samples and provide relevant data on honey samples. Moreover the Food and Drug Authority of India would be aided or informed of the safety or otherwise of the honey in circulation.

Nepal - Project Completion Report of Mr. Narayan Prasad Damase



Mr. Narayan Prasad Damase, Lecturer, Sun Shine Higher Secondary School, Bhaktapur, Nepal was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2016-17 to carry out research in the Tripura University, Agartala, India on a project titled 'Lightning and Convective Rain Study in Different Parts of the Himalayan Region' under the supervision of Prof. Barin Kumar De and Dr. Anirban Guha from 9th January 2017 to 4th July 2017.

From the earliest starting point of the human advancement, exploration on security and welfare from devastating natural events have been proceeding, yet the procedure cannot be finished through a single exertion. To comprehend the lightning climatology and its reliance on meteorological parameters, we

(Contd. from Page 9 - RTFDCS Reports - 2016-17)

examined fifteen years (from 1998 to 2012) lightning flash count detected by the Lightning Imaging Sensor (LIS). For the present study, two lightning prone regions (the Eastern Himalayas (24°N-28°N, 88°E-96°E) and the Western Himalayas (30°N-36°N, 68°E-78°E) having different topography, vegetation and greenness on the Himalayan belt are selected. The effect of the Convective Available Potential Energy (CAPE), Surface Air Temperature (SAT), Relative Humidity (RH) and Cloud-Top-Temperature (CTT) on lightning activity as well as the relation between Lightning Flash Count (LFC) and Rain Rate (RR) in two different parts of the Himalayas has also been investigated.

Dependency of LFC on meteorological parameters for both regions appears to be different. LFC in the Eastern Himalayas has a peak during the month of April whereas variation in the Western Himalayas peaks during the month of July. SAT and CAPE are the major stimulating meteorological parameters for the lightning activity, although the correlation between LFC with CAPE and SAT is higher in the Western Himalayas than in the Eastern Himalayas. LFC shows moderate correlation with RH in the Western Himalayas, however it is insignificant in the Eastern Himalayas. LFC and CTT have positive correlation in the Western Himalayas whereas it is negative in the Eastern Himalayas. LFC and RR have greater correlation in the Eastern Himalayas than in the Western Himalayas.

Despite the fact that SAT and CAPE are responsible for the generation of the lightning activity, amount of water vapour present in the atmosphere is an important parameter. 75% and 85% of the total LFC are present between 30% and 70% RH and SAT greater than 289K in the Eastern and Western Himalayas separately. It appears that RH could play a major role for the seasonal and annual variation of lightning activity over the Eastern and Western Himalayas.

Nigeria - Project Completion Report of Dr. Malachy Chigozie Ugwu



Dr. Malachy Chigozie Ugwu, Department of Pharmaceutical Microbiology and Biotechnology, Nnamdi Azikiwe University, Nigeria was sponsored by the NAM S&T Centre under its RTF-DCS Fellowship scheme for 2016-17 to carry out research in Vallabh Patel Chest Institute, Delhi University, Delhi, India on a project titled 'Phenotypic and Molecular Characterization of Multidrug Resistant Bacterial Uropathogens in South-Eastern Nigeria' under the supervision of Prof. Malini Shariff from 31st January to 24th July 2017. The main objective of this research was to characterise the enterobacterial uropathogens with respect to drug resistance. Thus this project investigated the antimicrobial susceptibilities and serotypes of enterobacterial uropathogens in southeastern Nigeria.

One hundred (100) enterobacterial uropathogens were studied: *E.coli* (58), *Salmonella* (15), *K. pneumoniae* (14), *Citrobacter freundii* (10) and *Enterobacter aerogenes* (3). Their antibiotic susceptibility patterns were evaluated using disk diffusion assay against major classes of antibiotics. The isolates were further screened and confirmed phenotypically for the presence of beta-lactamases viz., ESBL, AmpC, carbapenemase and MBLs, which are a major cause of resistance in these pathogens. Resistant isolates were further tested for the presence of various beta-lactamases genes (ESBL, MBL, KPC, AmpC and NDM) by multiplex or uniplex PCR. Fifty four (54) *E. coli* isolates were typed using Randomly Amplified Polymorphic DNA (RAPD) technique.

The antibiotic susceptibility of the isolates shows that most of the *E.coli* isolates were resistant to cefpodoxime, cotrimoxazole and meropenem, intermediately susceptible to aztreonam, cefotaxime and ceftazidime but susceptible to the Fluoroquinolones. *Salmonella* isolates on the other hand, had a very good susceptibility profile to the 3rd generation Cephalosporins (cefepime, ceftriaxone, cefotaxime and ceftazidime), intermediately susceptible to cefoxitin but were resistant to ofloxacin and cotrimoxazole. *Klebsiella pneumoniae* isolates were resistant to cefpodoxime, cefotaxime and cotrimoxazole but sensitive to the Fluoroquinolones. Screening tests showed 96 % (58 *E.coli*, 15 *Salmonella*, 10 *K.pneumoniae*, 10 *Citrobacter freundii* and 3 *Enterobacter aerogenes*) were positive for ESBL production while 58 % (21 *E.coli*, 15 *Salmonella*, 13 *K.pneumoniae*, 6 *Citrobacter freundii* and 3 *Enterobacter aerogenes*) were positive for AmpC. Thirteen (13) Isolates (4 *E.coli*, 7 *Salmonella*, 2 *K.pneumoniae*) were MBL screen positive while 17 isolates (6 *E.coli*, 1 *Salmonella*, 7 *K.pneumoniae* and 3 *Citrobacter freundii*) were positive for Carbapenemase production. Out of the 58 ESBL screen positive *E.coli*, 16 were phenotypic positive and 35 were confirmed positive with PCR. The predominant gene was *bla*_{TEM}. Forty three percent (25/58) of the *E.coli* isolates was positive for various MBL genes by PCR. *bla*_{SPM} was the most predominant MBL gene. Ten (10) of the 25 *E.coli* had co-expression of more than one MBL gene: [3(*bla*_{IMP}+*bla*_{SPM}), 1(*bla*_{SPM}+*bla*_{GIM}), 3(*bla*_{SPM}+*bla*_{SIM}), 1(*bla*_{SPM}+*bla*_{VIM}+*bla*_{SIM}), 2(*bla*_{IMP}+*bla*_{SPM}+*bla*_{GIM}+*bla*_{SIM})]. Two out of the 21 AmpC screen positives were phenotypically positive for AmpC and only one of these was confirmed positive by PCR. Only 2 *E.coli* isolate were KPC positive by PCR while none of the *E.coli* isolates was positive for NDM gene. Seven out of the 15 ESBL screen positive *Salmonella* isolates were confirmed by PCR to co-harbor TEM+ SHV gene, 3 isolates harboring *bla*_{CTX-M2} (n=1), *bla*_{GES} (n=1) and *bla*_{PER} gene (n=1). Of the 7 MBL screen positive *Salmonella*, 2 were PCR confirmed positive: 1 (IMP+SPM+VIM) and 1 (IMP+VIM+GIM). Nine of the 10 ESBL screen positive *K.pneumoniae* were phenotypically and PCR positive, 5 of which had co-expression of *bla*_{TEM}, *bla*_{SHV}, *bla*_{OXA-1-LIKE} and *bla*_{CTX-M1}. Of the 13 AmpC screen positive *K.pneumoniae*, none was confirmed to be AmpC producer. Three isolates of *K.pneumoniae* were positive for MBL genes: IMP (n=1), IMP+VIM+GIM (n=1), IMP+GIM+VIM+SIM (n=1). All the 10 *C. freundii* were positive for ESBL genes. *Bla*_{TEM} was the predominant ESBL gene. It existed in combination with *bla*_{GES} in 5 isolates and with *bla*_{VEB} in 1 isolate. The dendrogram generated from RAPD-PCR showed a high degree of genetic variability among the 54 isolates, including 38 distinct RAPD patterns 6 of these showed 100 % similarity. The discriminatory index was 0.9846.

The uropathogens were found resistant to various antimicrobial classes. The study showed high prevalence of drug resistant genes among the enterobacterial uropathogens. Majority of the uropathogens harbored more than one antibiotic resistant gene and the most predominant gene was ESBL (*bla*_{TEM}) followed by MBL (SPM) gene. The RAPD showed a high degree of genetic variability among the uropathogenic *E.coli* isolates.

SCIENCE AND TECHNOLOGY NEWS IN THE DEVELOPING WORLD

Barbados: Caribbean Centre for Renewable Energy and Energy Efficiency

A Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) is being established in Barbados to support and coordinate the execution of regional renewable energy and energy efficiency projects and programmes. The agreement to establish the Centre was signed by the Heads of Government of the Caribbean Community (CARICOM) early in July 2017 as a response to the difficult energy situation being faced in many CARICOM Member States, as they simultaneously face the challenges of affordable energy services, energy security and climate change mitigation and adaptation. It is envisaged that by developing their renewable energy sources and putting in place energy efficiency measures, many of the islands will now have significant opportunities to reduce their overall fossil fuel consumption. This should lead to an improvement in their energy security, and promote economic growth and enhanced competitiveness. The centre is being established with the assistance of the United Nations Industrial Development Organisation (UNIDO); the Small Island Sustainable Energy and Climate Resilience Initiative (SIDS DOCK); the Government of Austria; and a number of other international development partners. The CCREEE is one of other regional sustainable energy centres for Small Island Developing States being established in the Pacific, Africa and the Indian Ocean. During the period 2017 to 2018, the revenues of the Centre will be derived from annual contributions from UNIDO, SIDS DOCK and the Austrian government; and voluntary contributions from the Contracting Parties and regional organisations. Thereafter, it will be funded by voluntary contributions from CARICOM Members and Associate Members. The Council for Trade and Economic Development will have general oversight of the Centre.

Source: CARDI, Agriculture in the News, 9th -15th July 2017

Brazil: New Type of Material in Nanotube Form

Layered double hydroxides (LDHs) are a new category of material that has attracted interest on the part of researchers in recent years owing to their flexibility and many applications as catalysts, sensors and drug carriers. LDHs are two-dimensional mixed metal solids built up from sheets of divalent and trivalent cations (positively charged ions that donate two and three electrons, respectively, when bonding to other atoms) interspersed with anions (negatively charged ions). A group of researchers at the University of São Paulo's Physics and Chemistry Institutes in Brazil in collaboration with colleagues at the University of Leuven (KU Leuven) in Belgium structured LDHs into nanotubes, sheets of the material rolled up to form cylinders with a diameter equivalent to a billionth of a meter. They increased the surface area of the material by creating small cylindrical pores and hollows. Because the pores can house various elements and chemical structures, they can be used to confer the material with additional properties. The study resulted from a project supported by FAPESP via a Young Investigator Grant. Nanometric LDHs doped with ions were developed from rare earths to obtain a new luminescent material that could capture solar energy more efficiently for use in photochemical and photovoltaic systems by partially replacing the divalent and trivalent cations in the metallic layers with rare-earth ions and introducing a photosensitiser that was adsorbed (retained) between the layers. The purpose of the photosensitiser was to absorb solar energy and transfer it efficiently to the rare-earth ions. Rare earths are a group of 17 minerals with magnetic and luminescent properties, used in such products as catalysts, high-efficiency light bulbs, smart phones and TV screens. The metals are also of enormous value to the defense and renewable energy industries. Based on the results of this successful project, they decided to develop LDHs not in the traditional form, but rather as micrometric flakes in order to increase their surface area. Although LDHs are versatile and can

accommodate molecules interspersed between the metal layers, they have a spatial limitation that rules out the inclusion of large molecules or complexes such as quantum dots, which are nanoscale particles or crystals of semiconducting material with a wide array of properties and applications, such as embedding in light-emission technologies. To surmount this space constraint, they thought of structuring the material in the form of nanotubes with hollow main cavities so that larger structures could fit inside the material. Pursuing a new strategy that entailed the use of a polymer as a mold to shape the LDHs into nanotubes, followed by its removal at the end of the process, they succeeded in achieving their goal and obtained cylindrical nanotubes composed of a mixture of aluminum, zinc and europium. This is the first time LDHs had been structured in the form of self-supporting nanotubes. To explore and enhance the material's luminescent properties, the researchers placed the nanotubes in contact with quantum dots of Cadmium Telluride (CdTe), a crystalline compound of cadmium and tellurium with semiconducting and photovoltaic properties. The results of their analysis showed that the nanotubes interacted with the quantum dots of CdTe to produce a new class of luminescent material. This unique LDH nanotube morphology and the possibility of interacting with different compounds extends the range of applications for LDHs, offering opportunities in catalysis, devices and active biological materials such as drug carriers. The researchers now plan to investigate the mechanisms underlying the formation of LDHs with this kind of structure and to explore their potential applications.

Source: Agência FAPESP Newsletter, 26th July 2017

Cambodia: Innovative Biodigester attracts Investors

Cambodia's National Biodigester Programme, coordinated by the Ministry of Agriculture, Forestry and Fisheries, developed a biodigester market in 2006 and has since been providing micro-loans to families keen on installing the biodigester. The programme, now operating in 14 provinces of Cambodia, provides immense relief from indoor smoke emanating from stoves that burn wood or biomass. Now an innovative household biodigester has proved itself to a point where a consortium of international investors has put down US\$1 million for further expansion in Cambodia and for exploring new markets in other countries. According to its developer, ATEC Biodigesters, a social enterprise co-owned by Engineers Without Borders, Australia, and Live and Learn Environmental Education, Cambodia, the biodigester uses an anaerobic chamber to break down organic manure from livestock to produce biogas (CH₄ and CO₂), which is piped to kitchens as cooking gas. Consequently, the resulting residual sludge is transformed into high-quality organic fertiliser. For isolated, rural and less wealthy populations, the benefits of a sustainable anaerobic digestion system are more direct than for urban populations in developed countries. While most biodigesters are vulnerable to groundwater pressure, soil expansion or flooding, the polyethylene ATEC biodigesters are designed for installation 'in-ground, half in-ground or totally above ground, depending on the local conditions'. Developed for use in Cambodia and other countries prone to seasonal flooding, the ATEC biodigester bagged the Google Impact Challenge Award in 2014. Over the past three years, more than 250 units have been installed and ATEC estimates that during a 25-year life cycle, each biodigester will reduce 75 tonnes of greenhouse gases, save over US\$6,000 in fuel and yield more than 492 tonnes of fertilisers. Clean energy solutions that utilise natural system principles to unlock the inherent energy in our waste streams have the potential to transform the way homes are powered across the world. It is important to improve the environmental performance of these technologies without disproportionate increase in costs. For isolated, rural and less wealthy populations, the benefits of a sustainable anaerobic digestion system are more direct than for urban populations in developed countries and there is room for improvement given that greenhouse gas emissions

(Contd. from Page 11 - S&T News)

from small-scale biogas plants are far higher than the more highly engineered, continuously-stirred tank reactors adopted by developed countries.

Source: SciDev.Net, 11th September 2017

China: Launch of Brain-Imaging Factory

Mammalian brains have millions of cells, and human brains even have billions. And the cells come in some 10,000 different types, marked by differences in shape, size and the genes they express. Neuroscientists hope that mapping out the structures and how they interact will help to reveal their functions. By comparing particular neuron types across multiple brains, scientists might be able to pick out the effects of a disease or a learned behaviour on cell structure. But such maps often require months or years of effort. The process involves shaving centimetre-long mouse brains into 15,000 ultrathin slices with a diamond blade, staining each layer with chemicals or fluorescent tags to pick out particular features, imaging each layer with a microscope and then reconstructing the images into a 3D map. Neuroscientists who painstakingly map the twists and turns of neural circuitry through the brain are about to see their field expand to an industrial scale. A huge facility, called the HUST-Suzhou Institute for Brainmatics, shortly set to open in Suzhou, China is partnering with the Allen Institute for Brain Science in Seattle, Washington and Cold Spring Harbor Laboratory, New York, USA and should transform high-resolution brain mapping. Where typical laboratories might use one or two brain-imaging systems, the new facility boasts 50 automated machines that can rapidly slice up a mouse brain, snap high-definition pictures of each slice and reconstruct those into a 3D picture. The Suzhou institute will generate a huge amount of data: each mouse brain map alone will be 8 terabytes. But the volume of a human brain is nearly 1,500 times that of a mouse brain; it would take a single machine around 20 years to digitally reconstruct one at the institute's current rate. This factory-like scale will dramatically accelerate progress and large-scale, standardised data generation in an industrial manner will change the way neuroscience is done. The institute, which will also image human brains, aims to be an international hub that will help researchers to map neural connectivity for everything from studies of Alzheimer's disease to brain-inspired artificial-intelligence projects. The new facility, which has a 5-year budget of ~US\$67 million, will employ about 120 scientists and technicians. Access to high-throughput, rapid brain mapping could transform neuro-scientists' understanding of how neurons are connected in the brain, just as high-throughput sequencing helped geneticists to untangle the human genome in the 2000s. This will have a major impact on building cell-resolution brain atlases in multiple species.

Source: Nature, 548, 17th August 2017

Congo, Democratic Republic: Long-lost Notebooks to shed Light on Reaction of Trees to Climate Change

A cache of decaying notebooks found in a crumbling Congo research station has provided unexpected evidence with which to help solve a crucial puzzle – predicting how vegetation will respond to climate change. The treasure trove of tree growth data dating from the 1930s was found in a tumbledown building at the Yangambi Biological Station, which was once Africa's leading forest and agriculture research institution. Combined with other records, the recovered data allows the researchers to make improved predictions about the health of the forest. The researchers had planned to install a high tech monitoring station known as a carbon flux tower in Yangambi. The instruments are indispensable for observing the way plant life responds to climate change and have become standard gear for studying forests in North America and Europe, as well as a handful of locations in the Amazon. Jungles such as the Congo forest play a critical part in controlling the rate of global warming; vegetation sucks up about 25% of the carbon dioxide we spew out of our tailpipes and smokestacks. Scientists believe much of this CO₂ ends up stored in the trunks of tropical trees, with the Congo's trees sequestering 250 bn tonnes alone. But research shows the tropical

carbon sink is faltering. This means CO₂ will build up faster in the atmosphere and temperatures will rise more quickly. Scientists are working to understand better how tropical forests respond to shifts in rainfall. The Congo forest, second only to the Amazon in size, is particularly hard to study. Poor infrastructure, unstable governments and civil war have hindered systematic research. But understanding the Congo is important – it appears to be drying out, and it is hard to say how it will behave in a drier climate. The researchers made copies of the old notebooks and annual summaries. The herbarium's roof was caving in and the documents were already exposed to incessant rains, leaving them water-stained. Rodents had gnawed on some of them. The collection however contained weekly observations of 2,000 trees between 1937 and 1958. Technicians had meticulously noted when trees flowered, fruited, dropped fruit and lost leaves. The archive was a treasure, but there was a serious problem. The hand-written notations could not easily be digitised for statistical analysis. Up to 100,000 observations needed to be transcribed tediously into a spreadsheet. Therefore the scans made in Yangambi were digitally sliced up into thousands of matchbook-size photos, each containing a year's information from a single tree. Volunteers on the site examined one photo at a time. In a matter of seconds they could transcribe the visual information into a form that could later be assembled into a complete data set. About 8,000 volunteers worked an average of 90 seconds per visit, perhaps on the bus to work or during TV commercials. Altogether the anonymous helpers contributed the equivalent of three years of full-time work. The European Union has recently authorised a grant to finally erect the longed-for flux tower at Yangambi, but it will take years for researchers to gather enough data to draw any conclusions.

Source: The Guardian, 22nd September 2017

India: Artificial Leaf for harnessing Sunlight

Producing hydrogen by harnessing the Sun's power depends on various factors such as light-absorbing efficiency, charge separation and migration in a photocatalyst. It is difficult to make such a versatile catalyst. Most catalysts can absorb only the ultraviolet rays of sunlight. Using a nano-composite, the researchers of the CSIR-National Chemical Laboratory, Pune have made a thin-film device that can absorb sunlight like a natural leaf and split water, making it potentially useful for generating hydrogen fuel. They prepared a wireless photochemical cell by using a nano-composite made of gold nanoparticles, titanium dioxide and specific quantum dots. The cell was dipped in an aqueous solution and exposed to sunlight. A camera recorded showed instant generation of hydrogen bubbles. The cell exhibited a power conversion efficiency of 5.6% - much higher than a similar wired cell. When exposed to sunlight for 25 hours, the wireless cell retained its efficiency without any light-induced corrosion. The wireless cell does not need any external voltage and performs better than existing solar cells. In the future, such cells can be integrated with cars to generate and store hydrogen fuel.

Source: Nature India, 6th September 2017

India: Table-Top Experiment to reveal Star Secrets

Much of the Universe consists of highly ionised and extremely hot gas (known as plasma) swirling at incredible speeds. The motion of these charged species - negatively charged, light electrons and positive heavy ions making up the plasma - generates a magnetic field. The randomness of magnetic fields generated due to fluctuations in the velocity and pressure of the swirling charged particles mimics in plasmas the kind of turbulence one sees in ordinary fluids. Until now, turbulent magnetic field dynamics that explain astrophysical phenomena could be obtained only through observations via telescopes and satellites. However, now a team of scientists from the Tata Institute of Fundamental Research in Mumbai and Institute of Plasma Research in Gandhinagar (both in India) and at the Instituto Superior Tecnico, Universidade de Lisboa in Portugal have been able to recreate solar turbulence on a table top, opening up the possibility of studying astrophysical phenomena, such as the evolution of stars, in a lab. They used a high intensity

(Contd. from Page 12 - S&T News)

ultra short laser pulse to excite hot, dense plasma on a solid surface and studied the extremely fast evolution of the giant magnetic field generated by the plasma dynamics. These lab observations have an uncanny resemblance to the satellite data on the magnetic field spectra measured for turbulent astrophysical plasmas in the solar wind. This demonstrates the potential of small-scale, table-top laboratory experiments for investigating turbulence in astrophysical environments.

Source: Nature India Alert, 12th July 2017

Jordan: Staking Its Future on Science

When the World Science Forum kicks off on the shore of the Dead Sea in November, it will be the latest jewel in the crown for one of Jordan's biggest champions of science. The movement of the high-profile biennial conference to the Middle East for the first time is part of Jordan's ongoing push to transform itself into a regional research powerhouse. The country wants to use a focus on research to solve its problems and build diplomatic ties in the Middle East. Jordan hopes to emphasise the power of science to transcend politics and war in the increasingly volatile Middle East. There are signs that these efforts are beginning to pay off for Jordan, which created its first national science fund in 2005 involving making porous crystals. In February, the country cemented plans for a reticular-chemistry foundry, the world's first. And in May, the Middle East's first synchrotron, SESAME, opened near Amman with the backing of seven nations and the Palestinian Authority. Jordan's leaders see science, engineering and technology as an engine of economic growth for their 71-year-old country, which lacks the oil resources of many neighboring states. The nation's political stability and central location have aided these ambitions. So has its diplomacy: Jordan is one of the only places in the Middle East where scientists from Israel and Arab countries can meet, which all in the region are facing issues with energy, water and the environment.

Source: Nature, 548 (14-15), 3rd August 2017

Kenya: Improved Cassava Varieties to Ease Hunger in Africa

Improved varieties of cassava that will help in addressing food crisis in Africa may soon be available in the continent. Scientists from Kenya Agricultural Livestock and Research Organization (KALRO) are developing the genetically modified Virus Resistant Cassava for Africa Plus (VIRCA Plus) varieties, which are nutritionally improved and resistant to cassava mosaic and cassava brown streak diseases. They reported that the two diseases lead to a combined economic loss of about \$180 million per year in East Africa alone. KALRO is collaborating with experts in various research institutions in Uganda and Nigeria, as well as in Donald Danforth Science Center and ISAAA. At present, VIRCA Plus varieties are under confined field trials. Failure to fund research and not heading to regulatory institutions poses threat to cassava technology development as Kenya trails others in adoption. According to ISAAA *Afri* Centre different ministries have varied perceptions on agriculture technology, but the policy should be harmonised to make sure that funds for research would not suffer.

Source: Crop Biotech Update, 5th July 2017

Portugal: High Power Photovoltaic Pumping Systems

The MASLOWATEN project kicked off in September 2015 with the goal of developing and marketing a quality photovoltaic irrigation solution. The project has a scheduled duration of three years. During the first year, five demonstration plants were installed on an industrial scale in four countries: Spain, Portugal, Morocco and Italy. Data from these plants is being gathered with a view to corroborating the technical and economic feasibility of the technology. A highlight of the MASLOWATEN project is the development and implementation of the 'cloud pass algorithm' in its photovoltaic systems. This patent-protected algorithm enables the functioning of the system to be adjusted in the event of sudden changes in solar radiation that might affect the reliability of the system by causing water hammer. With the aim of supporting European companies, the project is committed to

transferring knowledge to SMEs. For this purpose, at least 20 European Union SMEs will receive training on the innovations developed within the framework of the project. The project will implement a different type of irrigation technology at each of the five demonstration plants. These technologies range from pumping to a raised pond from a well of 300 metres in depth using 100% solar energy to hybrid systems driven by electricity and diesel that ensure irrigation at a constant pressure. The demonstration plants can be classified into two groups: Photovoltaic pumping systems that do not use different energy sources simultaneously 100% photovoltaic pumping to raised pond. Located in the province of Villena in Alicante, this system enables water to be pumped from a well of 300 m in depth to a raised pond with a volume of 175,000 m³. This facility has the project's largest photovoltaic generator (360 kWp) and enables up to 663,000 m³ of water to be lifted to the raised pond, from where it will be distributed by means of natural pressure. Constant-pressure photovoltaic pumping system for sprinkler irrigation located in Uri in Sardinia, this pumping system has a 40 kWp photovoltaic generator. The use of automated irrigation systems enables the water needs of a 10-hectare farm devoted to artichoke cultivation to be satisfied. The system consists of three pumps driven by the same photovoltaic generator: two pumps submersed in separate wells, which pump to a pond of 2,000 m³, and a pump to provide pressure to a network of low-pressure sprinklers. Constant-pressure photovoltaic pumping system for centre-pivot and sprinkler irrigation Located in the town of Alaejos in Valladolid, this system has a 160 kWp photovoltaic generator. Through the use of a pond, which acts as a storage system, the system guarantees continuous pressure for both centre-pivot and sprinkler irrigation. The pumping system is installed on a farm of 150 hectares devoted to the cultivation of beetroot, which requires around 300,000 m³ of water per annum. The MASLOWATEN project has received funding from the European Union Horizon 2020 programme, which finances research and innovation projects

Source: Futur Enviro Newsletter, 15th September 2017

Sri Lanka: Mud Bricks - Best for Cool, Green Houses

The sustainability of buildings and housing construction, being adapted to the local environment, is essential to save lives and prevent inadequate living conditions. In 2015, the government of Sri Lanka launched a programme to build 150,000 houses for the poor. This triggered the researchers' idea to compare the different types of brick. A Sri Lankan study at the University of Moratuwa suggests that simple mud concrete bricks perform best in tests of price, carbon footprint and thermal insulation, providing the most affordable and sustainable houses in the tropics. Comparisons of four different types of walling materials revealed that mud concrete bricks have the lowest environmental impact and keep houses cool. They are also the cheapest, and easiest to dispose of once a house is knocked down. Researchers compared mud concrete bricks with red bricks (modern fired clay bricks), hollow cement blocks and Cabook, the Sri Lankan name for bricks made from laterite soil, which are common in the tropics. Mud concrete bricks are made from soil in the same way as traditional mud bricks, but contain gravel and sand to improve their strength. The goal of the study was to find out which types of walling material are the most suitable for constructing affordable houses in the tropics, where population density and poverty are generally high. The researchers looked at the carbon footprint of all four walling materials, and found that mud concrete bricks were the most environmentally friendly to produce and dispose of. To check on thermal conductivity the researchers built one-square-metre model houses of the different walling types, where they found that red brick kept a house coolest, but mud concrete bricks performed almost as well. Mud concrete bricks were also found to be the cheapest, at less than US\$1,000 in Sri Lanka for an average-sized house, whereas red bricks cost nearly US\$3,500. Mud concrete bricks are widely used in other tropical countries but novel in Sri Lanka. They are popular because they are easy to make and therefore cheap. However, as people grow wealthier they prefer

(Contd. from Page 13 - S&T News)

the red bricks and cement blocks, as these are associated with higher socio-economic status. Other considerations, such as aesthetics and symbols of modernity or social status influence people's choice of materials. Future studies should also take into account other sources of environmental damage such as **deforestation** (to produce timber to fire the bricks) or excavation of soil.

Source: SciDev.Net, 28th June 2017

Saudi Arabia: Regulatory Framework for Small-Scale Solar Energy Generation

Households account for about half of power consumption in the desert kingdom of Saudi Arabia, much of it for air conditioning. The country has now issued a regulatory framework for electricity consumers to operate their own, small-scale solar power generating systems and export unused power to the national grid. According to the Electricity and Cogeneration Regulatory Authority the rules will come into force from next July 1 and will cover small photovoltaic facilities with generating capacity of no more than 2 megawatts. Consumers will have their excess electricity offset against their future consumption and after a year they will receive cash payments at a tariff approved by the authority. What has been achieved is an essential step forward towards the realisation of the deployment of renewable energy in the Kingdom of Saudi Arabia. The country, world's top oil exporter, currently has few renewable energy facilities but has aimed to generate 9.5 gigawatts of electricity from such sources annually by 2023 through 60 projects, investing between \$30 billion and \$50 billion. Solar energy is expected to lead the renewable drive. The energy ministry is drawing up an incentive programme to encourage both companies and households to generate their own solar power, but no timetable for its introduction has been set. The scheme was feasible at current Saudi electricity tariffs and further power price rises could make it more attractive. Seeking to save money in an era of cheap oil, the government raised ultra-low electricity tariffs for major industrial and residential users in early 2016. It initially planned another round of tariff hikes in mid-2017; this has now been put on hold, partly to avoid hurting sluggish economic growth, but it is expected to go ahead late this year or early next.

Source: EQ Magazine, 23rd August 2017

Thailand: Thailand as New Production Hub for Electric Vehicles

Thailand is quickly cementing its status as ASEAN's leading Electric Vehicle (EV) hub and main production base after receiving new investments from leading auto manufacturers including BMW, Nissan and Toyota. This status is further reinforced by the Thai

government's commitment to have 1.2 million electric cars on the roads in Thailand by 2036. To help increase demand and boost the production of environmentally friendly cars in the country, Thailand Board of Investment (BOI) launched new schemes to promote electric cars such as waiving tariffs for imported EVs, offering incentives for EV part manufacturing and assembly, and promoting the establishment of charging stations nationwide. The Thailand Board of Investment (BOI) is the investment promotion agency for Thailand that facilitates foreign direct investment. BOI's services are free of charge and customised to help business succeed in Thailand. Approved tax incentives aim to promote production of three types of electric cars in Thailand including hybrid electric vehicles, plug-in hybrid electric vehicles, and battery electric vehicles. Production of major parts for HEVs, BEVs, and PHEVs can lead to corporate income tax exemption for up to 8 years. The industry's growth was boosted further last year when the nation's largest energy provider, PTT Pcl, signed a deal with six major automakers to start producing electric cars, including the Thailand units of BMW, Mercedes-Benz, Mitsubishi, Nissan, Porsche and Volvo. Major global companies are already taking advantage of Thailand's capabilities in the automotive sector as it pertains to EVs. BMW Group Thailand has delivered their BMW i3 (94Ah) battery to the Thailand Automotive Institute, which has a capacity of 33 kilowatt hours (kWh) thanks to the higher storage density of the lithium ion cells. In addition, Nissan recently announced the company's plans to offer the LEAF electric vehicle in Thailand starting next year. The company is introducing e-power technology into Thailand's auto market with a new system that doesn't require external charging, instead receiving electricity from a 3-cylinder, 1.2-litre internal combustion engine that serves as an in-house generator. Toyota Motor Corporation is also investing US\$570 million to start manufacturing Hybrid Electric Vehicles (HEVs), and electric vehicle developer FOMM Corporation will start assembling electric vehicles in Thailand next year. To further aid in developing the country's EV industry, Thailand's Energy Absolute plans to establish and operate 1,000 electric-vehicle charging stations in the country by the end of 2018, investing a projected 600-million-baht.

Another milestone in Thailand's mission to become a major EV hub was the opening of Thailand's first Technology and Innovation Learning Center for Electric Vehicles in July 2017. The Center will be an EV technology development and learning center for entrepreneurs, government officials and general public to help generate public awareness of a sustainable future with EV technology.

Source: EQ International, 27th September 2017

DISTINGUISHED VISITORS TO THE CENTRE



Mr. D.P. Joshi, IAS, Special Commissioner, Swachh Bharat Mission (Gramin), Government of the State of Gujarat, India



Prof. Dr. Chandima Gomes, Department of Electrical & Electronics Engg., and Former Head, Center for Electromagnetics and Lightning Protection (CELP), Universiti Putra Malaysia (UPM), Serdang, Selangor, Malaysia

Past Scientific Associate of NAM S&T Centre

Ms. Harsha Doriya



Ms. Harsha Doriya worked in the NAM S&T Centre as a Research Associate from May 2015 to January 2016. Her primary responsibilities included planning, implementation, evaluation and assessment of various scientific programs of the Centre. She actively contributed towards the promotion of scientific activities among students, scientists/academia and scientific organisations in the developing countries through workshops, seminars and training courses and for the publication of the quarterly Newsletter of the Centre. She worked on the implementation of various schemes of the Centre, viz. Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme sponsored by the Department of Science & Technology, Government of India and the U2ACN2 Research Associateship scheme in Nanosciences & Nanotechnology, a scheme implemented at the University of South Africa in Pretoria with the UNESCO UNISA Africa Chair in Nanosciences & Nanotechnology. She contributed towards the preparation of the guidelines and announcements of these schemes in a major way, managing the database of R&D and academic institutions, and coordination with scientists & researchers from developing countries. Ms. Doriya has also acquired editorial skills during her affiliation and contributed in the compilation and publication of a highly valuable book on 'Herbal Medicines'. She also initiated the work on the organisation of an 'International Workshop on Mitigation of Disasters due to Severe Climate Events: From Policy to Practice' and drafted the Announcement brochure for the same.

After the enriching experience at the NAM S&T Centre, she moved on to the Department of Forests and Wildlife, New Delhi as a trainee to gain exposure towards environment and started working for handling of National Green Tribunal (NGT) High Court cases related to environment and wildlife. Her work as a trainee involved in updating the status of court cases, forwarding petitions to the concerned divisions, contacting advocates for the respective cases and maintaining the documentation for NGT and high court cases.

Recognising her interest towards environment and wildlife, she joined Wildlife Trust of India, a well known organisation working for wildlife of India as Assistant Project Officer. She worked there on a number of projects related to several threatened animals and birds, organising and managing workshops and consultative meetings for the betterment of the wildlife and environment. Further, she has also contributed to the disaster management in the form of emergency relief camps.

Harsha had obtained excellent knowledge of project management, database management, monitoring & evaluation, fund raising and much more through the organisations where she worked.

She has acknowledged that the NAM Centre is an excellent organisation which has provided her the opportunities to build up her strength and understand the dynamics of an organisation.

Mrs. Divya Sai



Mrs. Divya Sai worked in the NAM S&T Centre as a Research Assistant from February 2013 to July 2013. Her primary responsibilities included planning, implementation, evaluation and assessment of various scientific programs of the Centre. She actively contributed towards the promotion of scientific activities among students, scientists/academia and scientific organisations in the developing countries through workshops, seminars and training courses and for the publication of the quarterly Newsletter of the Centre.

Moving from the NAM S&T Centre, Mrs. Divya Sai started working as a Research Analyst with the Technology and Innovation research firm, Cheers Interactive, in Navi Mumbai from 2014-2016, where her job related to the latest technologies and developments in the field of polymer science, organic chemistry, and metallurgy for global Fortune 500 companies. Her work at Cheers Interactive involved analysis of technological developments from patents and scientific literature, generating insights on activities of companies, universities, start-ups, and other relevant entities, and presenting the findings to clients and answering their questions. Recognising her interest as well as strength in education counselling, she transformed her role from research to student consulting and is presently working as an Education Counsellor and Business Development Executive at MTEducare, Mumbai. Her current responsibilities include counselling students and their parents on identifying the best education path for their career aspirations and goals, organising and managing training and rewards recognition events for MTEducare, and organising and leading doubt solving sessions for students in Physics, Mathematics and Chemistry for Board examinations as well as competitive entrance examinations.

Centre Announces

International Roundtable on Impacts of Extreme Natural Events: Science & Technology for Mitigation (IRENE) Colombo, Sri Lanka, 13-15 December 2017

International Roundtable on THE IMPACTS OF EXTREME NATURAL EVENTS: SCIENCE & TECHNOLOGY FOR MITIGATION (IRENE)

Colombo, Sri Lanka
13-15 December 2017



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



National Science and Technology Commission (NASTEC),
Sri Lanka



Research Centre-Technology for Disaster Prevention,
South Eastern University, Sri Lanka (RC-TDP, SEUSL)

An inescapable effect of the climate change is the increase in the occurrence and severity of extreme natural events. To combat these hazards, the need of the hour is not only to work out appropriate disaster-prevention strategies, but also since the climate change is a reality, call for an ecosystem for development and diffusion of new climate-relevant technologies. This would require preparing a blueprint for crisis managers, community officials and policy makers, which would specify the converging partnerships among the host of stakeholders, find resource requirements for successful programmes and provide a step-by-step demonstration of the disaster-planning process.

With the above in view, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) in partnership with the National Science & Technology Commission (NASTEC), Sri Lanka and the Research Centre - Technology for Disaster Prevention, South Eastern University of Sri Lanka (RC-TDP, SEUSL) announces the organisation of an International Roundtable on the 'Impacts of Extreme Natural Events: Science & Technology for Mitigation

(IRENE)' in Colombo, Sri Lanka during 13-15 December 2017.

The International Roundtable has been primarily designed for scientists, meteorologists, engineers, policy makers, public health specialists, technologists, armed forces and civil administration experts working in the field of disaster mitigation from different countries and industries across the world. The selection of the participants will be strictly based on merit and relevance of their current responsibilities to the subject of the Roundtable as well as the quality of the extended abstract of the paper to be submitted by them along with the completed nomination form. A pre-condition for participation in the Roundtable is that the participants must present a paper during the Roundtable and submit the final manuscript of their papers, in MS Word format, at least 14 days before the commencement of the event.

Experts and scientists desirous of participating in the Roundtable, excepting those from Sri Lanka, may submit their nomination forms electronically directly to the NAM S&T Centre as early as possible, but latest by Friday, 10th November 2017. However, Sri Lankan Experts and scientists desirous of participating in the Roundtable should send their applications with completed documents to the RC-TDP, SEUSL with a copy to NASTEC, Sri Lanka latest by the above stated deadline.

For further details, please visit the Centre's Website: www.namstct.org

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