

a major support for all the scientific researchers, students, in and across the country. Being one of the prominent member of DeLCON Consortium, Bioinformatics SubDISC, Sikkim State Council of Science & Technology, Department of Science & Technology and Climate Change, Government of Sikkim, is successfully disseminating this valuable facility among all the concern scientists, researchers and students of various research institutes, universities and colleges of Sikkim.

### Principles of Polymerase Chain Reaction (PCR)

In Molecular Science the process of amplification of huge numbers of genes are done with the an application of *Polymerase Chain Reaction* (PCR). There are three major steps in PCR, which are repeated 30 or 40 cycles in an automated cycler, that can heat and cool the tubes with the reaction mixture in a very short time.

#### I. Denaturation

The double DNA strands melts and open to a single stranded DNA by denaturing at 94°C. The enzymatic reaction stops in this process.

#### II. Annealing

Annealing at 54°C, leads to a creation of Brownian motion during this cycle, the primers are found to be jiggling to and fro. In this cycle an ionic bonds are formed constantly and broken between the single stranded primer and single stranded template. As soon as bases starts building, an ionic bond between the template and the primer become very strong and unbreakable.

#### III. Extension

By extension at 72°C, the primers which are built up with bases, have strong ionic bonds attraction to the template than the forces breaking these attractions. The unmatched or inattentive primers are loose out again because of the high temperature and would not show any extension to the fragment. The complimentary bases to the template are coupled to the primers on the 3' side. The polymerase add dNTP's from the 5' to 3' side, by reading the template from 3' to 5' side, complementary bases are added to the template.

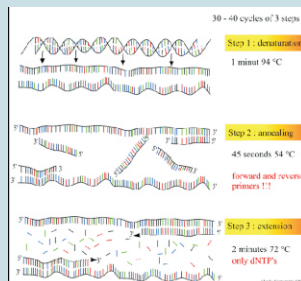


Fig.8 Polymerase Chain Reaction

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# BIOGYAN

Quarterly News Letter, Volume VII, December, 2013

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#### Coming up event:

25<sup>th</sup> All India National BTISnet Coordinators' Meet, Goa, from 27<sup>th</sup> to 28<sup>th</sup> February, 2014.

#### Sikkim *Rhododendron* species documented On Video

A Documentary film on *Rhododendrons* of Sikkim Produced by Sikkim state council of science and Technology, Department of Science and Technology and Climate Change was shown in the hall of Tathagata Tsal, Rabongla on the occasion of launching of 8<sup>th</sup> phase State Green Mission by the Hon'ble Chief Minister Shri. Pawan Chamling.



Fig. 1 *Rhododendron aeruginosum* Hook.

This documentary film is a scientific documentation of the *Rhododendrons* of Sikkim to showcase the 36 species, with an objective to protect it from biopiracy and informatics on the state's natural resource. Scientific consultations for the same were evaluated by Shri Lalit Kumar Rai, Scientist of GB Plant institute, Sikkim and Dr. B.C Basistha, Additional Director and other scientific personal of Sikkim State Council of Science and Technology.

#### Microbe: Vesicular Mycorrhizal mechanism is much profound remnant for the growth of *Bischofia Javanica* Blume

*Bischofia javanica* Blume locally known as Sumon Kung (Lepcha), Kaijal (Nepali), is existed more in

ecology having higher density of *Vesicular Mycorrhizas* and its Microbial mechanisms rather than *Arbuscular Microbial* activities. In a recent published journal research paper on Medicinal value and Microbial *VAM* incidence analysis of *Bischofia javanica* Blume in Sikkim Himalaya, India, in the Journal of Ethno-biology and Traditional Medicine, researcher Laydong Lepcha, Information Officer and his colleagues from Bioinformatics SubDISC, Sikkim State Council of Science & Technology, analyzed that *Vesicular Mycorrhizas* are prevailing more in rhizospheric atmosphere of this tree plant. The study conducted in various key pot areas of *Bischofia species* in Sikkim also informed upon the medicinal importance and its conservation aspects for the sustainable growth and use of this species in Sikkim Himalaya.



Fig. 2 *Bischofia javanica* and Vesicular mycorrhiza

#### VI<sup>th</sup> North East Bioinformatics Networks (NEBInet) Meet

VI<sup>th</sup> North East Bioinformatics Network (NEBInet) Coordinators' meet was held in Bioinformatics Centre, Silchar, Assam University, from 12<sup>th</sup> to 13<sup>th</sup> November, 2013.

The programme was attended by various eminent scientists from across the North East India. Dr. T. Madhan Mohan, Adviser,



Fig.3 VI<sup>th</sup> NEBInet Silchar, Assam

Department of Biotechnology, Government of India, was the chief patron of this meet. During the programme all the North East Bioinformatics Centre's Coordinators and officials presented their research works and progress respectively. Shri. Laydong Lepcha, Information Officer, Bioinformatics Sub DISC, represented the Sikkim Bioinformatics Centre, Sikkim State Council of Science & Technology, in these two days long NEBInet meeting. The meeting also discussed upon the various important Bioinformatics activities in future in North East India. The next VII<sup>th</sup> NEBInet was decided to be organized in Bioinformatics Centre, Lumami, Nagaland University, in November, 2014. The NEBInet Meet was initiated from Bioinformatics SubDISC, Sikkim State Council of Science & Technology, Department of Science & Technology and Climate Change, in the year 2008.

## Latest Biological Developments

### Beetles that live with ants

According to the Scientists from the Smithsonian Institution the Spectacular Guyane False-form beetle or *Guyanemorpha* from Guyane (French Guiana), exhibits a natural behavioral to live with an Ants. The scientists explained that the newly discovered species stands out among its dull relatives in the Western Hemisphere, with its great



Fig 4. *G. spectabilis* Erwin.

size and beautiful coloration. The study was published in the open access journal *Zoo Keys*. This surprising large and colorful pseudomorphine came as a shock, as all other species of the Tribe in the Western Hemisphere are quite dull brown, dark reddish, or blackish with no or little, color contrast on the upper surface. In the world of entomology this new species can be only compared in its rare characteristics the Olinguito, a new carnivore species which charmed the world and just recently described by Kris Helgen in *ZooKeys*. The new species belongs to the Pseudomorhini Tribe, famous for the co-existence of its representatives with various ant species. Members of *G. spectabilis* occur at lowland rainforest sites in French Guiana

and are accordingly most likely to live with ants, although at present nothing is known about their way of life.

Source: [http://www.biologynews.net/archives/2013/12/03/beetlethat\\_live\\_with\\_ants\\_a\\_remarkably\\_large\\_and\\_colorful\\_new\\_species\\_from\\_guyane.html](http://www.biologynews.net/archives/2013/12/03/beetlethat_live_with_ants_a_remarkably_large_and_colorful_new_species_from_guyane.html).

### Scientist discover chemical modification in human malaria parasite DNA

Most of the people think "malaria" is caused by biting insect is merely the messenger, delivering the *Plasmodium* parasites that sickened more than 200 million people globally in 2010 and killed about 660,000 worldwide.



Fig 5. The human malaria parasite.

Recently, the researchers from University of California, Riverside, who are studying to understand the biology of the parasite have discovered a potential weakness—low levels of DNA methylation in *Plasmodium's* genome. DNA methylation is a biochemical process involving the modification of DNA that plays an important role in development and disease. The DNA methylation enzyme found in *Plasmodium* is quite different from the one found in humans. If a drug can be developed that specifically inhibits the methylation enzyme, it could kill the parasite in infected humans. Further the researchers acclaimed upon the real need of research to understand the entire biology of the parasite and how it replicates. *Plasmodium's* life cycle is very complex as it lives in both humans and mosquitoes. The parasite moves to the salivary glands of an infected mosquito. Once the mosquito bites a human, the parasite is injected into the blood stream and quickly reaches the liver cells, where it rapidly reproduces asexually, creating thousands of new parasites that move into red blood cells, their favorite food source. The parasite is transmitted from humans to mosquitoes when a mosquito draws blood from an infected human.

Source: [http://www.biologynews.net/archives/2013/12/11/scientists\\_discover\\_chemical\\_modification\\_in\\_human\\_malaria\\_parasite\\_dna.html](http://www.biologynews.net/archives/2013/12/11/scientists_discover_chemical_modification_in_human_malaria_parasite_dna.html).

### Existence of Rarest orchid on the lost world volcano in the Azores of Europe

Researchers studying speciation of butterfly orchids on the the Azores have been startled to discover that the answer to a long-debated

question "Do the islands support one species or two species?" is actually "three species". Hochstetter's Butterfly-orchid, newly recognized following application of a battery of scientific-techniques and reveling in a complex taxonomic history worthy of Sherlock Holmes, is arguably Europe's rarest orchid species. Under threat in its mountain-top retreat, the orchid urgently requires conservation recognition.

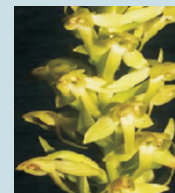


Fig 6. Butterfly-orchid.

The research team, led by independent botanist Prof. Richard Bateman in collaboration with local Botanist Dr Monica Moura (university of Azores ) and a Plant Morphologist Dr. Paula Rudall (of the Royal Botanic Gardens Kew), originally viewed these butterfly-orchids as a simple, tractable system ideal for studying the origin of species and so they initiated a focused exploration of all nine Azorean island.

Source: [http://www.biologynews.net/archives/2013/12/10/europes\\_rerest\\_orchid\\_rediscovered\\_on\\_lost\\_world\\_volcano\\_in\\_the\\_azores.html](http://www.biologynews.net/archives/2013/12/10/europes_rerest_orchid_rediscovered_on_lost_world_volcano_in_the_azores.html).

## ARTICLES

### In-silico Bioinformatics: Drug Designing.

Laydong Lepcha, B. C. Basistha,  
K.B. Subba & Rajdeep Gurung

The study of biological researches by involving mathematics, statistics and computation tools is known as In-silico Bioinformatics. It has become a fundamental and rational part of any biological researches. The development of Drugs is one of the legitimate fields of In-silico Bioinformatics, which is showing good attraction to any diseases based researchers. To design a novel drug has become a major challenge for any drug designers including Pharmaceutical industries from across the world. In Bioinformatics, the Drug designing is categorized under sector of Computer Aided Drug Design (CADD). The whole of the Drug Designing procedure comprises of various important steps. The identification of target disease would be its initial work, then study of related compounds, finding of molecular bases, rational drug design techniques, refinement of compounds, Quantitative Structure Activity Relationship (QSAR), solubility of molecule and testing of new drug.

### Role of Proteins in Drug Design

Proteins are the major source of Drug. The development of potential drug depends upon the binding affinity of Protein-Ligand. More the binding capacity higher the drug potential.

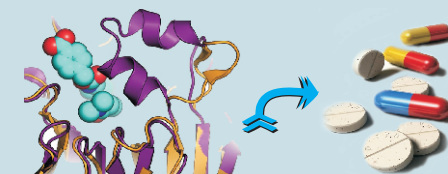


Fig.7 Protein-Ligand interaction to form a potential drug.

The protein affinity is predicted by applying a method known as Docking, which helps to predicts preferred orientation of molecules to their protein targets or predicting energetically favorable complexes between a protein and a putative drug molecule, also called ligand. There are number of software available such as, Autodock, DockVision, Hex etc which will help to study and understand the Protein-Ligand binding capacity. The molecules with higher binding capacity is the preferred molecules to design and develop targeted drugs.

### DeLCON Consortium : Free online access of journal's research papers (Nodal Officer's Column)

BIOINFORMATICS SUBDISC  
Sikkim State Council of Science & Technology  
Department of Science & Technology and Climate Change  
Government of Sikkim

DeLCON Consortium is one of the scientific literature sectors of Department of Biotechnology,



Government of India. It deals with the renowned research journals publishers from across the globe and provides journal access facilities to the respective research institutes of the country. Since its operation in January, 2009, the Consortium has established 34 members throughout the country, upon which 18 members are from North East India only, including Sikkim State Council of Science & Technology. In the year 2011, Bioinformatics SubDISC, Sikkim State Council of Science & Technology, Department of Science & Technology and Climate Change, Government of Sikkim, has become one of the prominent member of this Consortium.

There are 926 renowned journals under DeLCON Consortium, which have been made free online journals to the members of DeLCON Consortium, Department of Biotechnology, Government of India. The facility has become