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SYNAPSE

STOMATA

… an exchange of ideas

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
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विद्या तत्व ज्योतिसमः

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I am truly thrilled to see rejuvenation in enthusiasm, zeal and passion among our students, staff and faculty so as to give a fillip to our Departmental club, which was launched few years back with a name "Synapse" - a convergence of innovative thoughts. The club was founded to provide an intellectual platform for bringing out ideas and thoughts of individuals or groups with a goal of adding value to the disciplines of Biotechnology and Bioinformatics. We all know that both of these disciplines are new compared to other branches of science, technology and engineering, therefore, require extra care and effort in creating awareness among society at large. I am confident that you all are moving in right direction for which my support and encouragement will always be there with you in accelerating the pace of growth of BT and BI towards your career building.

I wish good luck to the new team of Synapse!

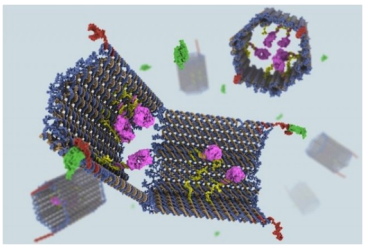
From the editor's desk

Stomata 1.1—and its happening!

An orifice, enabling an exchange—of ideas, thoughts, information and experiences. Here we acquaint you with the extended family of Synapse and its sublime affairs, also laying out a suitable platform for the voices to share, to involve, and to indulge. A stimulating passage, resounding the idea that every thought matters—that inane in you is what the world needs! Your crazy matters. So speak up, pen it down or voice it out, come to us. The club is accurately a bunch of neurons spreading their sparks—the kind of association you'd wish to seize forever!

Welcome to Synapse, where learning-by-doing finds its true realization. Wishing the enthusiasts a semester full of curiosities, exploration and newness!

Pallavi Raj Sharma



Cell-targeting DNA nano-robots bearing antibody-fragment payloads (Douglas et al 2012)

Nano– the new in science

A *fantastic voyage* in *Innerspace*, hovering alongside blood cells and platelets, a bundle of medicines being cell-delivered exclusively for you.. Science fiction? Not anymore!

Welcome nanobots, the latest recruit in the realm of target interventions. Among other applications, the most awed is the potential of these nano-machines to sense, target, seek and repair on the molecular level, ensuring maximum effectiveness and minimizing side-effects.

Nanotechnology deals with creation of machines and robotic components at the nanometer scale. Referred to as a 'bottom-to-up' process, the bots are assembled taking one atom at a time. They are designed for precision interaction with nanoscale objects. But one must wonder what are they made out of? Currently, use of biological components and biomolecules such as DNA is being made, though the ultimate aim is to design a nanobot completely out of electrochemical components consisting of sensors, a power source, a data acquisition, storage and transmission system along with a control and navigation system.

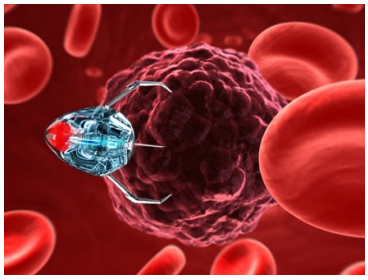
The father of DNA Nanotechnology, Prof. Ned Seeman, first conceived the idea of folding DNA strands and utilizing them for targeted drug delivery. These could also be used for early disease diagnosis, wherein the nanobots are designed to sense proteins or biomarkers and emit an electrical impulse when detected. Thus, this technology has wondrous applications in the medical field. Blood tests could be obtained in a few minutes, sugar level can be known, aneurysms and clots can be detected and dissolved, fat deposits clogging the blood vessels can be chipped off preventing the chances of a stroke, cancer chemotherapy can be carried out without affecting the adjacent healthy cells. Fast, efficient and apparently painless, such a breakthrough was long awaited!

"Nanotechnology is manufacturing with atoms"

William Powell

Dr. Ido Bachelet,revels in the art of DNA origami and has devised a DNA nanobot – comprising of cylindrical clamshells made of twin DNA double helices along with flexible DNA hinges, which are capable of holding a molecular payload inside them. They are engineered to open up to only specific proteins present on the surface of cancerous cells, thus releasing the payload, which is the drug of action.

Besides the medical field, nanotechnology finds its application in energy generation and optimization, telecommunications, sports and swimming. As we've seen, this is not one man's job. This discipline is meant to be performed in collaboration, as it involves amalgamation of various scientific fields such as proteomics, nanobioelectronics and electromagnetics.



The ideal nanobot is not yet realized, but being pursued. The process of creation of nano-integrated circuit systems usually begins with equipment prototyping.

Inspiration can be drawn from anywhere, and an array of hybrid materials can be used for manufacturing. Transduction into the human system involves a pre-requisite study of all interactions on microlevel, changes in chemical gradient and a sensing system. The nanobot activation is usually based on proteomic overexpression, and the nanobiosensor emits radio frequency signals which can be detected and recorded.A dream in progress, once materialized, maybe we can celebrate a medical revolution.

Good things come in small packages, right?

Brewing Brains

Treading further on the aisle of experiences, an industrial visit to the Mohan Meakin Brewery, Solan was organized by Synapse for the 2nd and 3rd year students of the department on 11th February, 2015.

The visit turned out to be both, a source of expedition and erudition. The students were guided by Mr. Behl, who elucidated each stage of the beer brewing process, along with a tour inside the establishment, which stands proud since the 1850s. The infrastructure still harbors its ancient essence, the very same copper tanks which were first installed are still in excellent working conditions. The plant still preserves its roots, such is its charm!

The students were startled when they observed the entire array of processes that take place before the 'Old Monk' is tight sealed. From the grand fermenters with a holding capacity of 16,700 liters to the special yeast that comes all the way from Denmark, and the systematic labeling of fluorescent bottles, the visit surely provided a powerful insight into the functioning of one of the most successful biotechnology based industries. The students look forward to more such visits, so that they can more purposefully explore the fathomless potential and endless applications of their knowledge and warm up their thinking pots!

Reaching out, reaching in

On Saturday, February 22nd, the Outreach team of Synapse headed by Dr. Sudhir Syal, visited the Dumehar Secondary school, eager to meet and spend time with the school children. The team was warmly welcomed with curious eyes, eager minds and enthusiastic minds. Every member was allotted a class. Interaction was initiated with introductions, and then proceeded to the subject the students wished to study, be it mathematics, science or english. The kids were interactive and displayed their interest in the subject and the studying, willing to grasp and hold on to every bit of knowledge being imparted. Time appeared to come to a standstill as the students indulged in questions and musings. Both the teachers and students left with a promise to come again, which was materialised on 4th March, when the team revisited the school. This time cheerful greeting welcomed them. The talks of "Didi-bhaiya aaye hain!" could be heard from each classroom. The focus was to cover the topics of the syllabus that students were finding difficult to understand. These visits were an enriching experience for everyone involved, as it ensures communication and understanding at all levels. Ms. Tulika Sharma, a member of the team very rightly said, "No doubt we visit the school with the idea of teaching something to the children, but have returned every time with the feeling of getting taught by the children!" Kudos to the team!

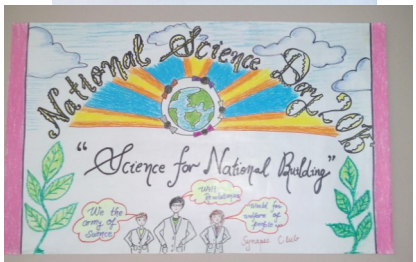
Visit to Minchy's Food Products

The trip to Minchy's Food Products, a food processing unit in Solan, was a much anticipated event. Organised by Synapse on April 9th 2015, and accompanied by Dr. Hemant Sood, the first year students set off to visit and explore one of the most successful bio-based industry in the state. Minchy's has a wide array of products ranging from quality fruit juices to pickles, jams, and wines among others. The unit also comprises of a testing lab, which is concerned with quality control ensuring that the products are of the utmost quality and taste. For this purpose they have microbiologists working in the labs and have recently recruited a biotechnology student from our department. The students were introduced to the entire process, from the picking of the fruits to the washing and subsequent shearing and extraction of the juice to the packing – every step carried out with utmost cleanliness and composure. The visit was surely an enriching experience for the students, and they returned with an insight into the working of a bio-firm, and a bottle of fresh juice in every hand!

National Science Day—2015

On the eve of National Science Day, 28th February 2015, Synapse celebrated the moment by hosting a guest lecture on Muscular Dystrophy under the supervision of Dr. Sudhir Syal and Dr. Hemant Sood. Mr Vipul Goyal, General Secretary, Indian Association of Muscular Dystrophy (IAMD) was invited as Chief Guest for the day. Mr. Goyal indulged the audience by talking about the disease and shared his experiences and anecdotes, and how he found solace in physiotherapy, hydrotherapy and motivation. He made people aware about the fact that around 4,000 people every year are born with this abnormality and around 4-5 lakh people today in India are affected by it. In one of his clever lines he mentioned that "*sometimes the bichara kind of factor makes you the actual bichara*". He inspired us and taught us that even the hardest battles can be conquered with enough positive attitude, physical and mental balance and proper education.

The faculty of JUIT assured to motivate the students to work and carry out research in this field and contribute towards the cause. Mr Vipul along with his team ended up with a theme song "*sath hai tere uparvala, vahi hai tera rakhwala"*. Everyone acknowledged the grit, determination and fascinating mental make up of Mr. Goyal. The success of the event could be easily seen with a smile on each face in the audien, a will to do something in the eyes of the students and a sign of satisfaction on Mr Vipul's face.



Outside the box!

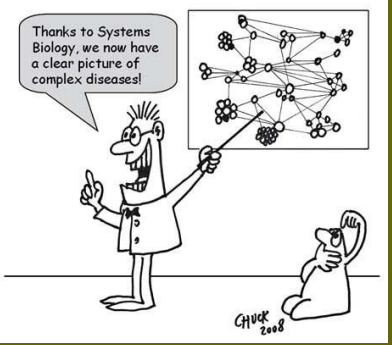
A lecture series for the IIIrd year students was organized by Dr. Rahul Shrivastava, incharge of the Training and Placement of Synapse during the months of April and May,

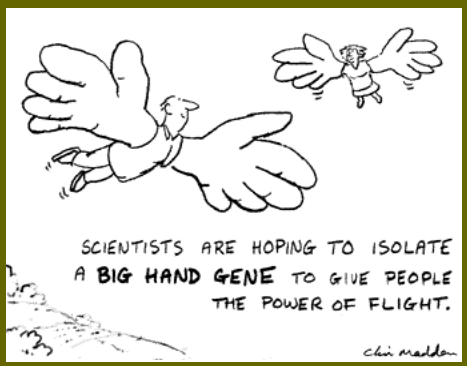
Dr. Hemant Sood imparted essential insights in the realm of IPR, Dr. Jata Shankar elucidated upon pursuing a career in research in India and abroad, while Dr. Tirath Raj Singh unfolded the applications and opportunities associated with Bioinformatics. The students found the lectures highly beneficial as they received a glimpse of the possibilities and pursuits awaiting them on the other side!

Visit to Panjab University

A group of IIIrd year Bioinformatics students accompanied by Dr. Tiratha Raj Singh attended a national symposium on "SYS-BIOMICS 2015" organized by the Centre for Systems Biology and Bioinformatics, Panjab University on 4th April.

The program consisted of inspiring lectures presided over by eminent scientists in the field - Prof. G.P.S. Raghava (IMTECH) and Prof. P.V. Bharatam (NIPER) among others. It was an enlightening experience for the students, being surrounded by the sublime scientific sounds and uplifting presence.





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