

BIOGYAN

Bioinformatics Centre, Sikkim State Council of Science & Technology

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QUARTERLY NEWS LETTER

IInd North East State Biotech Hub Coordinators' Meet

State Biotech Hub, Sikkim State Council of Science & Technology has successfully organized a IInd Coordinators' Meeting of North East State Biotech Hub, in Chintan Bahwan, Gangtok, from 19th to 20th April, 2012.



Fig.1 Shri. Pawan Chamling Hon'ble Chief Minister, Sikkim, unveiling the proceeding of the meeting during the inaugural session.

The programme was inaugurated by the Hon'ble Chief Minister, Shri. Pawan Chamling. Various honorable Dignitaries like Shri. Bhim Dhungel, Minister, Department of Science and Technology and Climate, Dr. T. Madhan Mohan, Adviser, Department of Biotechnology, Government of India, Shri. P.T. Euthenpa, Secretary, DST, Dr. A.K. Srivastava, IAS, Principal Secretary, Dr. Peyush Goyal, Scientist, DBT, Govt. of India, Miss Sarala Rai, Additional Secretary, DST, Dr. B.C. Basistha, Additional Director and Coordinator, State Biotech Hub, Sikkim State Council of Science & Technology, Shri. D. T. Bhutia, Additional Director and Shri. D.G. Shrestha, Additional Director, Sikkim State Council of Science & Technology, have attended the inaugural session of the meeting. The meeting was attended by various coordinators of State Biotech Hubs and Institutional Biotech Hubs of North Eastern India.

During the meeting hours, the coordinators of the State Biotech Hubs and Institutional Biotech Hubs gave presentation of their progress report and future plan respectively. The scientific presentation were examined by Department of Biotechnology, Government of India and Biotech Consortium India Limited (BCIL) and some valuable suggestion for the development of research in Biotechnology were included too.

Training on Documentation of Ethno-traditional knowledge by using Bioinformatics tools

On 07th December, 2013, Bioinformatics Centre, Sikkim State Council of Science & Technology, Department of Science & Technology and Climate -

Change, organized a day training programme on "Documentation of Ethno-traditional knowledge by using Bioinformatics tools. The training was sponsored by the Department of Biotechnology, Government of India.

A day long programme was inaugurated by Miss Sarala Rai, Additional Secretary, Department of Science & Technology. Dr. B.C. Basistha, Additional Director and Coordinator, Bioinformatics Centre, SSCST, Shri. K.B. Subba, Co-coordinator & Assistant Scientific Officer, SSCST and Dr. Shiva Kumar Sharma, Assistant Scientific Officer, SSCST, were also present during the inaugural session of the training. The Resource Persons of the training programme were, Shri. Lalit Kumar Rai, GBPANT Institute, Government of India, Dr. Bharat Kumar Pradhan, Survey Expert, Sikkim Biodiversity Conservation and Forest Management Project, JICA and Shri. Laydong Lepcha, Information Officer, Sikkim Bioinformatics Centre, Sikkim State Council of Science & Technology, Department of Science & Technology and Climate Change.

During the training hours, Dr. Bharat Kumar Pradhan delivered a lecture on, necessary of documentation of Ethno-traditional knowledge and the role of Bioinformatics for the documentation of Ethnotraditional knowledge. He has also demonstrated a short documentary film on Ethno-traditional practices of Lepchas of Dzongu, North Sikkim. Shri. Lalit Kumar Rai, Scientist, GBPIHED Institute, delivered a lecture on logistic concepts of social practices like Ethno-traditional knowledge. He also talked upon Ethno-botany and its four major studying phases.



Fig.2 Trainees along with Dr. B.C. Basistha, Additional Director and Coordinator, SSCST and Resource persons.

Shri. Laydong Lepcha, Information Officer, SSCS&T, DST&CC, delivered a lecture on Ethno-traditional medicinal plants by referring two aspects; alarming status of some of the Ethno-traditional medicinal plants of Sikkim caused by Natural hazard, landslide and the development of Computational biogrid database for the documentation of Ethno-traditional knowledge by introducing sophisticated Bioinformatics software. Shri. Lepcha also gave hands on demonstration to the trainees by introducing PERL Bioinformatics programming software.

The training programme was ended with a valedictory session, during which Dr. B. C. Basistha, Additional Director and Coordinator, Bioinformatics Centre, Sikkim State Council of Science & Technology, distributed certificates to the participants of the training programme.

Training of Elsevier Science Direct publisher on online access of Research Journals

On 09th August, 2012 Bioinformatics Centre, Sikkim State Council of Science & Technology, in collaboration with Elsevier Science Direct, conducted crucial training on techniques and methodologies of online research journals from Science Direct. The training was attended by Scientists, Senior Research Fellows, Junior Research Fellows, Research Assistants and other relevant researchers, working in Sikkim State Council of Science & Technology. In the training, Mr. Tanumoy Misra, Product Trainer, Elsevier Science & Technology, New Delhi, gave hands on training to the trainees.



Fig.3 Training under process in Bioinformatics web lab.

The Elsevier Science Direct is one of the journal publisher partners of DeLCON Consortium, which is providing free online access of research journals in the Bioinformatics centre, Sikkim State Council of Science & Technology, with the support of Department of Biotechnology, Government of India.

LATEST DEVELOPMENT IN BIOLOGICAL SCIENCES

Virus with close genetic relationships to the H1N1 'swine' flu virus.

Six influenza-A viruses which shows close genetic relationship with the H1N1 swine flu virus, have been identified by the scientists by using mathematical and computation techniques.

The biological studies focused on finding of strains of these influenza virus revealed that five of this viruses were identified from pigs, while the sixth one was identified from human working in hogs. The scientist obtained data on all fully sequenced influenza A viruses available in a National Institute of Health database and used supercomputers to efficiently track how all of these influenza A viruses are related to each other and which path through the network led to the pandemic H1N1 virus of 2009.

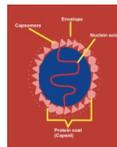


Fig. 4 Virus

This finding will help the researchers to obtain an explicit historical and molecular map of how influenza A viruses evolved from several ancestors to modern day viruses.

Source: <http://news.bioscholar.com>

Researchers Developed 16 Disaster Management Drugs

The Indian Scientists have developed 16 drugs for disaster management. This include an anti-cyanide drug, an anti nerve gas drug and anti toxic gas drug. The drug was developed by the scientists working in Defence Research and Development Organization (DRDO), Institute of Nuclear Medicine and Allied Sciences (INMAS). The drug has passed the efficacy test and believed to be cheaper the those available in the market. The discovery of these drugs will be a huge benefit in future in dealing with chemical, biological, radiological and nuclear (CBRB) incidents.



Fig. 6 Drugs

Source: <http://news.bioscholar.com/2013/01/indian-researchers-developed-16-disaster-management-drugs.html>

Damaging DNA among all

Recently, the scientists have found that even a healthy person carries on an average approximately 400 potentially damaging DNA variant in which two are directly related with disease. This was discovered by the researchers working at Cardiff and Cambridge Universities.



Fig.5 Deoxyribonucleic Nucleic Acid (DNA)

The same been published in American Journal of Human Genetics, indicated that one in ten people is like to develop a genetic condition as a consequence of carrying these variants. The study was made possible by using Human Gene Mutation Database (HGMD). The HGMD has a collection of published data on gene mutations underlying or associated with human inherited disease.

The HGMD dataset was cross compared with whole genome sequences derived from 179 people enrolled in the 1000 Genomes Pilot Project, which help to figure out detail of human disease causing mutation. The samples for this study were taken from individuals who at the time of sampling were unlikely to have any overt genetic disease. The average figure of 400 potentially damaging DNA variants is predicted to increase as more and more powerful genetic studies discover rare genetic variants more efficiently. In the majority of people a potential disease causing mutation was found, though the genetic material is in quite mild condition or may become apparent in the later part of life.

Source: <http://redirect.cf.ac.uk/news/articles/why-nobody-is-perfect-9921.html>

Freshwater species under threat in eastern Himalayas

The recent IUCN Red list of threatened species indicated that 31.3% of the 1,073 freshwater species of fishes, molluscs, dragonflies and damselflies currently known in the Eastern



Fig. 6 Freshwater amphibian

Himalaya region are at risk of becoming victim of developmental exploitation. The study was carried out by IUCN and Zoo Outreach Organization (ZOO). The development of water resources in the Eastern Himalaya region is expanding at a rapid rate. It is observed that there is a serious lack of information to guide conservation and development planning. As a consequence of this a pose of threat has been developed in the entire eastern Himalaya.

Source: <http://www.iucn.org/knowledge/news/76754/Freshwater-species-at-risk-in-Eastern-Himalaya-development-surge>.

Genetic Research Uncovers population history of Giant Panda

The scientists working in the Institute of Zoology at the Chinese Academy of Sciences (CAS) and genome sequencing center BGI have managed to construct a complete, continuous history of giant Panda, from its origins to the current day.



Fig.7 Giant Panda

The research was completed by means of whole genome re-sequencing of 34 members of the species. The researchers also discovered that six modern-day geographic giant panda population could be divided into three genetic population: Qinling (QIN), Minshan (MIN), and Wionglai-Daxiangling-Xiaoxiangling-Liangshan (QXL).

Source: redOrbit Staff & Wire Reports - Your Universe Online

To be able to perform these important biological functions, the proteins folds into one or more specific spatial conformations, led by an interactions of number of non-covalents such as hydrogen bonding, ionic interactions, Vander Waals forces and hydrophobic packing. By understanding how proteins fold and what structure they are likely to assume in their final form will help the researchers to predicts the actual function of particular proteins. Some time the incorrectly folded proteins in humans results in unexpected variants leading to horrible diseases.

Bioinformatics, which is an allied field of science, promotes healthy prediction of protein folding, protein structural predictions. Recently the bioinformatics in proteomics is introducing new algorithms to handle large and heterogeneous data sets and to improve the knowledge discovery process. The Bioinformatics algorithms improves the protein folding predictions. There are various Bioinformatics software, such as ROSETTA which are used for the purpose of protein folding mechanisms, protein protein interactions, predicting and designing protein structures. The introduction of Bioinformatics in Proteomics has contributed augments of success to the research in Biological Science.

Source: <http://en.wikipedia.org/wiki/Proteomics>

Stinging Nettle

Smrita Pradhan & B.C. Basistha
State Biotech Hub, SSCS&T

Urtica dioica L. under the family Urticaceae commonly known as stinging nettle locally known as "sishnu" in Nepali is used both as medicine as well as vegetable famously known as "spring spinach."



Fig.9 *Urtica dioica* L.

The stinging sensation of the leaf hairs or stinging trichomes is caused by several plant chemicals including formic acid, histamine, serotonin, and choline that injects the chemicals when we touch the plant.

The part used are usually leaves, stem and even roots in some places. It is known to be very effective against high blood pressure, urinary infection, diabetes, inflammation, cleaning blood and also shows analgesic, antiulcer, treatment of enlarged prostate and antimicrobial activity. Herbal tea of stinging nettle leaves can be taken daily for the better health. The Leaves of this plants contains the phytochemicals called Beta-sitosterol which is a flavanoids that helps lowering cholesterol and quercetin. It also contains vitamin C and tannins. Besides its medicinal value, fibres from the stinging nettle is also used for making yarn for making cloths out of it. Hence Stinging Nettle is commonly found plant with great value.

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Antioxidant, antimicrobial, antiulcer and analgesic activities of nettle (*Urtica dioica* L.) Ilhami Gülçin a, Ö. İrfan Küfrevio glu a,*, Münir Oktay b, Mehmet Emin Büyükokuro'glu c.

Effect of *Urtica dioica* extract intake upon blood lipid profile in the rats ;Costantine F. Daher , Karmen G. Baroody, George M. Baroody.

ARTICLES

Bioinformatics in Proteomics

Laydong Lepcha & B.C. Basistha
Bioinformatics Centre, SSCS&T

The study of proteins, including their structures and functions, is called *Proteomics*. In advance biology, it is refer to as large scale experimental analysis of proteins. Proteins are the main component of the physiological metabolic pathways of cell. The vast array of functions of living organisms including catalyzing metabolic reactions, replicating DNA, responding to stimuli and transport of molecules from one location to another, highly depends upon the functional potentiality of Proteins.

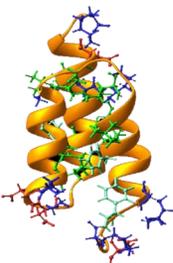


Fig.8 Protein fold helix

Free-radical-scavenging activity in the inflorescence of European Nettle Sisnu (*Urtica dioica* L.) Mandal P, Misra TK, Singh ID, Das JK, Bhunia M - J Young Pharmacists.

Hypoglycemic activity of *Urtica pilulifera* in streptozotocin-diabetic rats G. Kavalali a,* , H. Tuncel b, S. Go^o ksel c, H.H. Hatemi.

Production and processing of organically grown nettle (*Urtica dioica* L.) and its potential use in the natural textile industry: A review; C.R. Vogl and A. Hartl.

Patenting of Biotechnology in India

Rajdeep Gurung, Patent Information Centre
SSCS&T

Intellectual Property Rights (IPR) provide exclusive rights to a person or company for a limited period of time to use their innovative ideas, plans, or other intangible assets. The main objective of IPR is to encourage innovation and secure one's invention from stealing or taking credit without his/her permission.

Modern biotechnology usually deals with the Recombinant DNA Technology (RDT), Gene splicing, etc. which developed in the late seventies. By using genetic engineering, many useful hormone like insulin, antibodies (monoclonal antibodies) and human growth factors, etc. were developed. Therefore, Biotechnological invention include products and / or process of genetic engineering technologies, isolation of micro-organism from culture medium, method of mutation, plasmids, processes for making monoclonal antibodies, cell lines for making monoclonal antibodies, etc. Biotechnological invention involves resolving of many problems in many field but transgenic plant, animals and genetically modified organism (GMO) involves debatable issue. Patenting of Biotechnological invention faces lots of challenges in the Indian Patent system.

Till 2002, patent office did not allow patenting of invention relating to (a) living entities of natural or artificial origin, (b) biological materials or other materials having replicating properties, (c) substances derived from such materials and (d) any processes for the production of living substances/entities including nucleic acids. In 2002, the Hon'ble Calcutta High Court, in its decision in 'Dimminaco AG v. Controller of Patents and Designs', patents to inventions where the final product of the claimed process contained living microorganisms was granted. In the same year Indian Patent Act, 1970 was amended by the Patent (Amendment) Act, 2002 where biochemical, biotechnological and microbiological processes were included for the grant of patent.

In 2005 the Indian Patent Act 1970 was also amended by Patent (Amendment) Act, 2005 which, allowed the grant of product patent including Biotechnology with keeping in mind the technological outputs respecting the national policy to protect the public interest. (Source: <http://www.ipindia.nic.in>)

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Ginger, *Zingiber officinale* (Variety, *Sanuaduwa*) Sushen Pradhan, State Biotech Hub SSCS&T

Ginger has numerous medicinal properties and it is known from ancient times. Cultivation of ginger has unrecorded history. In ancient times, ginger was more valued for its medicinal properties than spices, and played an important role in primary health care in ancient India and China. It was named as "MAHAUSODHA" in ancient times. In Sikkim there are 14 hill tribes. Each and every tribe has its own importance of ginger to their religious purpose. During the ancient time Ginger was cultivated for religious practices and medicinal purposes. Six cultivars varieties of *Zingiber officinale* Rosc are *Bhaisay*, *Gorubhangey*, *Jorehangey*, *Nangrey*, *Majhauley* and *Sanuaduwa* reported from Sikkim and Darjeeling hills (JR Subba, 2012). Generally, cultivar varieties of ginger are named after the region or area where they grow (Govindaranjan 1982), whereas, in Sikkim cultivars varieties of ginger are named according to size of ginger rhizome, viz., *Sanuaduwa* (small in size), *Bhaisay* (big in size), *Chari Nangrey* (nail of bird) and *Majhauley* (medium in size) except *Jorehangey* and *Gorubhangey* representing the name of places (Pradhan et al 2012). From this six variety *Sanuaduwa* was preserved by Lepcha tribe which showed high antioxidant and antimicrobial activity than other variety of ginger found in Sikkim Himalaya.



Fig. 10 Ginger (Variety, *Sanuaduwa*)



Fig. 11 Plate showing antimicrobial activity of ginger extract in human pathogenic organism.

This variety is totally ignored by the Sikkimese farmer due to its non commercial viability, but chemically this variety showed higher biochemical activity, so detail research is required to get to know about the ginger variety, which was preserved by ancient Lepcha people of Sikkim.

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