

## Science trends in North–East India\*

Scientists from 8 North–East (NE) states of India came together at a symposium to discuss a wide range of topics in the fields of metagenomics, biomolecular aspects of cancer, chronic obstructive pulmonary disease (COPD), medicinal plants, crop improvement through genetic engineering, barcoding, implications of toxic heavy metals in health, microbe and plant-based biomolecules, genomics of the biodiversity in the region and application of biotechnology in tea research.

R. C. Boruah (Society of Biological Chemists (India), North East Chapter) gave a brief introduction to the history of the society. This was followed by two technical sessions. In the first session, D. Chattopadhyaya (Society of Biological Chemists (India), Bangalore) in his keynote lecture spoke on the metagenomic analysis of microbial community capable of degrading petroleum hydrocarbons. His team has initiated studies on a crude oil-contaminated soil from NE India. Using a metagenomic approach, the research team has studied the resident microbial consortia operating on the petroleum hydrocarbon pollutants in the soil. In addition to preparing 16S rRNA clone libraries for bacteria and archaea, capillary sequencing has also been done by them. Sankar Ghosh (Assam University, Silchar) gave a brief talk on NE India's biodiversity genomics. His team has generated large-scale data on popular molecular markers from mitochondrial and chloroplast genome to assign the genomics-based DNA-PASSPORT and GENOMIC DIVERSITY to explore the species identification and validation of diverse flora and fauna, which include different species of fish (catfish, mahseer and ornamental fishes), testudines (tortoise, turtles and terrapins) and other endemic economic species. They have also undertaken studies on cancer genomics of head and neck, esophageal, naso-

pharyngeal, colorectal and breast cancers in order to identify molecular markers based on Genomics. B. G. Unni and Tapan Dey (North East Institute of Science and Technology, CSIR-NEIST), Jorhat) discussed the biochemical and molecular aspects related to COPD and emphasized on the increasing health risks due to occupational and environmental exposures to persistent environmental contaminants and heavy-metal emissions. Their experiments to evaluate the coal dust 'exposure–response' relationship amongst people residing very close to open-cast coal mines and their genetic susceptibility to COPD with respect to four genes – *GSTM1*, *GSTT1*,  $\alpha$ -1 Antitrypsin and *HMOX1* were briefly discussed. A. K. Mukherjee (Tezpur Central University) delivered a talk on molecular aspects and mechanism of snake venom and cardiovascular drug development from microbial resources of NE India. B. K. Sarma (DBT, Assam Agricultural University) spoke on crop improvement programme using genetic engineering research at Assam Agricultural University. He also talked about the introduction of insect resistance gene(s) into chickpea plants using gene technology. In addition, he mentioned the research done by his team to generate transgenic lines in pigeon pea using *Bt* genes to confer protection against pod borers. Anupam Chatterjee (North Eastern Hill University, Shillong) spoke on genomic changes and chromosomal instability induced by raw betel-nut, which can lead to cancer. His research has assessed the involvement of TSGs like CDKN2A (at 9p21) and *Rbl* gene (at 13q14) and evaluated the status on the expression of mitotic checkpoint genes and their association with chromosome instability (CIN) in the development of raw-betel nut (RBN)-induced cancers. Lisam Shankujumar Singh (Manipur University) delivered a talk on development of anti-cancer therapeutic drugs. He mentioned that OGR1 (Ovarian cancer G-protein Coupled Receptor 1) inhibits cancer-cell migration through strongly enhancing cell-matrix adhesion via G-proteins activation. OGR1 also regulates expression

of neutral endopeptidase (NEP) and *CK2 $\alpha$*  intronless gene. T. C. Bora (Biotechnology Division, CSIR-NEIST) discussed in detail the microbial resources from NE gene pool and their functional properties in agriculture, bioremediation and the health sector. He also discussed the overall activities undertaken in the area of microbiology at his institute.

In the second technical session, Samir Sil (Tripura University) spoke on anti-cancer and immunomodulatory activity of *Parkia javanica javanic* and the evaluation of *in vitro* and *in vivo* anti-proliferative activity of the plant extract. Ajaikumar B. Kunnumakkara (IIT, Guwahati) delivered a talk on the alternate methods for accelerating cancer drug discovery and development. He briefly discussed the various approaches, including increasing the efficacy of already existing chemo-therapeutic agents by combining with other non-toxic agents to decrease drug resistance and using nanotechnology to increase its bio-availability. Thiyam Ramsing Singh (Manipur University) spoke on Fanconi anaemia pathway (FA) and interstrand DNA cross links pathway repair and their implication in cancer therapy. He discussed his team's effort in developing a cell-based assay system to screen the medicinal plants in Manipur and the discovery of plant extracts that disrupt the FA pathway.

Mahuya Sengupta (Assam Central University) spoke on immunobiological and health implications of toxic heavy metals in human infertility. In a study undertaken by her research team, it was established that heavy metals like arsenic, cadmium, lead and mercury cause irreversible biochemical and physiological changes in male reproductive system. D. N. Das (Rajiv Gandhi University, Arunachal Pradesh) in his lecture, highlighted the importance of biotechnological intervention to improve fisheries, in addition to the scope and strategies for sustainable development of inland fisheries using aquatic biotechnology. P. K. Bhardwaj (Regional Centre of Institute of Bioresources and Sustainable

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Development (IBSD), Sikkim) spoke briefly on the molecular dynamism of endophytism in medicinal plants. Tanoy Bandhopadhyay (Tea Research Association) spoke on the applications of biotechnology-based research in tea. In addition to briefing the audience on the various research activities undertaken at Tocklai Research Institute, Bandhopadhyay spoke on the impact that the Tea Improvement Consortium has made the formulation of collaborative projects

with other research institutions within the NE region and with other institutions at the national level.

The symposium concluded with suggestions to extend infrastructure facilities in order to undertake collaborative research work utilizing regional resources from the NE region. It was agreed to by the participants to conduct similar symposiums, mini conferences, brainstorming sessions and interactions among research fraternity in different

regions of NE India as a part of the Society's activities.

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