Vol . I

SCIENTIA SCRIPTURAM

Ode to ideas, thoughts and innovation

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2019

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(एक केन्द्रीय विश्वविद्यालय)

सिलचर 788011 असम, भारत

ASSAM UNIVERSITY

(A Central University)

Silchar 788011, Assam, India

MESSAGE

It gives me immense pleasure to know that Scientia 2019 is going to publish the first ever magazine 'Scientia Scripturam' very shortly on the occasion of third annual fest. I am confident that the magazine will inspire the celebrations of the fascinating world of science and technology and will open the doors to experimentation and innovation.

My felicitation and congratulations to the editorial board for their meticulous works for publication of the magazine.

Date : 16.09.2019

Vice Chancellor

MESSAGE FROM THE REGISTRAR

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Silchar - 788 011, Assam (India)

Date: 11th Sept., 2019

MESSAGE

I am very delighted to know that 1st SCIENTIA magazine 'Scientia Scripturam' will be published by the organising committee.

I convey my best wishes and extend full co-operation and support for such endeavour.

I congratulate the members of the editorial board for publication of the magazine.

(11.9.19)
(Dr. Sanjib Bhattacharjee)
Registrar

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FROM THE CHIEF EDITOR DESK

It is an immense pleasure from the outcome of resourceful edition of first ever science magazine i.e. *'Scientia Scripturam'*. I on behalf of chief editor desk share my gratitude to all the participants/students teachers and research scholars for their immense contribution and submission.

Hope this first ever edition fulfill the hopes, aspirations and encourage the students as well as scholars and different stakeholders. The editorial team has taken the utmost care in ensuring that the articles, facts and figures presented herein (inclusive of the details of achievements of the research scholars and students of various departments) are correct and up to date. If any discrepancies and/or mistakes have crept in, we at the very onset would like to express or sincerest apologies. This is the first attempt in launching an independent e-magazine from the campus of Assam University, recognizing the achievements and thoughts of our students and research scholars and we hope and pray that our readers will be obliging in regard to the betterment of this initiative and also for the holistic development of the overall effort the team has put into *'Scientia Scripturam'.*

It is our proud moment to publish *'Scientia Scripturam'*as a resourceful magazine that collects value of information, guidance, mission, earning and learning scientific atmosphere.

Ashish Kumar Basumatary
Chief Editor
Scientific Temper

MESSAGE

We are glad to know that Assam University,Silchar is publishing its first magazine 'Scientific Temper' in SCIENTIA-3.0.

Magazines have a great educative value. They encourage students to think and write. In fact, young talents find its first exposure through this medium. The magazine also records the achievements and various activities of all science departments including B.Pharma and B.sc B.Ed. We hope that this publication would be successful in achieving these objectives.

Our best wishes for the entire endeavor.

Regards-
Assam University Research
Scholars' Forum
Assam University, Silchar

FROM THE STUDENTS' UNION DESK

It gives me immense pleasure in getting to know that, for the third time, general science fest, Scientia 2019 is going to be held with new aspires and fresh enthusiasm. It has been always pleasure to be a part of practicing scientia and contributing towards the promotion of scientia. The exact motto was taken for consideration in the earlier 2017 and for the first time scientia was organized successfully. Now it's a pleasure to see scientia growing year by year. A heartiest congratulations to the organizers for the Nobel initiative and wish all the success in arranging the event.

Regards,
Abhinandan Mahanta
President, AUSU

FROM THE SCIENTIA EXECUTIVE MEMBERS' DESK

It gives us immense pleasure to publish the first ever scientific magazine, "SCIENTIFIC TEMPER" with lots of resourceful thoughts and ideas. This magazine also includes the various awards and achievements of different science departments of Assam University.

We hope that this publication will help encourage the students and scholars create resourceful ideas as well and scientific ideas and thus create a scientific atmosphere.

Regards,
Gulafsha Begum Choudhury
President Scientia 3.0

ARTICLES

"AN APPLE A DAY KEEPS THE DOCTOR AWAY"

LET'S BREAK THE MYTH.

- **Ankita Purkayastha** ***(Dept. of life Science & Bioinformatics)***

Apples are considered as healthy fruit. They have antioxidant properties that help to protect against cancer-inducing oxidative damage. But as we go deep inside, we are confronted with something not so sweet; tiny black or dark brown seeds. Apple seeds contain Amygdalin, a cyanogenic glycoside composed of cyanide and sugar. When the chemical comes in contact with the digestive enzymes, it gets digested in to highly poisonous Hydrogen cyanide. A lethal dose of HCN can kill within minutes. The cyanogenic glycoside, Amygdalin is found in other plant sources particularly in the pears and members of the Prunus species (apricot, plums, peaches etc.) Amygdalin is a part of seeds' chemical defenses. It is harmless when intact, but when the seeds are damaged, chewed or digested, Amygdalin degrades in toxic compound. Cyanide has been used as a poison throughout history. It works by interfering with cells' oxygen supplies.

However, the Amygdalin is accessible only if the seeds have been crushed or chewed; and the human body can process HCN in small doses, so a couple of chewed seeds are usually completely harmless. Consuming 0.2- 1.6 mg of cyanide for each pound of body weight (0.5-3.5 mg/kg) may lead to severe poisoning causing a coma, paralysis, heart and lung failure or even death. For a 81 kg adult, this apple equals to 41-286 mg of Cyanide. Lower amounts of cyanide may cause various milder symptoms, such as headache, nausea, vomiting, stomach cramps, dizziness, weakness. The exact amount needed to make you sick depends on your body weight. Young children are at a greater risk.

Body weight (kg)	Apple seeds (grams)	Apple seeds (number)
9	19-529	27-756
54	113-3,175	162-4,536
59	123-3,440	176-4,914
64	132-3,704	189-5,292
68	142-3,969	203-5,670
73	151-4,234	216-6,048
77	161-4,498	229-6,804
82	170-4,763	243-6,804
86	180-5,027	256-7,182

Table: It shows how many apple seeds you would need to eat to risk death, relative to your body weight.

TEA, A CUP OF GOOD HEALTH?

- Nishitrishna Das, Sindhuja Sengupta, Tanjima Tarique Laskar & Himakshi Baruah ***(Department of Pharmaceutical sciences)***

Tea, is often said to be good for health but if tea is good for you how good? And why? Tea chemistry is very complex. Just how complex? Well on the bush, tea leaves contains thousands of Chemical compounds. When steeping tea leaves, our senses are tingled by the thousands of volatile Compounds rising from the tea liquor and the thousands Of non-volatile compounds that are floating within the tea Liquor. For this, tea is known as the MASTER OF CHEMICAL DIVERSITY. In order to keep the active product intact, we should be concerned about the withering and oxidation of tea leaves. WHAT'S IN YOUR CUP? Well, tea contains certain substances linked to better health. The Main players are chemicals called polyphenols in particular catechin and epicatechin. WHAT DO POLYPHENOLS DO? These are actually anti-oxidants which can treat attacking artery walls and used in cardiovascular disease. When good health strikes our mind, we should focus on green tea rather than black tea. Are you curious to know why green tea is preferred over black tea? So here it is- • BLACK TEA Black tea has deficient amount of polyphenols that is catechin and it has more amount of oxidised phenolic compounds.

As it is more processed compared to other varieties of tea so the active compounds are partially degraded. • Men who take more amount of black teas are 50percent more likely to develop " PROSTATE CANCER" • For pregnant and breast feeding women, taking more than 3 cups of black tea can cause increased risk of miscarriage, increased risk of sudden infant death syndrome, infantile with lower birth weight.

❖ GREEN TEA:-

Green tea has requisite amount of polyphenols and has no oxidised Phenolic compounds. It is less processed as compared to black tea and so its active constituents remains intact as such. It is loaded with antioxidant and nutrients that have powerful effects on the body. These include improved

brainfunction, fat loss, a lower risk of cancer and many other impressive benefits.

- **WHITE TEA**

In recent years, a special variety of tea has been introduced and it has been named as White tea. It is known to be one of the most delicate tea varieties because it is so minimally processed. White tea is harvested before the tea plant's leaves open fully, when the young buds are covered with fine white hairs hence the name 'WHITE TEA'. The impressive benefits of white tea are reduced risk of heart disease, weight loss, anti -bacterial effect on teeth, anti- cancer, and protest against osteoporosis, help combat skin ageing.

So, we can conclude with the convenience that White tea is best as compared to green tea and black tea but availability is less in case of white tea. So, we can go for GREEN TEA for daily healthy life purpose.

COMBINED ENDOWMENT OF BIOLOGICAL SCIENCE AND DATA SCIENCE TOWARDS BETTER FUTURE

- **Priyakshi Nath** (***Dept. of Life Science and Bioinformatics)***

Biology is rapidly acquiring the character of a data science. Billions of data points on genes, proteins and other molecules are compiled in large files and systematically studied. This has led to more knowledge and understanding about living organisms, including crops and livestock that are the basis of food security for the world population. Unravelling the human genome between 1990 and 2003, costs approximately $ 2.7 billion but in 2014, the costs for unravelling the same genome were barely $ 4000. The gradual reduction in cost made a huge increase in the amount of data possible, allowing us to read the genomes of tens of thousands of organisms. Mapping out the complex tomato gene took an international consortium five years to accomplish but today we can read the genomes of 150 different tomatoes in 1 yr. All the data from analyses of the properties, structure and functions of thousands of molecules in cells are stored in enormous databases. This unimaginable amount of data is referred to as 'Big Data'. Dealing with big data requires a different approach. Big Data has enabled many research fields such as Computer Vision and Deep Learning to flourish and has made possible for machines to perform complicated decision – making tasks and to extract from raw data information hidden, until then, to the human eye. Bioinformatics has now become intrinsic to biological/life science research. As the evolving landscape of life science research has become more data driven, integrative and computational, the need to learn and acquire knowledge about bioinformatics and develop skills on it has grown presently.

Data science is massively helping to solve sophisticated problems such as developing high performance genomic analysis platforms, identifying new molecular targets for drug discovery, analyzing electronic medical data to forecast disease, progression to reduce mortality rates. So, biologists now have proved the necessity of adopting concepts and tools from other areas including machine learning, computational biology, computational chemistry, engineering, mathematics and physics. Computational biology is the combined application of mathematics, statistics and computer science to solve biology based problems such as in genetics, evolution, cell biology and biochemistry. Datasets of biological data can be created from amino-acid sequences, nucleotides, macromolecular structures and so on. Many robotic systems and algorithms frequently used in computer science are inspired by biological complexes such as Deep Learning Neural Networks which are inspired in principle by the human brain structure. Different algorithms are used in computational biology

such as Global Matching (makes use of knowledge about the proteins of an organism), Markov Models (used for modelling sequences), Gene Regulation Networks (formed from the interaction of different proteins in an organism) etc. Since long back, there has been relationship between biology and machine learning. Machine learning has been helpful to transform bioscience research. Fields like protein structure prediction, homology modelling and cheminformatics frequently employ tools from machine learning. Deep learning has allowed access to newer information and technology, an exponential decrease in computing costs, exponential decrease in cost for genome sequencing, advancement in lab instruments and generation of trained scientist who understand the complexities of biology and biological systems and also have the ability to go deep into computer science. One of the interesting areas of application is the drug discovery space such as the predicting molecule toxicity and reactivity, which is often a huge burden on the drug discovery pipeline or even drug repurposing. Biology in computational systems has been developed as a powerful paradigm to visualize and analyze the vast data ensembles in novel routes with unparalled adaptability (Barabasi and Oltvai 2004). Therefore, network-based methods, including computational tools for analyzing, such as protein – protein interaction networks, gene regulatory networks and disease networks, can be developed to provide us with a better understanding of genes, proteins, and the biological processes with which they are involved.

Molecular Property Diagnostic Suite (MPDS) is a Galaxy based open source drug discovery and development platform. MPDS web portals are designed for diseases such as tuberculosis, diabetes mellitus, and other metabolic disorders, specifically aimed to evaluate and estimate drug- likeness of a given molecule. MPDS consists of three modules, namely data libraries, data processing and data analysis tools which are configured and interconnected to assist drug discovery for specific diseases. Molecular Property Diagnostic Suite Diabetes Mellitus (MPDSDM) is a Galaxy- based, open source disease-specific web portal for diabetes. The data library module provide extensive and curated information about the genes involved in type 1 and type 2 diabetes onset and progression stage. The database also contains information on drug targets, biomarkers, therapeutics and associated genes specific to type 1 and type 2 diabetes. A unique MPDS identification number has been assigned for each gene involved in diabetes mellitus and the corresponding card contains chromosomal data, gene information, protein UniProt ID, functional domains, druggability and related pathway information. One of the objectives of the web portal is to have an open source data repository that contains all information for developing therapeutics to cure diabetes.

Molecular Property Diagnostic Suite- Tuberculosis (MPDSTB) has also been developed. It is a disease specific web portal for Tuberculosis for drug discovery and development. MPDSTB web portals has nine modules that are classified into data

library which is a repository of literature and related information available on Mycobacterium tuberculosis and deals with protein target analysis of the chosen disease area and contains a compound library consisting of 110.31 million unique molecules generated from public domain databases and custom designed search tools. All the molecules are assigned a unique MPDS ID and corresponding card.Data analysis specifically handles QSAR model development tools using molecular descriptors generated and integrates the Autodock Vina algorithm for docking and provides screening filters and provides the necessary visualization tools for both small and large molecules. Thus, the MPDS suite of web portals shows great promise to emerge as disease- specific portals of great value, integrating chemo-informatics, bioinformatics, molecular modelling and structure and analogue based drug discovery approaches. More MPDS for metabolic disorders and HIV are on the process of development by researchers.

More recent biological disciplines such as macromolecular structure and genomics have inherited many of the data analytic features from genetics and other natural sciences. Such as genomics which emerged in 1980s at the confluence of genetics, statistics and large scale datasets. The tremendous advancements in nucleic acid sequencing allowed the discipline to swiftly assume one of the most prominent positions in terms of raw data scale across all the sciences. Moreover, it is important to realize that many other existing data – rich areas in the biological sciences are also rapidly expanding, including image processing (including neuroimaging), macromolecular structure, health records analysis, proteomics and the inter-relation of these large data sets, in turn, is giving rise to new subfields of biological- data science.

DID YOU KNOW THESE UNKNOWN FACTS ABOUT……?

- **Debakshi Deb** (***Department of Life Science and Bioinformatics)***

PLANTS

- ✓ An average size tree can provide enough wood to make 170,100 pencils!
- ✓ The first type of aspirin, painkiller and fever reducer came from the tree bark of a Willow tree!
- ✓ Bananas contain an amino acid called Tryptophan, in the body it converts into Serotonin which can make people feel happy!
- ✓ Cricket bats are made of a tree called Willow and baseball bats are made out of the wood of Hickory tree!
- ✓ Dendrochronology is the science of calculating a tree's age by its rings!
- ✓ Caffeine serves the function of a pesticide in a coffee plant! Apple is 25% air that is why it floats on water!
- ✓ The tears during cutting an onion are caused by Sulfuric acid present in them!
- ✓ The first potatoes were cultivated in Peru about 7,000 years ago!
- ✓ Strawberry is the only fruit that bears its seeds on the outside. The average strawberry has 200 seeds!
- ✓ Bamboo is the fastest-growing woody plant in the world; it can grow 35 inches in a single day!
- ✓ A sunflower looks like one large flower, but each head is composed of hundreds of tiny flowers called florets, which ripen to become the seeds!
- ✓ Cabbage has 91% water content & Carrots were originally purple in colour!
- ✓ The California redwood (coast redwood and giant sequoia) near Trinidad, mainly located in the Giant Forest of Sequoia National Park in Tulare County, in the U.S. state of California. It is the tallest, widest and largest known living single-stem tree on Earth. Species: Giant sequoia (Sequoiadendron giganteum) Height: 83.8 meters (275 ft.) Diameter: 7.7m (25 ft.) Volume of trunk: 1,487 m3 (52,513 cu ft.) Estimated age: 2,300–2,700 years.
- ✓ The Elephant grass/Napier grass (Pennisetum purpureum) found in Africa is named so as it is 4.5 meters high and even elephants can hide in it!
- ✓ Eating lots of onions will make you sleepy, as it acts as a sedative!

- ✓ A cluster of bananas is called a hand and consists of 10 to 20 bananas known as fingers!
- ✓ Vanilla flavoring comes from the pod of an orchid called, Vanilla planifolia!
- ✓ The first certified botanical garden was founded by Pople Nicholas III in the Vatican City in 1278 AD!
- ✓ Oak trees are struck by lightning more than any other tree!
- ✓ During the 1600s, tulips were so valuable in Holland that their bulbs were worth more than gold. The craze was called Tulip mania and caused the crash of the Dutch economy!
- ✓ The baobab tree found in Africa can store 1,000 to 120,000 liters of water in its swollen trunk!
- ✓ Oak trees don't produce acorns until they are 50 years old!
- ✓ At over 2000 km long, The Great Barrier Reef is the largest living structure on Earth!
- ✓ The first product to have a bar code was Wrigley's gum!
- ✓ The 'ghost orchid' has no leaves or stem, and is simply a system of roots when it is not flowering!
- ✓ There is a tropical flower plant named Dumb cane that has been nicknamed "mother-in- law's tongue."
- ✓ Chewing gum/chicle gum was made from the sap of the Sapodilla tree.

ANIMALS

Arthropods:

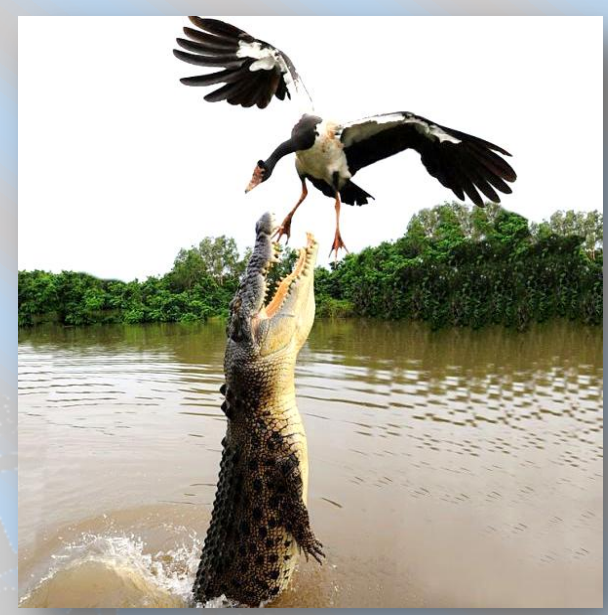
- ✓ The male butterfly can smell a female from miles away.
- ✓ Butterflies taste with their feet so their new born caterpillars won't be hatched on poisonous plants.
- ✓ A flea can survive in extreme conditions. If we freeze a flea for a year it would be alive after melting the ice and can jump 200 times of their size.

✓ Birds:

- ✓ The owl has a night vision and can rotate its head to 270 degrees.
- ✓ 3% of the ice present in Antarctica is the urine of penguins.
- ✓ Ostrich eyes are bigger than their brain.

Reptiles:

- ✓ The snakes do not have ears, they hear from their tongues.
- ✓ Most snakes give egg (oviparous) and few give birth to snakelet (baby snake); viviparous in nature.
- ✓ Crocodiles can jump upside from the water and can catch flying birds.



Mammals:

- ✓ Bats can eat the insect's half weight of their weight in a night.
- ✓ A giraffe can't sleep more than one hour.
- ✓ Camel can drink 135 liters of water in only 10 minutes.
- ✓ Zebra has black skin and white strips on their body.
- ✓ Baby elephants drink their mother milk for 5 years.
- ✓ Elephant's body grows for a lifetime. That way the leader of the group has the biggest body. They are the only animal which can't jump.
- ✓ Kangaroos are good swimmers.
- ✓ Mole rats have to eat continuously. If they do not eat continuously they can die.
- ✓ Koala has similar fingerprints like Humans.
- ✓ Sloth take two weeks to digest their food.
- ✓ In a lifetime a cow gives average 200,000 glasses of milk.
- ✓ Orangutans often fall from the tree. Due to falling 50% of them have fractured bones.

Collected from various sources.

MANGALYAAN

MOMENT OF GLORY IN INDIA'S SPACE JOURNEY

- ***Abdulla Ahmed*** ***(Department of Physics)***
-

It is true that necessity is the mother of invention but there are several other milestones achieved by the human beings during the course of evolution not due to the necessity but because of curiosity in human mind. If the human mind would have been devoid of any curiosity about the unknown, we might still be living in the Paleolithic age. The latest Mangalyaan or the Mars Orbiter Mission (MOM) endeavor by the Indian Space Research Organization (ISRO) is too driven by the curiosity about the unknown in the outer space. In fact the rover sent to the Mars by National Aeronautics and Space Administration (NASA) of the United States was also named as Curiosity.

One of the biggest accomplishment in Indian History is Mangalyaan (Mars Orbiter Mission – Mars). Indian Space Research Organization (ISRO) successfully launched a space probe that orbits Mars. The Mission was launched on November 5, 2013 for a 300 days journey to Mars. The fact in this mission is that India is the first in the world (Fourth after Soviet Space Program, NASA and The European Space Agency) to successfully launch the mission in the first attempt.

So far 51 missions have been sent to Mars out of which only 21 succeeded. NASA and other various agencies sent various mission to Mars to investigate habitability, its climate and geology. India has too joined the race to Mars. With the successful launch of its "Mangalyaan" India has entered a new era in its space

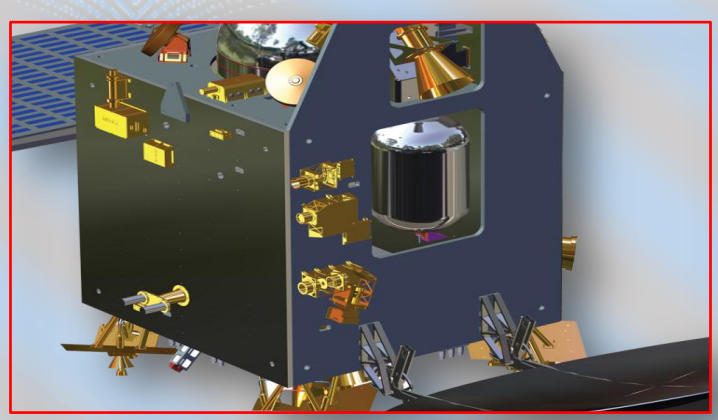


Fig-https://www.isro.gov.in/sites/default/files/missions/pslv-c25-mom

program to explore Mars. "Mangalyaan" is India's first interplanetary mission. It will revolve around the Mars and explore the presence of life there.

The spacecraft consists of five scientific instruments.

1. Methane Sensor will explore methane which is an indicator for life presence, and map its sources.

2. Lyman-Alpha Photometer (LAP) will measure the hydrogen isotopes ratios deuterium/hydrogen. It will find out the water source and estimate the amount of water loss to outer space.

3. Thermal Infrared Imaging Spectrometer (TIS) will measure temperature and emissivity of the surface composition and mineralogy of mars.

4. Mars Exospheric Neutral Composition Analyzer (MENCA) will analyze the neutral composition of particles in the Exosphere.

5. Mar's Color Camera (MCC) will capture the Mars surface in the visual spectrum.

'Mangalyaan" has definitely cherished the dreams of many young people who aspire to become scientist. Small children when explained by elders and teachers are in awe hearing the innovation science has made. They are definitely inspired by the feat of the India scientists. All this pose a bright future for the country. The success of Mangalyaan is a great achievement in the history of India and has strengthened the position of India in Space Science. The mission is a great motivation for budding scientists and gives ways for more successful mission from our country in future.

NEXT GENERATION SEQUENCING

A VERY USEFUL TOOL TO DETECT PRE- NATAL AND POST-NATAL GENETIC ABNORMALITIES

- Th. Sobita Singha (*Dept. of Life Science and Bioinformatic)*

N*ext generation sequencing (NGS) is a high through put methodology that enables rapid sequencing of the base pairs in DNA or RNA samples.NGS technologies have progressive advantages in terms of unprecedented sequencing speed, high resolution and accuracy in genomic analysis. Todate, these high-throughput sequencing technologies have been comprehensively applied in a variety of ways, such as whole genome sequencing, targetsequencing, gene expression profiling, chromatin immunoprecipitation sequencing and small RNA sequencing, to accelerate biological and biomedical research. NGS is driving discovery and enabling the future of personalized medicine.NGS is on the horizon to replacing Preimplantation genetic screening (PGS).NGS allows embryologists to screen for defects on the chromosomal level than ever before.NGS results are comprehensive and a higher resolution than any other genetic testing method because it detects more translocations.NGS may be run as a standalone test- or in conjunction with PGD – at a faster completion rate. NGS also detects mosaicism – when the embryo's cells exhibit different chromosomal content.*

PRIMARY BENEFITS OF NGS

R*eduction in the number of miscarriages, reduction in the number of IVF cycles, reduction in the risk of a multiple pregnancy with a single embryo transfer, increasing ongoing pregnancy rates, increase in live births etc.*

NGS RESEARCH AND AREAS OF APPLICATION

- *Inherited disease research- From targeted panels to RNA expression and aneuploidy detection.*
- *Cancer Research - From basic to translational to clinical research.*
- *Human Identification (HID) - From genotyping to STRs to mitochondrial DNA.*
- *Reproductive Health Research – From pre implantation to congenital research.*
- *Infectious Disease – From viruses to microbial communities.*

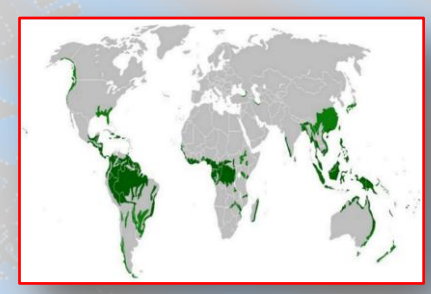
IMPORTANCE OF NGS

A*s a woman reaches an advanced maternal age (35 and older), there is a greater chance that her low quality eggs will create chromosomally abnormal embryos. The primary goal of the NGS is to transfer embryos that have been found to have a normal chromosomal number (euploid).Embryo morphology – how the embryo looks – alone as a means of selection for transfer is not the best tool. It is best to couple PGS with NGS to eliminate the chance of good looking embryos being abnormal.*

RAINFORESTS-THE TRUE LIFELINE

***-Debjani Chanda** (Department Of Life ScienceAnd Bio Informatics)*

Rainforests are those ecosystems which are filled with mostly evergreen trees that typically receive high amounts of rainfall. Rainforests are found in every continent except Antarctica. Tropical rainforests cover a large part of the globe, found near the equator and are characterized with high average temperatures and humidity. Temperate rainforests are found in temperate regions and lie mostly in coastal, mountainous areas within the mid-latitudes. They occur in North America, Europe, East Asia, South America, Australia and New Zealand.



Map showing rainforests in green Colour present all around the world.

Tropical rainforests are of vital global importance for two major reasons: their exceptional biodiversity and their key role in global carbon cycles. Tropical rainforests are centers of biodiversity, holding an estimated half of the world's plants and animals, many of which have yet to be catalogued. Rainforests produce, store, and filter water, protecting against soil erosion, floods, and drought. **T**hese rainforests serves economic value, scientific value and environmental value.

Interior part of Amazon rainforests, a hectare of forests typically consisting of larger trees.

Plants found in the forests are used for making medicines including anti-cancer drugs, along with beauty products and foods. Drugs under development for treating HIV such as Calanolide A, is derived from a tree discovered on Malaysian Borneo. Brazil nut trees

refuse to grow anywhere but in undisturbed sections of the Amazon rainforest. Amazon rainforest, the world largest tropical rainforests is a home to possibly a quarter of the world terrestrial species.

According to The Nature Conservancy, a 4-square-mile (2,560 acres) area of rainforest contains as many as 1,500 flowering plants, 750 species of trees, 400 species of birds and 150 species of butterflies. In the tropical rainforests of Borneo, Scientists have documented more than 15,000 plant species, including 2,500 species of orchids.

Biologists estimate that tropical rainforests contain about 50% of the world's terrestrial plant and animal species, yet they encompass only about 6% of the world's land area. The Amazon rainforest alone contains around 10 percent of the world's known species. Many unusual animals and plants have been discovered in rainforests. For example, the fairy lantern parasite (*Thismia neptunis*) reappeared in the rainforest of Borneo, Malaysia, in 2018, 151 years after it was first documented. This plant sucks on underground fungi and doesn't need sunlight to survive. The massive South American Goliath bird eater (*Theraphosa blondi)* is the world's largest spider, according to Guinness World Records. Each leg can reach up to 1 foot (30 centimeters) long, and it can weigh up to 6 ounces (170 grams).

The South American Goliath bird eater (*Theraphosa blondi*) is the world's largest spider, according to Guinness World Records

The South American Goliath bird eater (*Theraphosa blondi*) is the world's largest spider, according to Guinness World Records.

Recent Amazon fires

Scientists have identified more than 2,000 tropical forest plants as having anti-cancer properties. However, less than 1 percent of tropical rainforest species have been analyzed for their medicinal value. There, the trees are pollinated by bees that also visit orchids, and their

Seeds are spread by agoutis, small tree mammals. Rainforests are also home to endangered or protected animals such as the Sumatran rhino, orangutans, and jaguars. Rainforests are the true lifeline for the indigenous people living here for thousands of years, these people collect fruits, nuts and firewood. They hunt and fish for food to stay alive. But on the other hand people are destroying the world's rain forests at a very fast rate. One of the reasons is deforestation. More and more trees are cut down every year because the world's population needs more and more wood, people in the tropical rain forest need energy. They can't buy oil or gas because it's too expensive, governments find valuable raw materials in these areas—like iron ore, gold or silver.

Recent Amazon fires

Fires normally occur around the dry season as slash-and-burn methods are used to clear the forest to make way for agriculture, livestock, logging, and mining, leading to deforestation of the Amazon rainforest. Such activity is generally illegal within these nations, but enforcement of environmental protection can be lax. Deforestation and fires have surged, reversing years of decline. Several scientists are now raising the alarm that the Amazon is moving closer toward a dieback scenario, where enough of the forest is lost that the ecosystem as a whole could collapse. In addition to the impact on global climate, the fires created environmental concerns from the excess carbon dioxide and carbon monoxide within the fires' emissions, potential impacts on the biodiversity of the Amazon, and threats to indigenous tribes that live within the forest.

Amazon fires 15-22 August 2019. Satellite image taken by MODIS

Now it's high time for each one of us to get united together for taking a step ahead in the plantation of trees and creating awareness among the people about the rainforests, its application in daily life and tell them about what will happen if they are completely destroyed. The environment protection loss should be enforced properly so that illegal Activities in the rainforests can be prevented.

We might be very, very close to the tipping point," said Carlos Nobre, a climate scientist at the University of Sao Paulo in Brazil. And if we cross it, he said, "It's irreversible".

SCHRODINGER'S CAT

- **Abu Ahmed Quisar** ***(Department of Physics)***

Schrödinger's cat is a thought experiment sometimes described as a paradox devised by Austrian physicist Erwin Schrödinger in 1935.It illustrates what he saw as the problem of the Copenhagen interpretation of quantum mechanics applied to everyday objects. The scenario presents a hypothetical cat that may be simultaneously both alive and dead, this state is known as a quantum superposition.

A cat is placed in a steel box along with a Geiger counter, a vial of poison, a hammer, and a radioactive substance. When the radioactive substance decays, the Geiger detects it and triggers the hammer to release the poison, which subsequently kills the cat. The radioactive decay is a random process, and there is no way to predict when it will happen. Physicists say the atom exists in a state known as a superposition—both decayed and not decayed at the same time i.e. there is a 50% chance of decay and 50% chance of not decay.

Until the box is opened, an observer doesn't know whether the cat is alive or dead. In other words, until the box was opened, the cat's state is completely unknown and therefore, the cat is considered to be both alive and dead at the same time until it is observed (i.e. the cat is in the state of "superposition") and when the box is opened, the superposition states would collapse into either the knowledge that "the cat is alive "or "the cat is dead," but not both.

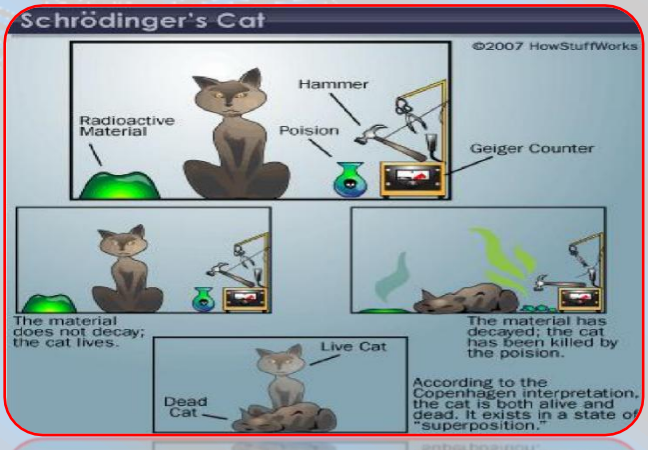


Diagram of Schrödinger's cat theory

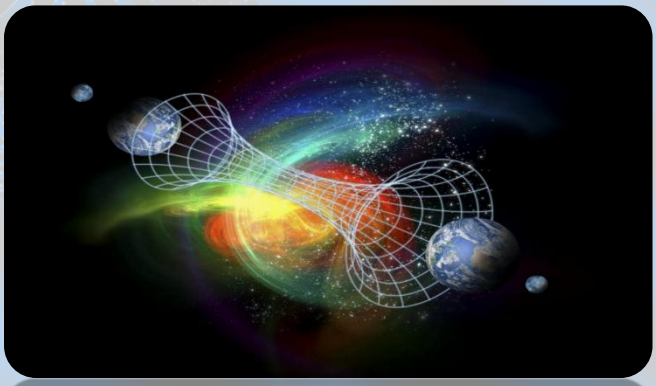
The quantum theory—which is

used to describe how subatomic particles like electrons and protons behave—is the idea of a wave function. A wave function describes all of the possible states that such particles can have, including properties like energy, momentum, and position.

"The wave function is a combination of all of the possible wave functions that exist," "A wave function for a particle says there's some probability that it can be in any allowed position. But you can't necessarily say you know that it's in a particular position without observing it. If we put an electron around the nucleus, it can have any of the allowed states or positions, unless we look at it and know where it is."

That's what Schrödinger was illustrating with the cat paradox, he says. “In any physical system, without observation, you cannot say what something is doing," .

The problem is physics can’t explain how the cat or the particle goes from being in a combination of two states at once, to being just one or just the other. Nor do we know how the decision is being made. This poses a problem for every single quantum mechanics experiment. In every case we can predict how likely it is for a particle to be in one state or another, but we still have no clue how it actually ends up that way. That is where “Many worlds theory” of the quantum mechanics comes in.



The mystery is that: In many-worlds interpretation, it holds that both possibilities continue to exist, but that “we” (the observers) are split into two: one of us observes a live cat, and the other a dead one. In this interpretation, the paradox of the alive/dead cat disappears: the cat is not alive in one universe and survives in another.

Apply this idea more widely, and an infinite number of parallel universes sprout, in which every conceivable outcome of every event actually happens, from an Earth where the Nazis won the Second World War to one where the dinosaurs evolved to read The Daily Telegraph. As the cosmological joke goes, it’s a theory that’s cheap on assumptions but expensive on universes.

THE ILLUSION OF EYE

- **Begum Rumana Nazmin, Pappu Deb & Ashish Kr Basumatary**
(Department of Biotechnology)

B*asically the eye is like a camera with an image-forming lens in front of a screen. This analysis of the eye vision is enough to appreciate certain perplexing optical illusions.*

The screen of the eye is the retina. Most striking is its shape-it is nearly spherical. When focused, an extended object forms a curved to accommodate this distortion of the image.

On this curved surface are photoreceptor cells. Light from the crystalline lens has to go through a tangle of optical nerves before reaching the photoreceptors.

There are two types of photoreceptors, the rods and the cones, so named because of their external appearances. They are not evenly distributed throughout the retina.

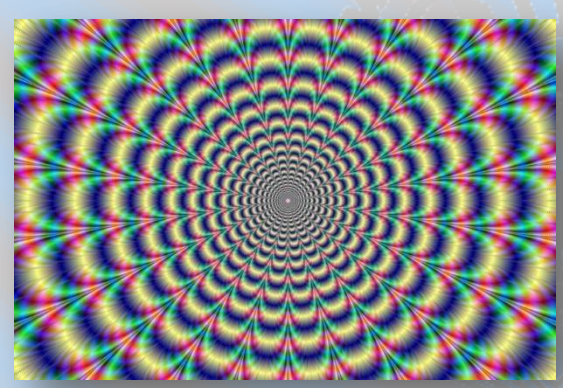
The rods cells respond only at low level no light, while the cones are active only at high levels of illumination. So night vision is mostly through the rods while day vision is confirmed to the cones. The rods and the cones also do not respond the same way to the colours. The rod cells hardly see any colour, but for a low response in the blue. On the other hand the cones respond to the colours. The discrimination in the rods and cones response together with their distribution on the retina results in a few interesting illusions.

A *photoreceptor remains dead for some time after receiving a signal. In other words it is "fatigue". This mechanism can result in intensity and colour being assessed wrongly. This fatigue leads to a problem which we all know very well: a room looks*

darker if we enter it from the sunshine. The retina is fatigued by the bright light and it is inactive to receive any light that is present in the room. After sometime the photo receptors regain their original state and are ready to receive light.

F*atigued can also result in what is termed as an after image. If one sees a bright object for some time and then shifts the gazed to a white wall then against a white background a dark image of the object is seen. The portion of thy retina that had received the images now "short of dead" and inactive while the rest if the retina is fully operative. This is generally called the negative after image in view of its complementary nature.*

B*ut there are also coloured after images. If one stares at a red object against a whiter background for some time and then removes the object, a greenish image of the object is seen in the same place. Of the three types of cones in the region of the image, the red sensing cones get fatigued and are thus inactive. Then that particular region can see only a complementary hue: bluish green. Can you guess now why doctors and nurses were a bluish green dress in operation theatres? A rotatory disc with a notch brings out this effect beautifully.*



T*hose are the few illusions of eye which occur due to fatigued nature of the eye. There are any more examples out there.*

AWARDS AND ACHIEVEMENTS

LIST OF NOTABLE ALUMNI

DEPARTMENT OF BIOTECHNOLOGY

Dr. Biswajit Sinha – Assistant Professor, Apex Professional University Pasighat, Arunachal Pradesh
Email- biswajit2812@gmail.com

Dr. Himangshu Deka – Jr. Quality Control Officer Quality Control Department, Hetero Healthcare Ltd, Guwahati
Email- himangshu.dk.25@gmail.com
Contact number- 9957820909/7002857258

Dr. Arif Uddin – Guest Faculty, Dept. of Education, Assam University
e-mail: arif.uddin29@gmail.com

Dr. Sambuddha Das – Research Associate, Grian Technologies Pvt. Ltd. Chennai

Dr. Javed Hussain Choudhury – Technical Lead Grian Technologies Pvt. Ltd., Chennai.

DEPARTMENT OF EARTH SCIENCE

1. Angom Sangeeta Devi -*CSIR NET-JRF (June 2018)*

2. T.N. Haokip- CSIR NET-JRF (December 2018)

3. Sujata das -*DST Scientist a (project) January 2019*

4. Meghali baruah -*Geo-India -American association of petroleum geologists ,*

DEPARTMENT OF ECOLOGY AND ENVIRONMENTAL SCIENCE

1. **PRIYANKA SARKAR**

a) Awarded as the 2019 Wetland Ambassador by the society of Wetland Scientists (SWS), USA.

b) Awarded as the 2019 Green Talent: Ambassador for Sustainable Development by German federal Ministry Of Education and Research (BMBF).

c) Received full registration scholarship to attend the '2018 Natural Capital Symposium' held during March 19-22, 2018 Stanford University, USA.

2. **Biswajit Chakdar**: - Scientist (A) at Bombay Natural History Society **(BNHS)**

3. **Monsoon JyotiGogoi –** Scientist (B) at Bombay Natural History Society **(BNHS)**

4. **BiplopBina Brahma**: - Shastri Indo-Canadian Post Doc. Fellow
Organic Agriculture Centre of Canada.

5. **Biswajit Sinha**: - Participated and awarded the young scholar award at 6th Asian and 6th Asian (Indochinese) Primate Symposium organized by Dali, China

6. **Karabi Pathak**:- Fullbright-Kalam Climate Fellowship for Post Doctoral Research **(First awardee from NE India)**, Sponsored by United States India Educational Foundation

7. **Biplob Bina Brahma**- Cleared SLET 2019, Selected for Shastri Indo-Canadian Post Doctoral Fellow under Shastri Research Student Fellowship 2019.

8. **Pompy Sharma**- Cleared UGC NET 2019

9. **Birkhungur Borgoyary**- Cleared UGC NET 2019

10. **Nanda Kumar Singh**- Cleared UGC NET 2019

11. **Nengpilam Howkip**- Cleared UGC NET 2019

12. **Sultana Parben**- Cleared UGC NET 2019

13. **Syed Saddam**- Cleared UGC NET 2019

14. **Identitia Marwin**- Cleared UGC NET 2019.

DEPARTMENT OF COMPUTER SCIENCE

1. **Sheikh Wakie Masood**- Cleared UGC-NET

DEPARTMENT OF B. VOC. PROGRAMME

BATCH 2019

➢ Food Processing

Sl.		Name	Designation	Name of the Company/ Industry
1		**Arup Das**	Lab. Microbiologist	Kenslay Packaged Drinking Water, Nilchara, Cachar,
2		**MantuSaha**	Entrepreneur	Premoda Trading and Co., Dharmanagar, North Tripura
3		**Subham Paul**	State Team Coordinator	Mi Lifestyle Marketing Global Pvt. Ltd., Itkhola, Silchar (Regional Office Ghy)
4		**Jyotiom Sarkar**	Internship (Quality and Production	Britania Industries Pvt. Ltd., Ghy

			manager)	
5		**SouvikNath**	Internship (Quality and Production manager)	Britania Industries Pvt. Ltd. Ghy

- **Farm Machinery and Power Technology**

Sl.	Name	Designation	Name of the Company/ Industry
1	**Sashankar Das**	Service Manager	Hero Motor Corp, Taranga Automobiles, Sonai Road, Silchar, Cachar
2	**Sachin Sinha**	Service Supervisor	Ford India Pvt. Ltd., Prova Ford, Sonai Road, Silchar, Cachar
3	**BibhuSuklabaidya**	Service Supervisor	Ford India Pvt. Ltd., Prova Ford, Sonai Road, Silchar, Cachar

DEPARTMENT OF MICROBIOLOGY

Anurag Kar Purkayastha- CSIR-UGC NET

Bhaskarjyoti Das- ICAR NET

AnuteeDoley- ICAR NET

KavitaSingha- ICAR NET

Rajkumari Elizabeth- ICAR NET

Ankita Das- GATE

Rajat Nandi - GATE

Rhitu Kotoky- Sandwich Fellowship Award (2018-2019)

Shiela Chetry- ICMR-SRF 2018

Zayalaxmi Wangkheimayum- ICMR-SRF 2018

Dr.NargisAlom Choudhury- Reseach Associate, ICMR

DEPARTMENT OF PHYSICS

Previous Year (2018-2019) Academic Record

1. **Dr. Amritaksha Kar** (Ph.d awarded 2019)
   Delivered a talk in the international conference IAU S350 laboratory Asmophysics. April 14 to 19, 2019 jesus college, university of Cambridge, Cambridge, UK.
2. **Ms. Abida Begum Choudhury** (Ph.d. ongoing) participate in a summer school during 1-12 July 2019, organized at "International centre of theoretical physics" (ICTP, Trieste, Italy)".
3. **Ms. Barnali Bhattacharya** (Thesis submitted)
   Published- more than 30 papers in international repute journal with some high impact factor journal such as Carbon, Journal of Physical Chemistry C, Physical Chemistry Chemical Physics, etc. with more than 350 citations. Received two best poster awards for her presentation. Received CSIR SRF Fellowship and also worked as a reviewer in papers in various prestigious journals.
4. **Mr. Jyotirmoy Deb** (Ph.d ongoing)
   M.Sc gold medalist 2014.
   Recipient of DST INSPIRE Senior research fellowship, cleared CSIR NET-LS (with AIR 44) June 2019.
   Published more than 20 papers having 130 citations, received one best poster award and also worked as a reviewer in papers in various prestigious journals.
5. **Mr. Suman Sinha** -(M.Sc gold medalist 2018) CSIR-NET JRF, JUNE2019.
6. **Mr. Nirmal Barman** -(M.Sc 2019)-SLET-2019
7. **Mr. Harkishan Dua** -GATE-2019
8. **Mr. Krishna Sarkar**-GATE-2019
9. **Dr. Pritish Halder** (Ph.d)

Joined as a post doctored fellow at PRL Ahmedabad

DEPARTMENT OF LIFE SCIENCE AND BIOINFORMATICS

LIST OF NOTABLE ALUMNI

*1.***Somorita Baishya**- *(Ph.d pursuing)*

- *Attended 8th congress of European Microbiologist in Glasgow, Scotland organized by federation of European microbiological societies, 2019*

*2.***Bedabrata Saha** *(Ph.d)*

- *Joined Post Doc. NPDF at dept of plant science lab. NISER, Bhubaneshwar, India(2019)*

*3.***Priyanka Saha***(Ph.d)*

-Joined post doc. At (IICB- TRUE) Indian institute of chemical padology, Kolkata(2019)

4.**Dr. Mitrajit Deb**

a) A documentary developed by our team on Ecology & Wildlife of Hollangapar Wildlife Sanctuary has been selected Wildlife Conservation Film Festival 2019, New York, NY, 2nd South Asian Short Film Festival 2019, Kolkata and International Nature Film Festival Gödöllő 2019, Budapest, Hugary. I have contributed significantly in the research & development of script and final narration writing. Our film has received media limelight and accolades. Links and references to this achievement is given below:

b) A coffee table book has been released on Wildlife of Hollangapar Wildlife sanctuary, Assam which is authored by Udayan Borthalur. The book showcases stunning photographs of more than 100 species of flora and fauna. Hollangpar wildlife sanctuary is known for its primate diversity and thus I have contributed to the research, development and writing of the Non human

primate section in the coffee table book book. Links and references to this achievement is given below. Photographic proof is also available, if required.

c) A wildlife documentary film on western hoolock gibbon released online and I have helped in the research, development and script of the documentary. The film is titled as- "The Western Hoolock Gibbon Sings and Swings Along the Forest Canopies

DEPARTMENT OF CHEMISTRY

1. **Bijoy Debnath** – CSIR NET, NE-SLET
2. **Nisithendu Bikash Nandi-** CSIR NET
3. **Debarun Sen-** GATE
4. **Parnashabari Sarkar-** GATE, NE-SLET
5. **Aditya Singha-** GATE
6. **Kuheli Deb-** GATE
7. **Nirmal Das-** NE-SLET
8. **Dr. Abhijit Dutta-** Post Doc in C Baptist University, Hongkong
9. **Sandip Saha-** Post Doc in China

DEPARTMENT OF PHARMACEUTICAL SCIENCE

List of selected candidates in **Nestle:**

1. **Benjoni Debbarma**
2. **Obaidur Rahman**
3. **Debolina Sarma Roy**