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Creativity Corner

Bioinformatics / Computational Biology

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With the increase in our ability to manipulate biomolecular sequences and the recent advances in sequencing technology, a huge amount of data has been and is being generated. The need to process the information to generate knowledge from this rapidly growing collection of data, so that it can be of use to further scientific advancement, has created a new interdisciplinary area named Bioinformatics or Computational Biology. Bioinformatics has evolved from its initial function of storage and maintenance of data repositories to present day application of computational techniques for biological sequence analysis, structural bioinformatics, simulations of molecular interactions like gene networks and metabolic pathways and also for rational drug design. The ultimate goal of bioinformatics is to enable the discovery of new biological insights as well as to create a global perspective from which unifying principles in biology can be discerned. The fundamental issue for bioinformatics is how do we describe, analyze, simulate and predict the dynamics of various biological processes. The central challenge is the rationalization of the mass of biological sequence information, with a view not only to derive more efficient means of data storage but also to design more incisive analysis tools. The imperative that derives this analytical process is the need to convert sequence information into biochemical and biophysical knowledge, to decipher structural, functional and evolutionary clues latent in the language of biological sequences. With its rapid multidimensional growth in last two decades, it is anticipated that field will continue its swiftness for the betterment and overall augmentation of the living world.

Enzyme Technology

An Introduction and importance in biotechnology

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Biotechnology is an interface of basic and applied sciences where gradual and subtle changes in sciences get transformed into technology to evolve the new products or services for improving the life of humankind. Biotechnology is the use of scientific and engineering principles to the processing of materials by biological agents to provide goods and services. Biotechnology comprises a number of technologies based upon increasing understanding of biology at the cellular and molecular level.

Biotechnology can be divided into various sub-fields as given below:

1. Red biotechnology: It deals with the medical processes. Examples are monoclonal antibody production using hybridoma technology, gene therapy, enzyme therapy.
2. White biotechnology: It deals with the industrial processes. It is also known as Grey biotechnology. Examples are preparation of recombinant strains to produce the enzymes and many other industrially important products, use of improved or/and recombinant enzymes in industrial processes.
3. Green biotechnology: it deals with the agricultural processes. Examples are biofertilizers, genetically modified crops (BT cotton).
4. Blue biotechnology: It has been used to describe the marine and aquatic applications of biotechnology.

The above described sub-fields make the biotechnology colourful. The enzyme technology – a sub field of biotechnology- is useful in any of these colours of biotechnology. Therefore, the enzyme technology becomes an area of considerable current interest and development. The enzyme technology includes the use of enzymes as biocatalysts in the development of new processes to manufacture both bulk and high added-value products. The technology gives the opportunity of meeting the today's needs in various fields such as food (bread, cheese, wine, vinegar), supplements (amino acids, vitamins), pharmaceuticals (antibiotics, antibodies). Enzymes are also used to provide services such as in washing, environmental processes, diagnostics and analytical purposes.

Enzymes are usually proteins in nature and act as biocatalysts. They are usually working effectively under mild conditions of pH and temperature. They have been used since ancient times in the production of food products such as cheese, beer, wine, and vinegar. Recently the microbial enzymes have increasingly replaced plants and animal enzymes. For example, amylases from *Bacillus* and *Aspergillus* have substituted those of malted wheat and barley in brewing, baking and biscuit-making and also in the textile industry, etc. Today, enzyme technologies have found various applications in different fields: in food and feed industry, detergent, textile, cosmetics, therapy, and for diagnostic purposes.

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In the food industry, the enzyme can be used for the production of foodstuffs from non-traditional raw materials: for instance, the development of the sweetener, high fructose corn syrup (HFCS), also called isoglucose. Recently, phytase is also used in the animal feed preparations.

The use of enzymes such as amylases, lipases, proteases, in detergent preparations improve the washing quality of detergent and reduces the use of water. In other industry like textile industry, the enzymes like pectinases, catalases, amylases are used to reduce the use of various polluting chemicals like bleaching agents perchlorates and also reduce the energy and water consumptions.

The other applications of enzymes are in cosmetics industry for preparations of hair-dye, in therapy and for diagnostic purposes like use of asparaginases in the treatment of leukemia, glucose oxidase in the diabetes diagnosis.

As listed above, enzymes are currently used in various industries and in processes to develop new products and services and new area of applications are constantly being added. The introduction of enzymes in various processes not only saves the various resources such as energy, water so environment but also improve the product quality and processes. The advances in modern biotechnology help in finding of new enzymes and their innovative applications in the areas where no one would have expected an enzyme to be applicable just a decade ago. In the last, the enzyme technology come up as a tool which offers a great potential for many industries to help meet the challenges they will face in years to come.



FOOD BIOTECHNOLOGY

Options in research as well as in Food Processing

India is one of the world's largest producers as well as consumer of food products, with the sector playing an important role in contributing to the development of the economy. The India's food and beverage industry currently stands at US\$ 40.3 billion and is expected to touch US\$ 66.3 billion by 2018, registering a growth of 18 per cent. In India, consumption of processed foods is noticeable across almost all sections of the population. As a result, the market for processed food is growing very fast. There is a plethora of opportunities mainly in food processing industry including quality control, food packaging industry, food processing machinery designing and fabricating industry; as well as in different research & educational institutions. The Ministry of Food Processing Industries (MoFPI) is encouraging investments in the food

sector through various schemes to provide financial assistance to food processing R & D projects. The ministry is providing incentives for cold chain development and also grant-in-aid for setting up laboratories that are equipped for testing food products and is planning to establish 500 food parks in the Tenth Five Year Plan across every parliamentary constituency. The ministry has also set up a new public institution “National Institute of Food Technology Entrepreneurship and Management (NIFTEM)” for research, education and to cater to the needs of various stakeholders such as entrepreneurs, industry, exporters, policy makers, government and existing institutions such as NIN, NDRI, CFTRI, IIFP, NABI, IICPT, DFRL, NMPPB and others. The Govt of India has also launched many schemes under DSIR, NABARD, MSME to encourage entrepreneurship programs which in turn leads to setting up own business generate fresh entrepreneurs in the area of Food Biotechnology and Processing. These agencies give subsidy and provide loans through nationalized banks. This will give a further boost to the growth and development of food processing industries and make India as a leader in the global food processing industry. Therefore, the scope of Food Biotechnology shall always be on the rise, in any part of the world, in order to meet the requirement of nutritious, healthy, delicious and safe food.

Student's Section



Comp

CRADLE TO CRADLE

Love And Relationship

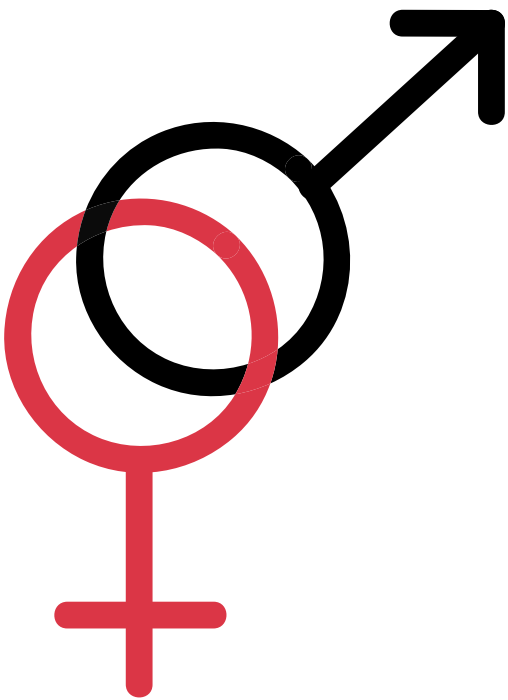
*Infatuation, Crush,
Liking and finally
happens LOVE!!*

This four step protocol has happened with most of the love-birds. But what is missing above is the element of – Friendship. Only few will say that it was love at first sight for both of them.

What people forget during their relationship is to keep the friendship element intact. Friendship is the base on which relationship makes its house. The day this base has a crack, relationship will fall apart like a pack of cards. There'll be no more fun left. As friends fight and cry and then in no time are again laughing and dancing together, similarly every relationship goes under this grilling and if not, it should. It's fun too.

It tells you how much understanding is between you guys. Another aspect to have a smooth relationship is to be a patient listener as listening solves most of the problems. Just remember without fighting there is no fun and if you are always fighting than you are not meant to be together.

Also to keep alive the fun element keeps surprising each other. It's not about giving expensive gifts; it's about giving something, anything which will bring a smile on his/her face. It can be her favorite chocolate or his favorite sportsman picture. If you want to know that if your partner is the one, just see how supportive he/she is, whether they scold you on your wrong doings or not, and most importantly they should not become a reason for you not giving time to your friends. It's always the quality and not the quantity that matters. It's good to have a happy one year together and cherish it forever rather be in a bitter ten(10) years long relationship and then break-up.



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HOSHALON KA MUSAFIR

Ek nayi udaan si hai soch ki,
Dil main umang si hai armaan ki,
Har pal naye se lagte in raston pe ,
Kisi ankahi ansuni dasstan ki,

Aage badh raha hai yeh safar traste naye rasste,
Naye ya purane ,par kya hai ye mere waaste?!
Yeh sawal to har zarra puchta hai ,
Mujhe har morr par rokne ki bejor koshis karta hai.

Par who kambhakt sawal kahan samjhta hai,
Main to udaan ke romanch main jine aaya hoon,
Hawa ke jhoko se haste haste jhujta aaya hoon,
Main yahan raftaar ke ufaan ko jine aaya hoon.

Har pal gujarte is safar me main kuch naya sa
dekhne aaya hoon,
Kheto ko bhalkati in hawaon ko sansoon main
bharne aaya hoon,
Main kuhase ki gehriyon ka paiman lagane aaya
hoon,
Main to iss raste ki barikyon ka pata lagane aaya
hoon.

Main to ek panchi hoon jo is mausam ka luft
uthane aaya hoon,
Ek maskara hoon jo tujhe hasane aaya ho,

Par mujhe kabhi halke se na lena ,
Main who gulal hoon,
jo apne andaj main tujhe rangne aaya hoon.
Bas mera safar yuhin aage badhta chale jata hai,

par doobara mujhse woh sawal mat puchna,
kyunki main to hoon musafir jo badhta chala
jaunga,
in raahon ke faaslo ko pura karta chala jaunga,
tu stabdh wahin khada reh jayega!
Main sirf hooslon se in raston ko apna karta chala
jaunga!

ME AND MY GRANDPA

The days I spent with you,
The time in which you were there,
The moment when you smiled,
The moment when you lost the ability to
speak,
The moment when you lost the ability to
balance,
The moment when you showed your
anger,
The moment when I was not there,
And you left me all alone here.
It is facts that even though how many
times we fight and even if we are not the
best child she could ever have, she
always makes us feel that we are the
best gift she ever received from god.

But still today,
It seems you are there,
Somewhere near me,
Talking to me,
Saying as if you want something,
As if you need something,
I wanted to stay with you for a bit more
time,
But I remembered you suffered a lot of
pain,
Your last few months were very painful,
But I'm happy,
As you had very peaceful death,
And got rid from all your problems,
And after few months,
You'll begin a new life,
You'll come in a new family,
And I hope,
This time you'll not suffer any pain,
You'll get all those things,
Which you never got with us,
I hope that one day,
We'll meet again,
And you'll remember,
That I was your grand-daughter,
In your previous birth.



ancer Immunotherapy

BREAKTHROUGH OF THE YEAR 2013

Medical sciences has proven time and again that when given the resources and opportunity, great progress in treatment, prevention and cure of disease can occur. America's leading science journal, Science magazine, has declared Cancer Immunotherapy to be the Breakthrough of the Year 2013 having said that the year 2013 may turn out to be the turning point in cancer research as various clinical trials have shown great success in this regard. The person to be credited behind this breakthrough James Allison, director of CRI's Scientific Advisory Council came up with the technology of developing the checkpoint blockade approach to cancer.

With the advances in studies regarding immune system, the branch of cancer immunotherapy has evolved simultaneously undergoing several refinements and the year 2013 has come up with the latest and most effective of all treatments that target the immune checkpoints. Immune cells are cells in our body that are programmed to defend the body against infections and diseases. The checkpoint blockade approach is based on empowering these immune cells with specific antibodies such that they can better counteract the tumour cells. The first antibody of this kind formulated is Ipilimumab. Ipilimumab is a monoclonal antibody that targets CTLA-4 (Cytotoxic T lymphocyte-associated molecule-4; a cell surface molecule that is expressed nearly exclusively on CD4+ and CD8+ T cells). CTLA-4 is a protein that maintains T cell homeostasis. By blocking the action of CTLA-4, ipilimumab boosts the immune response against melanoma cells in the body. Today, after the approval of FDA, ipilimumab is used as first-line treatment for patients with metastatic melanoma. To add to this kind of immune response various other monoclonal antibodies like anti-PD-1 and anti-PD-L1 have been successfully tested that can be used in combination with ipilimumab. Tumors that express PD-L1, which binds to PD-1, disable the activated T cells that could kill tumors. Antibodies directed against PD-1 and PD-L1, thus can generate impressive responses in patients undergoing cancer immunotherapy.

This breakthrough can be considered as the new beginning of new era where complex interplay among the host immune response, tumor cells and tumor microenvironment will be harnessed to augment the anti-tumor immune response. Next generation technologies of molecular and cytokine profiling will further help in selecting the appropriate immunotherapeutic agents that will elicit the most effective antitumor response. Immunotherapy can thus be concluded as the next great hope of cancer treatment.



Mother

- Apoorva Bangroo

Mother a word which means a universe in one's life, an emotion that have no boundary and a feel that could never change and a part which no one wish to loose in their life. "Maa" the first word spoken by us when we take birth not even before opening our eyes. A woman has to play many roles in her life and amongst those the most important is the role of mother. Maa is only word in which whole world is concentrated and those who have it are very lucky but those who don't have their lives almost gets spoiled

A mother is actually an ordinary person and a very kind-hearted person. Mother is a kind of who brought up a child with her whole kindly heart, the kind of persistent woman with strong willpower who had to face the toughest challenges in life, and the kind of person who always demonstrated great zeal for every unlucky lives without requiring anything in return and great willingness to help everyone's misery though she did not have much, a mother teaches us more than anyone else, not only inspires us the strength to overcome hardships in my life, but also

left us with invaluable life lessons. A mother is a diligent and determined woman who has left us with the right direction of our road, more importantly; she has helps us appreciate this life as precious gifts of ordinary and true happiness by her kindly heart.

We really can't express how much we love her, in just words as mom is the big part of ours and she's the one who influences and inspires us. We can't imagine life without her because she's the one who is always there whenever we need her. We are what we it's just because of mother. She always tries to make us good person. We never tell our mother that we never want her to be sad; we try to work hard so that she is happy and later when we grow and become successful she feels proud on us. She always supports us for goals and ambitions and that's the key in pursuing our dream.

It is facts that even though how many times we fight and even if we are not the best child she could ever have, she always makes us feel that we are the best gift she ever received from god.

IF I WOULD HAVE A CHANCE TO BE BORN AGAIN, I WOULD HAVE CHOSEN TO BE AGAIN HER CHILD. CHILD OF THE MOST IMPORTANT PERSON IN MY LIFE.....



Experience @ SYNAPSE

- Brandon Hulsebusch



Someone asked me what the craziest thing I had ever done, and the only answer I could give was this experience. I had to give up almost everything I've had: comfort, quality time with friends and family, job, and I flew alone to the other side of the world. For someone who has never flown alone, let alone been outside of the United States of America, this was definitely the craziest thing I've ever done, and may ever do for a long time.

I did it all to learn about a new culture, experience new things, and meet new people. My trip to India has taught me so far that although we have differences (and there are a lot of them), we still have many similarities among us. The people I've met have been so kind, so welcoming, and honestly some of the best people I've come to know in my short life. Loyalty to friends and family is paralleled to few people, and I'm happy I made this experience my own. It's been barely a month, and I've met some people I hope to keep in my life for years to come.

The differences are in no way negative, but definitely peculiar. My culture has always been equality, liberty, and justice above all. Although the caste system is technically no more, it still resonates throughout the country, and equality suffers. But this nation is young, and has so much potential. I hope I do more traveling in the future, and I'd be interested to see how other people pair up to the Indian spirit. Everyone is so passionate in anything that they do. Coming to a university that accepts the top 10% of students, I came to also realize the great gap in

education. Our education systems aren't terribly dissimilar, but the students have a lot of care for their work, especially the Ph.D. scholars.

I had the opportunity to visit another college in India. A group of about 20 students and I had a weekend of preparing dances, brains, and songs for a fest held at Goswami Ganesh Dutta Sanatan Dharam College (SD College). We arrived a bit late, and had to run to register. My event, the Science Quiz, started promptly at 11:00. It was 11:03 when we registered. We had no time to lose! So we ran to their bio-tech building and found the room. We started late, and finished early. The questions were ludicrous, and had to make some practical guesses. After some time, it was announced the two groups from our University, had tied for fourth place. Since only four teams could advance, we had a Jaypee Head-to-head Battle. After some impressive reaction times and quick wit, me and my partner (Sumant), advanced to the finals. We took an early lead, but after some rough questions, we ended up finishing third. We were awarded after some great dancing (we received so many awards!) and delicious smoothies, we made the trek back to campus. It was worth the time and energy spent and was one of my more memorable experiences thus far in India.

One question it seems everyone asks is how I enjoy the food here... and I love it! I've always been a spice-fiend, so coming to India has always been a dream of mine.

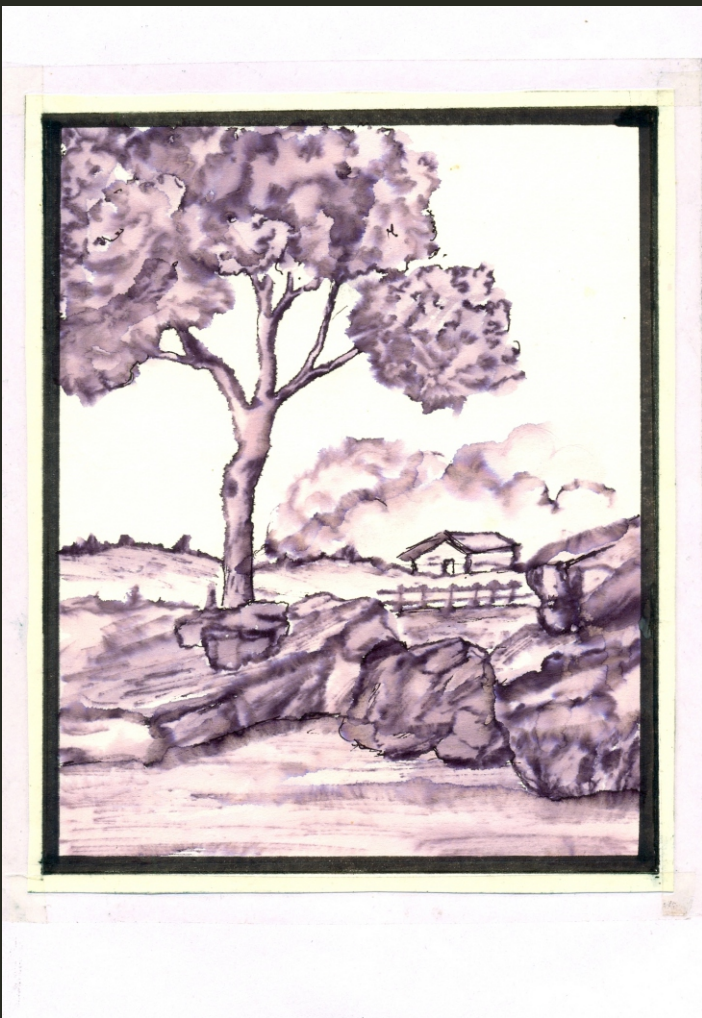
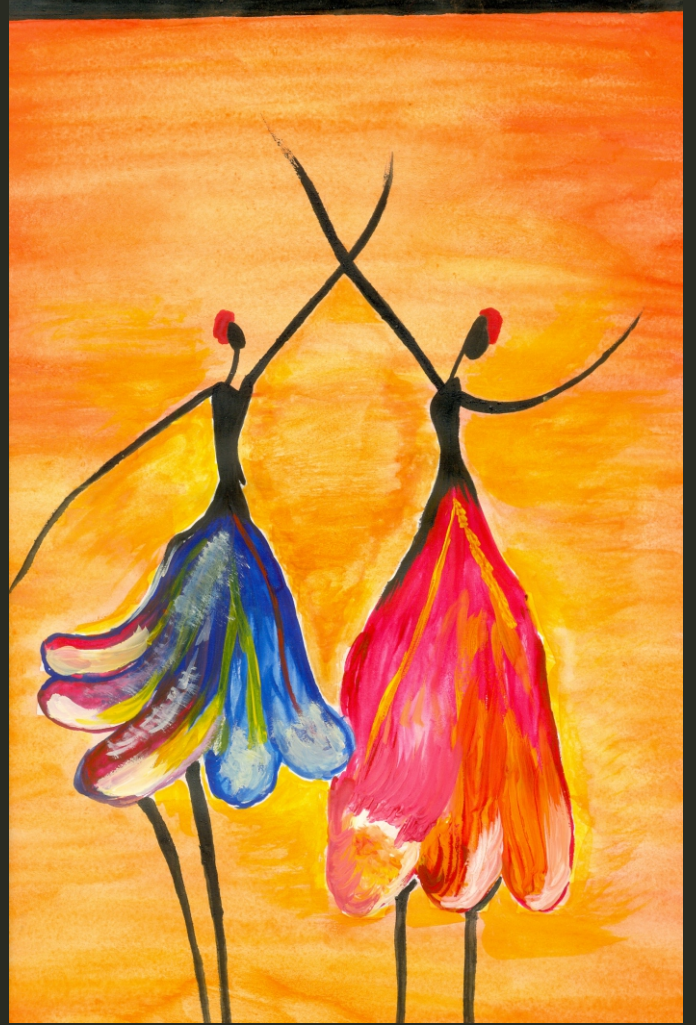
One thing though, it's not spicy enough! I know the use of spices in Himachal isn't as heavy as the South, but I'm still on the lookout for food that I can't handle. If you have any suggestions of where to go that's near, don't be afraid to let me know!

The culture, the people, the food, and the landscape have all enthralled me for years, and I'm happy to finally make it here. It definitely won't be my last visit to India, I have even considered relocating here after my degree program is finished at home. Thanks, JUIT, for making my experience as wonderful as I could have imagined. In fact, it's even better than I could have imagined. I wasn't sure what I was in store for when I devoted myself to this trip, but in general, it's been a very positive experience in my life, and I'll take it with me for the rest of my life.

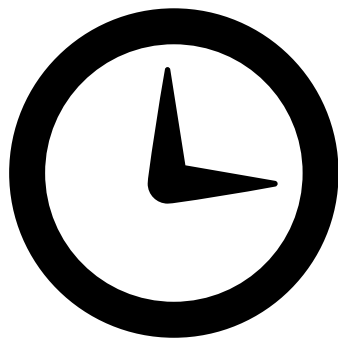
“CREATIVITY IS
INTELLIGENCE
HAVING FUN” - ALBERT EINSTEIN

CREATIVITY SECTION









Ph.D. Section

What Next For Young Biologists???

Let's hear from Shivam Jain

Many people think that Biology is a subject of the doctors and the ones with this subject who are not chopping humans over and desk in an OT of any hospital are considered to be the ones who have not achieved much. So just to get out of the box and to broaden people's view about biology we have interviewed the PhD scholars of our university. We go with Shivam Jain our passionate researcher who completed his academics from the heart of India i.e. from the state of Madhya Pradesh.

Q. Your qualification Sir??

A. I have completed my M.Sc. in Biochemistry from Jiwaji University, Gwalior.

Q. How to opt for PhD?

A. A person willing to opt for PhD should qualify NET i.e. National Entrance Exam. Top 20 to 25 candidates are given JRF which is Junior Research Fellowship and are offered Rs 18,000/- pm. These people can apply in any leading institutes of India for research. If a person has appeared for GATE the scores are valuable and many universities conduct their own entrance exams also like ours.

Q.What made you choose Biology?

A. (smile and continues), I was a good student but never liked maths much but chose it as my subject after my high school but soon realized that it was not my cup of tea, so I chose biology, as commerce at that time was considered to be the subject for the average students and I had a soft corner for biology.

Q. What made you choose PhD?

A. After completing my masters I joined as a lecturer. Everything went off well but then again teaching became monotonous and I realized that to achieve something big, one should have high qualifications as well. The topics in my mind initially were Immunology,

Enzymology and med. Biology. So here I am.

Q. What is your topic of research?

A. I am researching upon VIRUS, Rota Virus to be more precise. Rota virus is known to cause diarrhea in babies which is often fatal. We visit the hospitals of Himachal Pradesh region to collect the stool samples, to detect Rota virus and figure out ways to eradicate them.

Q. What are your hobbies?

A. Well!!..I am a Movie and a You Tube freak!!

Q. How long does it take to complete PhD and what next after this?

A. Amity takes two years for a person to complete his PhD after M.Tech and three years after M. Sc. At the max. It will take seven years. After PhD one has a number of options as post doctorate, as a professor or can apply for jobs in industries related to their field of research like Pharmacy Industries, Biomedical Industries. One can also join as a scientist.

Q. What do you do in PhD?

A. During this course a person has to make a Thesis on his project of research. After the compilation of results they are being sent to external scientists, one in India and one abroad. If the Thesis is accepted well

Q. How has been your experience in JUIT?

A. Lab experience has been good throughout, it is well equipped, would consider it as one of the finest ones. And yes how can you forget JUIT Mall.

Q. What keeps you going on?

A. (sighs) "Kuch time ka struggle fir hai Bright future", also mentions that "Rome was not built in a day".

Q. Strongest support?

A. Friends and Family. Special thanks to Shivani, my subordinate who supported and motivated me when I lost all hopes.

Q. What has been your mantra sir and what would you like to say to all the young biologists reading this??

A. "Kabhi bhi Life me Studies me aisa mat sochna ki fass gaye aur agar aisa lage ki ab kuch nahi ho sakta toh bas let the time pass. As the time passes everything becomes alright and comes on track." (His own experience which acts as a tonic to drive him all the time).

And now to bring in the session to an end here is a mood lightening rapid fire round to find out the other naughty freaky side of our serious researchers.....

Food-	fond off
Holidays-	must
Fav Movie-	Dil Chahta Hai
Actress-	Sonali Bendre
Immunology-	Dr. Harish
Girls-	are good
Jaypee-	nice place to live
Flower-	beautiful
Style-	style
Friend-	very important
Dislikes-	PhD
Sports-	cricket
Bad Teacher-	Sister Catherine
Idol-	my father
Billu Barber-	Barber
Shaadi-	(giggles!) Pata nahi!!(" Case with majority of them")

Getting to know **Mr. Archit Sood**

Born on 26/05/1985 Palampur

PhD topic— Research on molecular mechanism to understand yield potential of *Jatropha* plant

Academics:-Msc. Biotechnology, Punjabi University, Patiala. Bsc. Medical (Chemistry, botany, Zoology), Sanatan Dharam College, Palampur.

Job Experience:- Research Associate at the prestigious CSIR and IHBT lab for 2 and half years

PHD:- JUIT Waknaghat, 2011

Guide:- Dr R.S Chauhan

Q) Sir please let us know a bit about your project?

A) Well I am working on Jatropha, as you know it is a great source of bio fuel, but much work has not been done to improve the yield of bio diesel from it, so I got this project from DBT and I am now working under Dr. Chauhan on its molecular mechanism. It is a DBT funded project.

Q) Would you like to inform us more about other plants such as jatropha?

A) Yeah, there are other plants like soya bean and sunflower which are also source of bio diesel, but the difference is that these plants are edible and there is the challenge between balancing its consumption need and as a fuel. The another aspect is that this can also be used as a fodder.

Q) What is the scenario of bio fuel in other countries?

A) Countries like New Zealand and Brazil are using it for a long time and on large scale while we are using petrochemical along with it. In our country it was President Kalam who promoted the need of biofuel, specially work on jatropha.

Q) How do you feel about the prospect of biotechnology in India?

A) See, it somewhere seems that in India biotechnology work is being constricted to only one sector of medicines it depends on entrepreneur, our government to think about the commercial utilization of the different biotechnology projects and researches that will boost our economy too.

Q. What is your topic of research?

A. I am researching upon VIRUS, Rota Virus to be more precise. Rota virus is known to cause diarrhea in babies which is often fatal. We visit the hospitals of Himachal Pradesh region to collect the stool samples, to detect Rota virus and figure out ways to eradicate them.

Q) How has your experience been in JUIT ?

A) Hmm... research wise, equipment wise and

considering the working environment it has been very good. See now I have been in research work for the last six years, and considering the time at JUIT will surely have to say that I enjoyed very much.

Q) What do you want to say about your fellow scholars and other people at lab?

A) See the work environment is very good here, the support and motivation from all the faculty members really is a great aspect here. While speaking on my mates everyone lifts each other's soul, it has been a great bond.

Q) What is a normal day at lab?

A) See work starts at lab by 9 am and carries on till 7 or 8 pm.(smiles) See we don't have bells at 10 or 12 for breaks.

GPU Computing In Bioinformatics

Computers contain at least one CPU (central processing unit), but several also contain specialized processors necessary for producing graphics rapidly, the GPU (graphics processing unit). Although GPU may be embedded on the motherboard of the computer, but for vast amounts of graphical power graphics card is required.

The question arises that why would we need to use a GPU at all? In desktops, the answer is quite easy because many of us have a GPU in our computer doing almost nothing most of the time. So we could actually make use of all this processing power called "hardware acceleration". With the majority of the power of a GPU still largely unused in a desktop machine, we could use that in solving our bioinformatics problems. GPUs are exceptionally good at performing huge numbers of similar operations in parallel and it just so happens that many of the Bioinformatics problems (e.g. sequence alignment) are exactly parallelizable. The languages you can choose are CUDA (specific to NVIDIA) or openCL (an open standard). Some of the Bioinformatics tools utilizing GPUs are listed below-

Application	Description	Expected	Multi GPU Support
ACEMD	GPU simulation of molecular mechanics force fields, implicit and explicit solvent	160 ns/day	Yes
AMBER	Suite of programs to simulate molecular dynamics on biomolecule	89.44 ns/day	Yes
CUDASW++	Open source software for Smith-Waterman protein database searches on GPUs	10-50x	Yes
CUDA-BLASTP	Accelerates NCBI BLAST for scanning protein sequence databases	10	Yes
CUSHAW	Parallelized short read aligner	10x	Yes
GPU-BLAST	Local search with fast k-tuple heuristic	3-4x	No
GROMACS	Simulation of biochemical molecules with complicated bond interactions	165 ns/Day	No
GPU-HMMER	Parallelized local and global search with profile Hidden Markov models	60-100x	Yes
SeqNFind	A commercial GPU Accelerated Sequence Analysis Toolset	400x	Yes
TeraChem	A general purpose quantum chemistry package	7-50x	7-50xYes

Rotavirus: A notorious killer of children



Background:

Rotavirus belongs to a group of viruses that usually infects children and is a significant cause of childhood mortality around the globe. According to estimates, every year this virus kills ~0.5 million (on an average) children under the age group of 5 years. The severity of the virus can be scaled by the fact that almost all children in the world get infected by it at least once before they reach the age of 5. The Indian scenario of rotavirus associated mortality is even worse. India contributes the highest burden among it, i.e. 21.8% of the total mortality. This heralded clinical significance of rotavirus has forced W.H.O (World Health Organization) to put rotavirus surveillance and research in its priority list, with an aim to reduce the childhood mortality by two-third between 1990-2015.

Biological features and strain diversity:

Rotavirus is a 70nm virus which belongs to the family Reoviridae and has a segmented RNA genome. It is

transmitted via feaco-oral route and infects humans by adhering to the epithelial lining of gastrointestinal tract. Like most of the gastroenteritis associated viruses, rotavirus also replicates in the mature enterocytes of the intestinal epithelium.

Rotaviruses are very diverse microbes and their genotyping is done with the help of G/P genotyping system. Till date, 27 G genotypes (G1-G27) and 35 P genotypes (P[1]- P[35]) have been detected while the reports of new genotypes are continuously pouring in. This vast diversity and frequently evolving capability of rotavirus is mainly attributed to its segmented genome which is continuously undergoing gene reassortment and rearrangement

Symptoms, treatment and vaccines:

Children infected with rotavirus usually have frequent watery diarrhea along with vomiting, fever, nausea and abdominal pain. Rotavirus infections in adults may show no or mild symptoms but the elderly people are equally affected as kids.

There is no antiviral drug against rotavirus so the treatment generally includes administration of Oral Rehydration Solutions (ORS) to counter the life threatening dehydration caused by the infection.

Rotaviruses are very contagious so good hygiene and cleanliness is very crucial to prevent the associated infections. But these preventions are not enough to combat this virus. The more reliable and effective measure is vaccination. RotaTaq and Rotarix are the widely used rotavirus vaccines, that have proved to be quite effective. In several countries they are an integral part of the routine vaccination programmes. However, the high cost of these vaccines is still a challenge for their administration in poor settings. Fortunately an Indian biotech company, Bharat Biotech

International Limited, has come up with a rotavirus vaccine under the trade name 'Rotovac'. It is supposed to be much cheaper (~20 times) in comparison with its preexisting competitors.

Challenges and public awareness:

Rotavirus is a virus which is preventable and yet it is claiming millions of lives each year. In most of the low income countries, there are no anti-rotavirus vaccines available. In many countries including India, rotavirus vaccines are still waiting to be incorporated in the vaccination programmes. Moreover, lack of information regarding the virus and its consequences is also obstructing the measures taken to eradicate this virus. In a nutshell, adequate and strong awareness can be an excellent weapon to fight this notorious virus; if rotavirus associated mortality is ever to be controlled. So be responsible for our children and 'Help the child reach 5'.