APRIL, 2019

VOLUME 02

EXPRESSION

National Institute of Technology Andhra Pradesh

Director's Message

National Institute of Technology a very young institute of national importance in the sun rising state of Andhra Pradesh has been witnessing a considerable growth since its inception from 2015.

The institute is eager and rich in nurturing biotechnologists to meet the challenges Of tomorrow and needs of our country.

Biotechnology is the 3rd wave in biological science and an interface of basic and applied sciences, where gradual and subtle transformation of science into technology can be witnessed.

Biotechnology has a promising future and be accredited for revolutionary changes in human life through its technology. Recent advances in bio energy, bio remediation, synthetic biology, DNA Computers, Virtual cell, genomics, proteomics, bioinformatics ,nanotechnology have made significant effect in the societal needs and thus became more powerful.

Biotechnology is a golden tool to solve some of key global problems like global epidemic, fatal diseases, global warming, rising fuel crisis and above all poverty.

It is a great pleasure to see the creative expressions of N.I.T. AP B.Tech (Biotechnology) students who have contributed to the second edition of the magazine "Expression".

Readers will realize the tremendous efforts endowed by the students in laying a foundation to this magazine. The magazine is presenting a glimpse of their association activities and several areas of research being pursued in their field. It also holds the achievements of their talented students.

I wish the magazine is widely read, cherished and hope it will continue to inspire all the students of N.I.T. AP.

Biotechnology has also proved to be extremely productive and innovative and hope that the 21st century is century of you

I am sure that our students will bear the flagship of N.I.T. AP to enormous heights.

I wish to see students stand as responsible technocrats and leaders in the Nation Building.

I wish the staff and students of the Department of Biotechnology success in their future endeavours.

Good luck to every student pursuing their scintillating course of Biotechnology at N.I.T AP.

God bless you all.

Prof C S P Rao,

Director NIT-AP

National Institute of Technology Andhra Pradesh

Department Of Biotechnology

Head of the department's Message

Greetings from the Department of Biotechnology! The department was established in the year of 2015 in National Institute of Technology Andhra Pradesh with a yearly intake of 30 students. The department offers B. Tech programme in Biotechnology since its inception. The department is also offering M.S. (by research, part-time) and Ph.D. (Part-time and full time) from the upcoming academic year 2019-20. The department offers science-based engineering curriculum to impart technical knowledge to undergraduates, promote their problem-solving skills and innovation of new technologies in multi-disciplinary fields. The course contents are periodically updated for introducing new scientific and technological developments. Undergraduate students are motivated to find a research problem and create the ability to address the problem through the literature support.

A basic biotechnology laboratory was established with a worth of 10 lacs in the academic year 2018-19 at Sri Vasavi Pharmacy college to help the students to execute their basic research activities. Currently, the department has eight faculties and most of them completed their Ph.D. The department has a distinguished record in both teaching and research. The faculty members have excellent academic credentials and are highly regarded. Several faculty members serve on the editorial boards of reputed journals, review technical articles for journals on a regular basis, and organize invited lectures.

Jahnavi and her team are timelessly working and are actively involved in the various activities of the association. This magazine is one such endeavor. It gives me great pleasure to see all those activities and collective contributions made by our students. I congratulate them and wish them for their bright future.

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Dr. Seenivasan Ayothiraman

Head of the Department

Department of Biotechnology

National Institute of Technology Andhra Pradesh

Department Of Biotechnology

Faculty Advisor's Message

It is a matter of immense pride to launch volume 2 of our Biotechnology Departmental magazine, 'EXPRESSION' initiated by members of Biotechnical Engineering Association (BEA).

This magazine is to bring into limelight the novel ideas and reading and writing proficiency of students. They are empowered to freely share their views and opinions on recent inventions and discoveries in the field of biotechnology. This magazine also discloses some advices from GATE toppers of our branch. The students also share a report of BEA activities through this magazine.

I wish to convey my sincere thanks and gratitude to all the students who have contributed to this magazine in any possible way. I ardently thank the students and the administration for extending support in making this endeavour a success.

I truly hope the following pages keep you gripped to the magazine.

Dr Manasa P

Faculty Advisor,

Biotechnical Engineering Asssociation

Motto of BEA

AWARENESS ABOUT THE FIELD OF BIOTECHNOLOGY AMONG OTHER BRANCHES AND INTEGRATION OF MULTIPLE DISCIPLINES:

Generally, many people from other fields have a perception that Biotechnology is a field exclusively of biological sciences and have no importance in the field of engineering. In this regard we want to take an initiative and provide awareness about the course by converging it with other disciplines. This would bring out new inventions and create a whole new expertise. BEA provides a platform to share ideas and acknowledges it by any means to bring it into limelight. We also plan to invite esteemed guests who could give us an overview of Biotechnology.

ESTABLISHING COLLABORATIONS

We plan to interact with students and mentors from other institutes across the country and incorporate their best practices and views in our curriculum to perform research work and publish papers in symposiums.

CAREER COUNSELLING:

Inviting experts from the field of Biotechnology through which students would get to know their experiences, discuss career pathways and various opportunities Post Engineering.

PERSONALITY DEVELOPMENT:

As presenting an opinion with confidence is essential to thrive in any field, our association would organize events where students can present their opinion on a given topic and conduct group discussions

MAGAZINE PUBLICATION:

Magazine publication would be a mandatory endeavor from now on as it lays as a strong foundation for present practices and research in biotechnology. It is also, a medium through which the alumni would be able to communicate their thoughts with fresh batches that enter the institute.

EXTRACURRICULAR ACTIVITIES:

These would include interaction sessions with students of our branch, industrial trips, biotechnology inspired art and photography competitions, quizzes and games.

Executive body of BEA

The executive body of BEA, Department of Biotechnology, NIT Andhra Pradesh for the academic year 2018-19 led under the supervision of Dr. P Manasa as Faculty Advisor and consists of the following students:

HOD: Dr. A. Seenivasan (9479010826) (hod_biot@nitandhra.ac.in)

Faculty Advisor: Dr. Manasa P (9740643471) (manasanaik710@gmail.com)

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	Pragna	7093051827
	Rachana	9494619197
	Sree Raj Akhil	7702290359
	Uday Kiran	7981321432

Acknowledgement

Members of Biotechnical Engineering Association (BEA) are grateful to our Director, Dr. C. S. P. Rao for giving us an opportunity to launch the second edition of our association magazine, “Expression”.

We express our gratitude to Prof G. Amba Prasad, Prof P. Nageswara Rao, Dr. A. Seenivasan and all the faculty of the Department of Biotechnology for their continuous support and co co-operation.

This magazine is an outcome of the meticulous work done by Department of Biotechnology students. It is my privilege and immense pleasure to express deep sense of gratitude to P. Akhil, and T. Harshini for their meritorious and sincere efforts in bringing out this magazine.

I would like to render my heartfelt gratitude to our Faculty advisor Dr. Manasa P. for her support and encouragement. Special thanks to BEA members and fellow students for their timely help and active participation in conducting various events held by the association.

-V. Jahnavi
General Secretary BEA

CONTENT

PILLI AKHIL

Process Analytical Technology An industry perspective

What is PAT……?

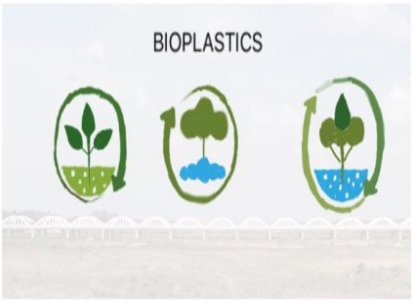
Process Analytical Tecnology (PAT) is a system for designing, analysing and controlling pharmaceutical manufacturing processes through measurements of critical quality and performance attributes of raw and processed materials to ensure final product quality, the idea of which is to become more efficient while reducing over-processing, enhancing efficiency and minimising waste. In this roundtable, three leading pharmaceutical PAT companies offer their opinions on why PAT is becoming more and more essential to the pharmaceutical industry

What industry needs does Process Analytical Technology meet?

Viewing this question from the regulator's perspective, Process Analytical Technology is primarily focused on reducing process variability. Integrating on-line measurement and/or modelling of critical quality attributes with automated feedback control of the process parameters impacting these attributes should reduce product variability. Reducing product variability will subsequently reduce the risk of releasing off-spec product into the marketplace. The push is to shift away from the historical quality assurance approach (i.e. testing quality after the process is complete) to a true quality control approach where the process is continually adjusted to maintain product quality. In addition, there are the benefits of cycle time reduction and increased process efficiency (e.g. increased yield, throughput and equipment utilisation) that are achieved by eliminating the delays associated with off-line assays, as demonstrated by Eli Lilly's ten-fold increase in throughput enabled by moving HPLC assays on-line. Identification of critical-to-quality process parameters and their optimum operating ranges should be accomplished much more efficiently with PAT in place throughout the process development and product manufacturing life cycle. Although this may be difficult to quantitate, it was a benefit of implementing on-line ion chromatography to measure amino acids that was cited by Genentech.

High regulatory requirements have resulted in nearly static manufacturing processes and production technology in the pharmaceutical industry in the last few decades. Thus in terms of automation and process control, the pharmaceutical industry is significantly behind other industries. But yes, there is a significant need to increase process knowledge and for improvements. Process Analytical Technology is an important part in the puzzle that will help the pharmaceutical industry to produce more flexibly at a lower cost and with consistently high quality. PAT helps generate process knowledge by opening the black box of various production steps. As such, it can be a relatively simple tool for process troubleshooting in process development or routine operation. Applied early in product development using design of experiment concepts, a design space for the production process can be developed. Applying PAT to existing products might be economically difficult, as long as refilling the product with the new, more flexible process is the goal. Last but not least, PAT is a door opener for continuous production processes, where in-line control is essential to achieve constant high quality.

The starting point has to be the vision of where the company wants to be in 10 – 15 years time and how this will impact manufacturing methods and practices. For example, a company may choose to implement relatively modest improvement investment in a plant that is manufacturing a product that is nearing the end of its patent life. Elsewhere, it may choose to plan for a rapid and full scale move to process analytical technology (PAT) enabling full realisation of the FDA's vision of real time product control and release, based on continuous manufacturing operations. Moreover, companies will face a choice between big plants with flexible recipe production versus small scale development (pilot) plants which will also be production facilities with dedicated lines. For both models of production, industrial IT systems will play a strategic role, requiring tremendous flexibility, in the first model to support the flexibility of production that will be necessary and in the second smaller scale model to link production with continuous development and learning from clinical trials.



BIOPLASTICS

HARSHINI TUMMANA

What happened with plastics..?

Many materials that we use in our everyday life are made extensively ofplastics. But why is it a staunch necessity for human beings to use these non biodegradable and non expendable materials?
What are these plastics not used for? Why are we the prime polluters of the environment while we have an opportunity to refuse and reduce the pollution?
These inevitable questions that will persist through generations and their generations cannot be left unanswered even after tracing a solution.
BIOPLASTICS is and will be the major game changer once brought comprehensively into the market.

PLASTICS-THEIR SUPPLY AND DEMAND

Indian plastics industry is set to buck the global trend of sluggish growth by emerging as one of the fastest growing markets with 12 percent growth rate.By 2020, plastics consumption of the 1.34 billion people is expected to increase from the current 12 million metric tonnes per annum (MMTPA) to 20 MMTPA.This huge number does nothing more but vastly destroy the nature.The damage done to the environment by these non biodegradable materials is irrevocable.

A dump yard for plastic amidst a slum

Essence of bioplastics being made from corn

Most plastics are made from crude oil. Molecules present in crude oil undergo chemical reactions that create monomers, which are assembled together to make polymers that can be processed into plastics. This process is very common, but it produces pollutants, such as carbon dioxide,carbon monoxide, dioxins and furans into air. Whilst carbon monoxide is a pretty well known poison, dioxins and furans are not. But studies have majorly linked dioxins and furans to cancer and respiratory disease.Also, crude oil is in great demand throughout the world. Scientists estimate that at today's consumption rate, the world's oil supply may dry up in less than 100 years.Not only does the accumulation of plastics in environment can wreak havoc on natural environments, leading to long-term issues for plants, animals, and people but also costs millions of dollars each year to clean the affected areas after exposure. To address these problems, scientists have been looking for the past two decades for new ways of making plastics. One way involves the use of plants as the raw material, instead of crude oil. This method produces a plastic that is ecological and environmental friendly.And thatplastic is called BIOPLASTIC.

INTRODUCING BIOPLASTICS

What are bioplastics made of?
A large proportion of certified compostable plastic products available on the market today contain a high proportion of renewable raw materials. There are also synthetic polymers (based on fossil raw materials) which are compostable. Rather than using fossil carbon in manufacturing conventional plastics, bio-based polymers use carbon from renewable resources such as sugar, starch, vegetable oils or cellulose in production. Corn, potatoes, cereals, sugar cane and wood are the most commonly used feedstocks.These are primarily made by converting the sugar present in plants into plastic.

Two types of bioplastics are now produced in large quantities. They are called polylactide acid (PLA) and polyhydroxyal kanoate (PHA).

- The biggest producer of PLA is NatureWorks, a company located in Blair, Neb. There, corn kernels are milled, a chemical substance called dextrose is extracted, and dextrose is fermented by bacteria or yeast in big vats. The result is lactic acid which acts as a repeating unit to make PLA.

- The other common bioplastic, PHA, is a polymer produced naturally by bacteria. Different PHA molecules are made by the bacteria. These molecules can consist of more than 150 different types of monomers, leading to materials with very different properties from one another. Two types of PHA polymers are formed in polymerisation reactions that combine more than 150 different types of monomers, that lead to materials with very different properties.

BIOSYNTHESIS OF PHA

Many living organisms, mainly plants and bacteria produce PHAs. However, microorganisms are more suitable for the industrial production of PHAs due to the fact that plant cells can only accumulate low yields of PHAs i.e. less than 10% (w/w) without adversely affecting their growth. In contrast, bacteria are known to store up PHAs at levels as high as 90% (w/w) of their dry cell weight.

A wide range of Gram-positive and Gram-negative bacteria including Aeromonas hydrophila, Alcaligenes latus, Pseudomonas sp, Bacillus sp, and Methylobacterium sp naturally synthesise PHAs. These bacteria produce PHA as a carbon and energy storage compounds under imbalanced nutritional conditions. When carbon is in excess and the other nutrients such as nitrogen or phosphorous or oxygen is limited, PHA is accumulated in the form of water-insoluble granules in their cytoplasms. To degrade properly, bioplastics need to be treated like compost and not just left in a landfill site where degradation is very difficult due to the lack of oxygen and moisture.

DEGRADATION OF PHB BY MICROORGANISMS

DAY 0 DAY 12 DAY 24 DAY 45

BIOPLASTICS VERSUS CONVENTIONAL PLASTICS

It must however be taken into consideration that a direct comparison of conventional plastic products with bioplastic products may lead to an inappropriate image. Conventional plastics are technically mature, high quantity products (commodities). Bioplastics, on the other hand, are in an early stage of development, and their production and distribution processes and recycling paths are not yet optimized. The comparison therefore merely provides a snapshot. Disregard for this could lead to over-estimatation of the status quo with the consequence that further development of bioplastics could be slowed or halted. Barriers to innovation with far reaching consequences would result.

On the other hand, growth in the market for products made from bioplastics can ensure the financing of the ecological advancement of the technology and the setting up of optimized infrastructure.

ENVIRONMENTAL AND ECONOMIC ADVANTAGES OF BIOPLASTICS

There are many good reasons to support the bioplastics innovation. Environmental aspects are top of the list. Various LCA studies have documented significant savings in the consumption of fossil energy and considerably reduced CO2 emissions for different types of bioplastic products. It is not however possible to make blanket assumptions such as "bioplastics are the more environmentally friendly solution". It is furthermore important to consider the following: Sustainability covers not only environmental aspects but also economic and social components. If jobs, growth markets or global export opportunities develop from innovative technologies such as bioplastics, this

BIOPLASTICS IN INDIA

In India, Bioplastics are still in their nascent stage with very few market players operating in this segment. Currently, the Indian Bioplastics market is beset by challenges such as low awareness that are typical to emerging markets, especially the markets dealing with eco-friendly products, but there is a potential for companies wishing to enter this market. Apart from possible government backing and rising greater environmental awareness, Bioplastics manufacturers can benefit from the easy availability of abundant feedstock in India. This segment has a long way to go in terms of production, raw materials and technology. Environmental awareness and promoting the long-term benefits of bio-plastics is an initial step that needs to take toward bringing this change.

On a brighter note, Jammu & Kashmir is the first state in India to have built a dedicated bioplastic product manufacturing facility with an installed capacity of about 960 metric tons per year. The J&K Agro Industries Ltd has started its joint venture with **Earthsoul India** to launch the country's first integrated biopolymer facility that can manufacture 100% bio-degradable and compostable products. The facility manufactures flower pots and trays for floriculture, carry bags for shopping, packaging material for foodstuff and meats, bin liners for hotels, etc. Ravi Industries in Maharashtra, Harita NTI Ltd and Biotec Bags in Tamilnadu are also the pioneers in Bio-plastics in India.

A Biospife

DIGGING FROM DEEP

DE-EXTINCTION

JAHNAVI V

Extinction

In biology, extinction is the termination of an organism or of a group of organisms normally a species. The moment of extinction is generally considered to be the death of the last individual of the species. More than 99 percent of all species, amounting to over five billion species, that ever lived on Earth are estimated to have died out.

Mass Extinction

A mass extinction event is a widespread and rapid decrease in the biodiversity on Earth. Such an event is identified by a sharp change in the diversity and abundance of multicellular organisms.

Poaching

Poaching is the greatest current threat to tigers, rhinos, elephants, gorillas and other African and Asian species. It's a crime and it's driving species to extinction. Tigers and rhinos are particularly vulnerable, their body parts being prized in traditional Asian medicine.

De-extinction

De-extinction, or Resurrection biology, or Species revivalism is the process of creating an organism, which is either a member of, or resembles an extinct species, or breeding population of such organisms. Although once considered a fanciful notion, advances in biotechnology enabled scientists to bring extinct animals back from the grave.

Key among the advances was the development in the 1990s of a technique known as **Somatic cell nuclear transfer** (SCNT), which was used to produce the **first mammalian clone, Dolly** the sheep (born 1996, died 2003).

The candidate species for de-extinction are many. Some high-profile examples include the Woolly mammoth, the Passenger pigeon the thylacine and the Gastric-brooding frog. A Jurassic Park situation of dinosaurs once more roaming the Earth remains a fantasy. De-extinction is incredibly challenging and it's not clear whether dinosaur DNA even can be recovered.

Realistic prospect of Extinct animal zoos

Woolly mammoth DNA is more accessible. We have flash-frozen mammoth samples and can implant the genetic material into elephants, which are genetically similar. By one estimate a woolly mammoth-elephant hybrid is only a few years away. Scientists might eventually be able to do that with other species that died out more recently than mammoths – like passenger pigeons by mapping the entire passenger pigeon genome, then mutating a common pigeon's genome so that it's akin to a passenger pigeon's.

In Scientist's estimation, if there were enough political will and funding, it would only take 10 years to reach a situation where zoos are populated with rare and even endangered animals.

3 REASONS WHY

1. To Improve Our Science

Science for science's sake is a noble effort, but there are also many arguments for "resurrection biology," which frame the effort as being less about the de-extinction of species that have been lost to us.

2. To Save Endangered Species

As humans have taken up more space and resources, we've destroyed natural habitats and endangered species. The less biodiversity in an ecosystem, the greater chance species after species will go extinct. Reviving extinct keystone species, then, could help us preserve biodiversity, and, possibly, the ecosystems.

3. To Preserve the Planet

Bringing now-dead species back to life might help Earth survive in the long run. The woolly mammoth, for example, used to fertilize the grasslands of Siberia; after it went extinct, the entire region became icy and barren.

Methods of De-Extinction

1. **Cloning:** Cloning, using the DNA of the organism, is the most known method that can be used to resurrect species, however, it is not the easiest. This method is not actually creating clones, but using the same idea of cloning to recreate the species. The problem is not reading DNA nor making DNA, but how to getting a cell to read the DNA. The cloning of many animals have been successful, and with recently extinct animals and endangered species, it is very possible that cloning will work.
   The banteng is an endangered species that was successfully cloned, and the first to survive for more than a week.

2. **Genome Editing:** Scientists would compare the genome of an extinct animal with the closest living species and swap certain genes by using gene-editing tools so certain traits are similar. Germ cells may be edited directly, so that the egg and sperm produced by the extant parent species will produce offspring of the extinct species, or somatic cells may be edited and transferred via somatic cell nuclear transfer. The modified genome would then be placed into a surrogate or in an artificial womb.

3. **Selective Breeding:** Selective breeding is the process by which living relatives of the extinct species are identified and specifically mated to reproduce the traits of the extinct species. This method involves using strategic mating, behaviour, and specific diets of a species alive today to produce the ancestors of that species. Some biotechnology of embryo transplantation might be needed, but it is still possible within some generations of breeding. This method can recreate the traits of an extinct species, but the genome will differ from the original species.

The aurochs, which became extinct in 1627, could possibly be brought back by taking DNA samples from bone and teeth fragments in museums in order to obtain genetic material to recreate its DNA.

The Quagga Project

This project, started in 1987, is an attempt by a group of dedicated people in South Africa to bring back an animal from extinction and reintroduce it into reserves in its former habitat. DNA analysis has shown that the Quagga was not a separate species of zebra but in fact a subspecies of the Plains Zebra (Equus Quagga). The Quagga formerly inhabited the Karoo and southern Free State of South Africa.

Like other grazing mammals, Quaggas had been ruthlessly hunted. They were seen by the settlers as competitors for the grazing of their livestock, mainly sheep and goats. By selective breeding from a selected founder population of southern Plains Zebras an attempt is was made to retrieve at least the genes responsible for the Quagga's characteristic striping pattern.

The first foal was born on the 9th of December 1988. During the successive years, further selected breeding stock taken from Etosha and Zululand have been added.The first foal of the second offspring generation (F2 generation) was born in February 1997. Reproductive maturity is reached only at two to three years in mares and four to five years in stallions. Fastforward to 2017, amazingly, 25 third-generation quagga were found roaming South Africa -- a bioengineering feat managed for the first time in the history of the planet.

Current Scenario

1. Woolly Mammoth Revival

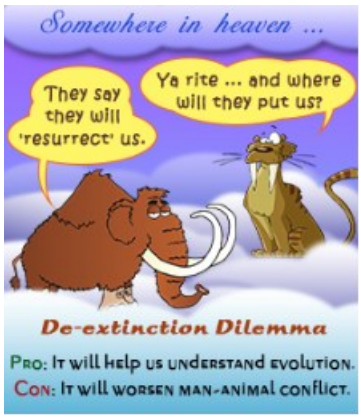
The goal of Woolly Mammoth revival is to bring back this extinct species so that healthy herds may one-day re-populate. The intent is not to make perfect copies, but to focus on the mammoth adaptations needed for Asian elephants to thrive in the cold climate of the arctic. The milestones along the way range from developing elephant tissue cultures to genome editing and developing insights that help with Asian elephant conservation

2. The Great Passenger Pigeon Comeback

Phase 1 –2012,Sequenced DNA from 37 Passenger Pigeons, including 2 whole genomes
Phase 2 –2017, experiments to genetically engineer pigeons, using Domestic Rock Pigeons as a model to begin testing the feasibility of editing genomes of living birds for the extinct Passenger Pigeon's traits.
Phase 3 – In July 2017, project collaborator Holland Shaw began raising Revive & ReStore's small Band-tailed Pigeon flock at his home in Massachusetts, the first step in growing our flock to raise future revived Passenger Pigeons.

Ethical Considerations

Cloning, stem cell manipulation, genome reconstruction, and genome editing are powerful technologies with significant ethical ramifications when applied to de-extinction. The expense and inefficiency of SCNT, for example, has raised questions about its practicality for resurrecting extinct species. Perhaps the greatest concern, however, is the potential of those technologies, as well as back breeding, to alter the course of natural history. De-extinction provides an opportunity for humans to rectify past harms inflicted on other species, as well as to expand species diversity. But many extinct species were driven out of existence as a result of habitat loss, and others lived in habitats that have since been altered dramatically.



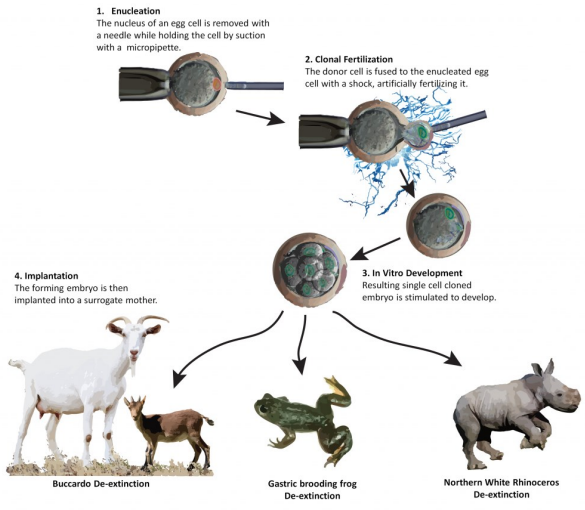
In addition, in the near term, resurrected species would be considered endangered and would therefore require conservation, for which resources often are constrained or lacking. Other concerns include unknowns about the fate of resurrected animals, from the health of cloned individuals to whether the animals would be able to adapt to current environmental conditions and whether they would be able to produce viable offspring. The classification of species revived through back breeding, cloning, or genetic reconstruction, all of which could involve divergence from an extinct species' original genetic constitution, also remains uncertain.

The potential to be leveraged as a means of advancing financial and commercial interests has led some to question the motivation of researchers and companies behind certain de-extinction projects. Nonetheless, de-extinction has helped fuel important progress in science, building particularly on knowledge in developmental biology and genetics. It also has generated interest in endangered species, with many of the tools of de-extinction also being applicable to conservation of endangered species. The reconstruction of extinct genes could be used, for example, to restore genetic diversity in threatened species or subspecies.

Conclusion

Every animal in an ecosystem has a function: Bats eat insects, fish clean algae from coral, grazers spread nutrient-rich dung across habitats. Some functions are redundant —shared among multiple different animals—but others are fulfilled by just one or two species.To understand how much we rely on ecosystem services, imagine a world where humans are the only species – perhaps in a spaceship far from Earth.

Nature is beautiful, and that aesthetic value is a reason to keep it, just as we preserve artistic masterpieces like the Mona Lisa or Angkor Wat.We have plenty of ways to find new medicines, which don't involve trekking through thousands of miles of dangerous jungle in the faint hope of finding a miracle plant. Equally, we can't take care of ourselves without preserving nature, because we need it for so many things. In specific situations we might choose to favour one or the other, but overall we have to do both.



COLOR BLINDNESS

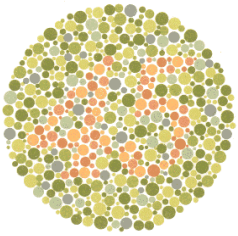
R KRISHNA SH

Introduction

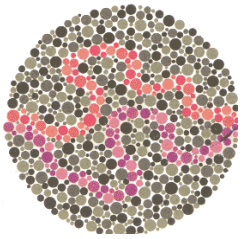
Nearly all people who are “color blind” can see colors but have difficulty distinguishing between certain colors. Not all people who are color blind have trouble with the same colors – most cannot distinguish between reds and greens; some cannot separate blues from yellows; and a very small group have a condition called monochromatism which only allows them to see black and white.Color blindness of various kinds affects roughly 8% of men – and less than 1% of women.

What Causes Color Blindness?

Color blindness is a genetic condition caused by a difference in how one or more of the light-sensitive cells found in the retina of the eye respond to certain colors. These cells, called cones, sense wavelengths of light, and enable the retina to distinguish between colors. This difference in sensitivity in one or more cones can make a person color blind.



A person with color deficiency may not be able to see the number 45 among the dots in this picture.



Those with normal color vision should be able to trace along both the purple and red lines.Those with Protanopia (red colorblind) should be able to trace the purple line, those with protanomaly (weak red vision) may be able to trace the red line, with increased difficulty.Those with Deuteranopia (green color blind) should be able to trace the red line, those with Deuteranomaly (weak green vision) may be able to trace the purple line, with increased difficulty.

Symptoms of Color Blindness

The symptoms of color blindness are often observed by parents when children are young. In other cases, symptoms are so slight, they may not even be noticed. Common symptoms of color blindness include:

- Difficulty distinguishing between colors
- Inability to see shades or tones of the same colo

Treatment for Color Blindness

There is no known cure for color blindness. Contact lenses and glasses are available with filters to help color deficiencies, if needed. Fortunately, the vision of most color-blind people is normal in all other respects and certain adaptation methods are all that is required. but many colour blind people find these actually confuse them further rather than help.

There is hope on the horizon for a ‘cure’ for inherited colour vision deficiency using gene technology – for more information visit www.genevolve.com. This will involve injecting genetic material into the eye so is not for the faint-hearted! At the moment there have been no trials on humans but the process has been proved to work in monkeys.

Color blindness awareness

September 6th is International Color Blind Awareness Day, but did you know that it’s also John Dalton’s birthday? Along with his work in atomic theory, He was also the first scientist to study color blindness, publishing a paper on the topic, entitled, Extraordinary Facts Relating to the Vision of Colours with Observations. After discovering his own color blindness, he began conducting rudimentary tests on his friends to see if they shared his color vision impairment. His observations contributed to the discovery of what we now call color vision deficiency (CVD) or more commonly known as color blindness.**John Dalton** was termed as the father of color blindness

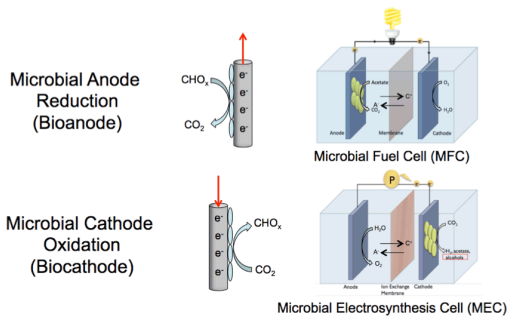
BIOELECTROSYNTHESIS

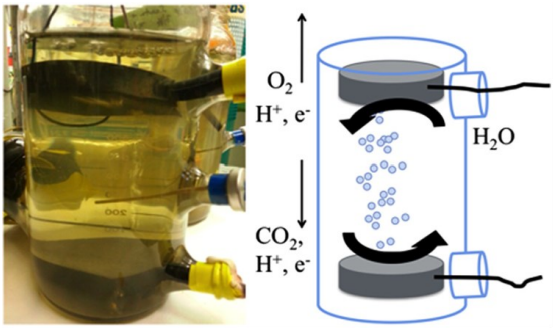
T SRITEJA

ABSTRACT

The word **Energetics** is currently based on burning of fossil fuels, oil, gas, and coal resulting in production of CO_2, a greenhouse gas. The conversion to technologies that reduce carbon dioxide emission is becoming a general trend in the world's development. Bioelectrosynthesis is new technology, where the carbon dioxide emissions are reduced using microorganisms. Microbes are used for obtainment of hydrogen, methane and formic acid along with electro-fermentation and fixation of CO_2. Microbial fuel cells or electrolysis cells, both use microorganisms to oxidize organic or inorganic matter at an anode to generate electricity or H_2. The discovery that electrical current can also drive microbial metabolism has recently lead to other applications in bioremediation and in the production of fuels and chemicals. Notably, the microbial production of chemicals, called microbial electro synthesis, provides a highly attractive, novel route for the generation of valuable products from electricity or even wastewater. The use of electrolysis hydrogen to grow hydrogen oxidizing bacteria are also considered. The mechanism of extracellular electron transport and mixing of metabolic and electric pathway are to be done.

Extracellular electron transfer in microorganisms is done in bio electrochemical synthesis utilizing microbes to catalyse anodic or cathodic biochemical reactions. Anodic reactions used for current production and cathodic reactions are applied for current consumption for valuable biochemical production. The extracellular electron transfer from the cathode to the microbe could catalyse various bio electrochemical reductions. Electro-fermentation used electrons from the cathode as reducing power to produce more





reduced compounds such as alcohols than acids, shifting the metabolic pathway. Electro-fuel could be generated through artificial photosynthesis using electrical energy instead of solar energy in the process of carbon fixation. Electron transport is done by using electron mediators or shuttles, by direct membrane associated electron transfer or by chemical mediators (neutral red or anthraquinone-2,6-disulfonate). Reactors used for Microbial fuel cells are H-type, Abiotic, and Mediator less reactors. H-Cell type of reactors consists of 2 chambers made of glass and linked with each other. A permeable membrane was used at the interconnection to allow the flow of electrons from one chamber to another chamber. The H-cells were used to boost current density and to encourage acetate production.

Abiotic reactors are same as unmodified H-cell reactors and used for calculate hydrogen production in absence of microbes. Membrane less reactors are constructed to reduce the internal resistance of our reactors, i.e., reactor without a proton exchange membrane. Graphite disks were used as anode and cathode. Voltage was controlled in membrane less reactors to reduce the production of hydrogen. The unique control of BES enables real-time monitoring of bio catalytic process. Voltages are applied in microbial cells to overcome the energy barrier of bio catalysts to form respective products. Using of waste water as anodic fuel in BES helps both in treatment as well as energy generation. Application of BES includes MFC, MEC, MDS and MES. Reactor efficiency is measured using number of electrons appearing in acetate (energy content per mole of acetate) to energy delivered to reactor. The future prospects in this field increases as research is being done to increase the electrode surface area, current density, increase biofilm formation and also optimisation of process by parameters temperature, pH and methanogen inhibitor concentration to increase the yield of the end product.

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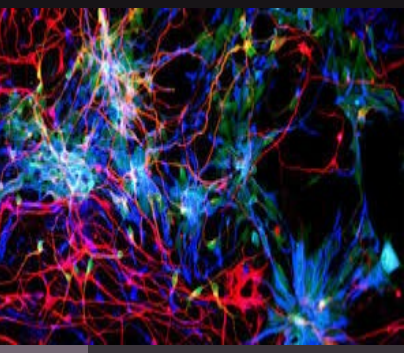
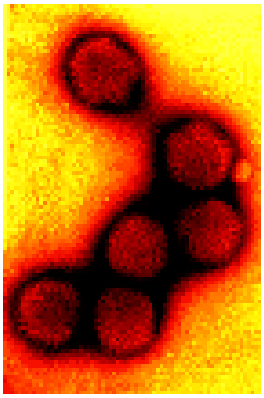


GENE THERAPY

G JHANSI PREETHAM

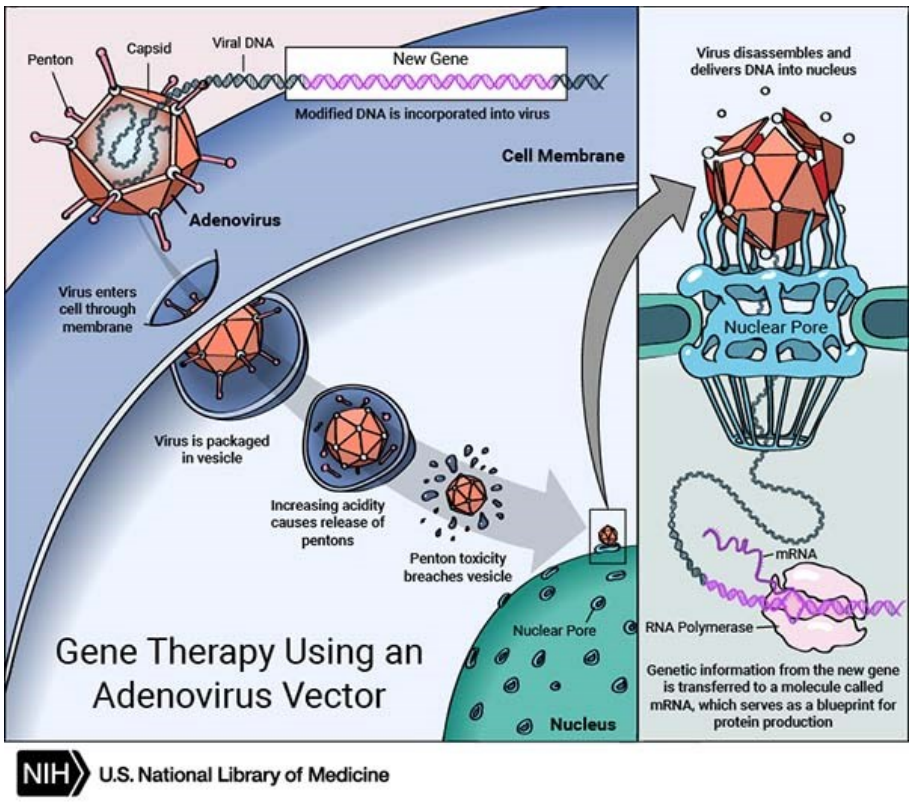
Gene therapy attempts to treat genetic diseases at the molecular level by correcting what is wrong with defective genes. Clinical research into gene therapy's safety and effectiveness has just begun. No one knows if gene therapy will work, or for what diseases. If gene therapy is successful, it could work by preventing a protein from doing something that causes harm, restoring the normal function of a protein, giving proteins new functions, or enhancing the existing functions of proteins.



Gene therapy relies on finding a dependable delivery system to carry the correct gene to the affected cells. The gene must be delivered inside the target cells and work properly without causing adverse effects. Delivering genes that will work correctly for the long term is the greatest challenge of gene therapy.

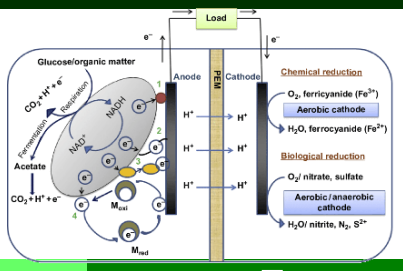
This photograph is of an adenovirus. Viruses are often used by researchers to deliver the correct gene to cells. Viruses deposit their own genetic material into host cells to instruct those cells to make more viruses. In gene therapy, the DNA for the desired gene is inserted into the genetic material of the virus. The virus is engineered so that it cannot reproduce, but it does de liver its new genetic material which contains the desired DNA.

Gene therapy researchers are investigating ways other than viruses to deliver the correct gene to cells. Fatty molecules known as liposomes may also be used as can micropipettes, sometimes called "gene guns" to insert genes into cells physically.



MICROBIAL FUEL CELL FOR SUSTAINABLE DEVELOPMENT

PR KRISHNA REDDY



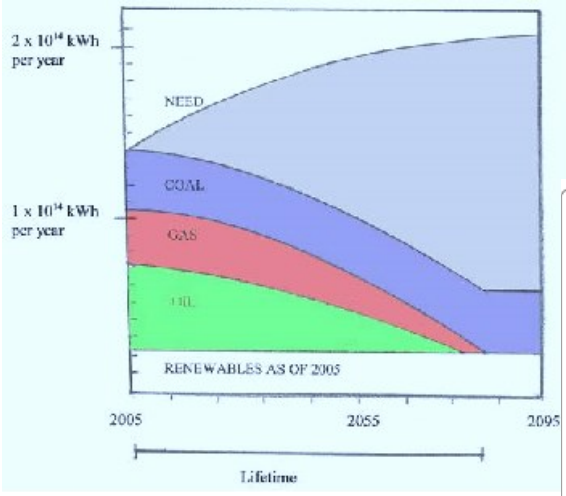
Why MFC…?

Today we are witnessing a global energy crisis due to huge energy demands and limited resources. Non-renewable energy sources are depleting and renewable energy sources are not properly utilized. There is an immediate need for the search of alternate resources for energy generation. One such alternative is Microbial fuel cell (MFC) technology, which uses microorganisms to transform the chemical energy present in organic material into electrical energy. Extensive studies have corroborated new insights into MFC's, which show that a wide array of carbon sources including wastes can be employed for energy generation.

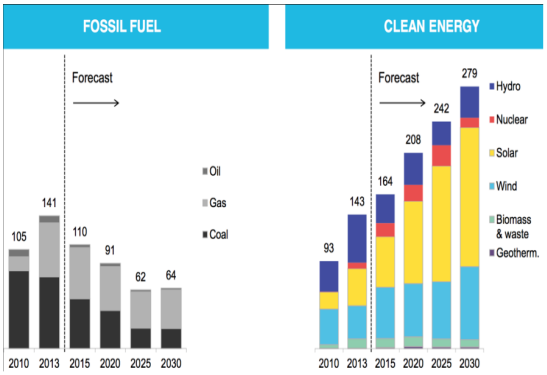
Microbial fuel cell (MFC) can be considered as a reliable, clean, non toxic, and efficient process. Moreover the by product generated from the above process can be considered as bio manure. Thus, in recent years, the application of MFCs have shown great potential in energy generation from organic waste.

Problem statement

At the global level we see that coal is the dominant electricity producing source accounting for approximately 40% of total electricity production followed by natural gas and oil accounting to 22%, and 4 % respectively (Figure 1a).



Therefore, search for alternate sources of energy generation which are economic, reliable and eco-friendly have become a primary necessity. The estimated chances for replacement of fossil fuels by clean energy. Out of the total solid municipal waste, 40% accounts for the organic waste and have the potential to generate the electrical energy worth $1.6 billion.



Types of MFC's

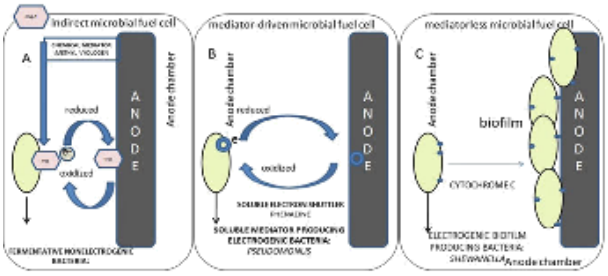
MFCs are of different types; however, the basic designs used in the laboratories for its applications include :

Double-chamber MFC AND Single-chamber MFC

Redox reactions

Biocatalyst is able to be divided from oxygen by posing a membrane between two separate chambers that allow charge to be transferred between the electrodes, the anode chamber, where the bacteria grow, and the cathode chamber, where the electrons react the oxygen

Mechanisms of electron transfer to anode in MFC



Anode reaction:

$C_2H_4O_2 + 2H_2O \rightarrow 2CO_2 + 8e + 8H^+$

Cathode reaction

$2O_2 + 8H_+ + 8e \rightarrow 4H_2O$

Process Flow chart

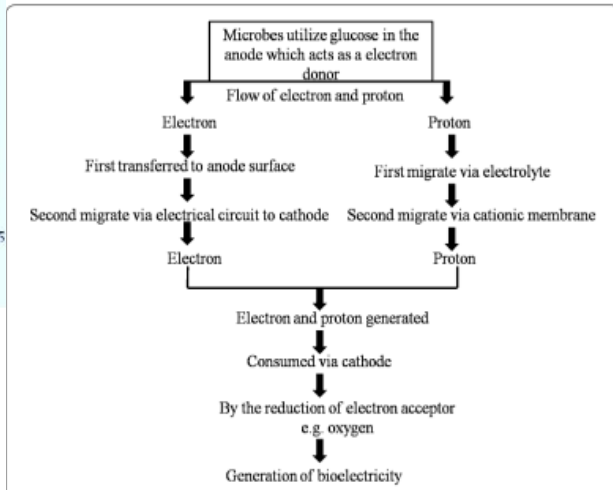


Fig. 2 Schematic representation of the production of bioelectricity from microbes

Acknowledgements

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BIOCHIPS

KOLA SASI PREETHAM

Introduction

A biochip is a collection of miniaturized test sites (microarrays) arranged on a solid substrate that permits many tests to be performed at the same time in order to achieve higher throughput and speed. Typically, a biochip's surface area is no larger than a fingernail. Like a computer chip that can perform millions of mathematical operations in one second, a biochip can perform thousands of biological reactions, such as decoding genes, in a few seconds.

1.Transponder 2.Reader

1. ***Transponder*** is the main biochip.it has four components

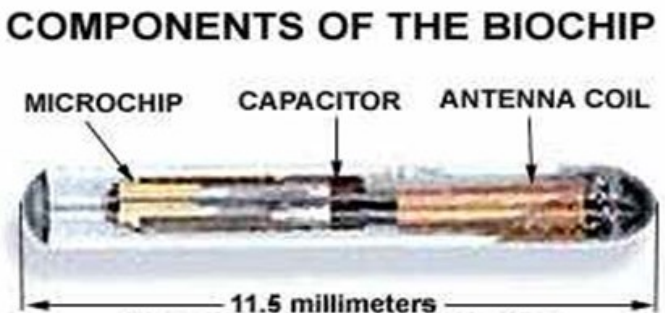
a)**COMPUTER CHIP**:-it stores a unique identification numerfrom 10 to15 digits long.

b)**ANTENNA COIL**:-this tiny and primitive radio antenna sends and receive signals from reader.

c)**TUNING CAPACITOR:-**this capacitor is charged by a small signal(1/1000 of a watt) sent by a reader.

d)**GLASS CAPSULE:-**it houses all the above components in it.it is made up of a biocompatible material such as soda lime glass.

2. Reader consists of an exiter coil which creates electromagnetic field and provides energy to activate the implanted biochip.it carries a receiver coil to receive ID number and decodes it by using a software giving the result in an LCD display.



In deep

WORKING

1. Reader transmits a low powered radio-signal and activates the implanted bio-chip

2. ID number transmitted by the transponder is received by the reader.

3. Reader displays the ID number on the LCD display.

ADVANTAGES

1. To rescue the sick

2. To find lost people

3. To identify a person uniquely.

4. Monitoring of health con-dition of an individual and increase speed of diagnosis.

DISADVANTAGES

1.Privacy of a person is at risk. There is danger of turning every human into a controlled slave

2.They can be implanted into ones body without their knowledge. They mark the end of human freedom and dignity.

ADVANCEMENTS IN USE OF BIOCHIPS

All the information of our cards,passport,aadhar

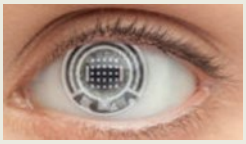
driving license can be saved in biochips

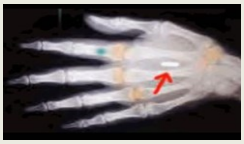
Blood sugar level can be found by using contact lenses

Disease diagnostics can be done easily by the use of biochips

It is used as a tracker by rich people

It is used as NFC tag





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DNA BASED ACTIVE CONTROLLER SWITCH

S TRIPATHI

Introduction

DNA has unique electrical properties, which can create advancement in development of tiny low cost electronic devices. Here, DNA switch is used to regulate the flow of electricity within a single atomic size molecule just like a bulb switch. Charge transport is possible in DNA, hence to turn the charge transport on and off, DNA is chemically modified.

The modification is just one of double-stranded DNA's standard bases (A, C, T or G) with another chemical group called anthraquinone (Aq). Anthraquinone can be inserted between DNA base pairs. It contains a redox group which convert chemical energy through switches that send all of the electrical pulses in our brains and hearts and communicate signals within every cell. The modified Aq -DNA helix help biomolecule to perform as electrical switch. When anthraquinone gains most electrons, it is far more conductive and hence reversibly control the conductance states to make DNA switch on and off.

It creates an exciting new avenue for DNA based Nano electronics application

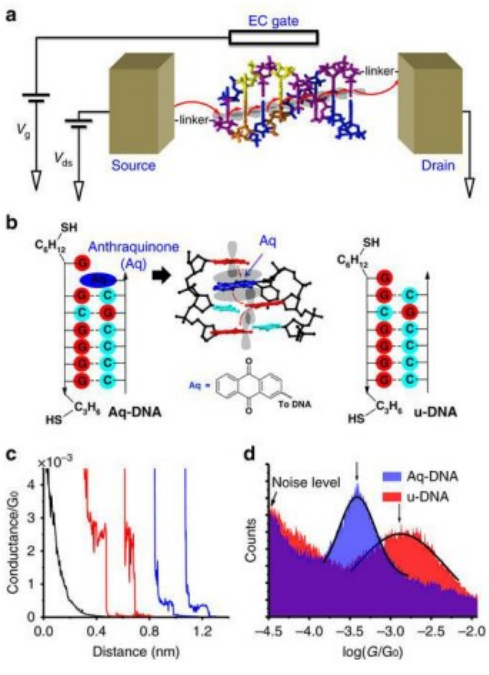
DNA is a unique molecule not only because of its role in living systems but also due to its double helical structure with π-electron stacking of the base pairs that has inspired many to explore DNA as a molecular wire. In addition, recent advances have made it possible to design and synthesize DNA with programmable three-dimensional nanostructures, which have further stimulated efforts to study DNA as device building blocks. Extensive theoretical and experimental works have indeed established that long-range charge transport can occur along double helical DNA via the overlapping π molecular orbitals of the stacked bases. While short-range charge transport in DNA has been attributed to non-resonant tunnelling, long-range charge transport is due to hopping between DNA bases, dominated by Guanine because its highest occupied molecular orbital (HOMO) level is closest to the electrode Fermi level among the four DNA bases. However, to further understand charge transport in DNA and to explore possible device applications, one wishes to electrically switch DNA conductance between different states with an external field. This has not yet been demonstrat-

Result

Structures and conductance measurements of DNA

To switch DNA conductance, we replaced one of the regular DNA bases with anthraquinone (Aq), a redox group that can be reversibly oxidized and reduced. Nuclear magnetic resonance and molecular dynamics analysis of a similar structure suggest that the Aq moiety stacks on the adjacent GC base pair, and the non-paired Guanine ring rests atop the Aq ring. This conformation is highly stable as indicated by the melting temperature increasing effect after this modification. It also allows overlapping of the anthraquinone molecular orbitals with those of the neighbouring bases, thus providing a continuous π–π stacking pathway along DNA for efficient charge transport.

To ensure high stability of double-stranded DNA and high charge transport efficiency, we choose the DNA sequences that consist of GC base pairs only. As a control experiment we also studied DNA without the Aq moiety. We refer the redox modified DNA as Aq-DNA, and unmodified DNA as u-DNA. Gel electrophoresis confirmed that both Aq-DNA and u-DNA form double helical structure, and no other structures were present under the experimental conditions.



(a) Illustration of the experiment, where the source and drain electrodes are the STM tip and substrate, and EC gate is a silver electrode inserted in the solution. A DNA molecule bridged between the source and drain electrodes via the thiolate linker groups, where charge hops from one base to the next (red arrows) via overlapping π-orbitals. The source-drain bias (V ds), and the EC gate voltage (V g) are controlled independently.

(b) From left to right: redox modified DNA (Aq-DNA), where a base was replaced with an anthraquinone (Aq) moiety (highlighted in blue) at the 3′-end of a DNA strand (see chemical structure in; three-dimensional structure (PDB ID: 2KK5, results are from nuclear magnetic resonance study1) shows that the Aq moiety intercalated in between the two Guanine bases on the other strand acts as a hopping site (red arrows) with its π-orbital overlapping with those from adjacent bases. Aq moiety is shown in blue. DNA without he Aq moiety (u-DNA) was studied as control. Both Aq-DNA and u-DNA contain a strand terminated with thiolated linkers at the 3′- and 5′-ends for contact with the source and drain electrodes.

(c) Representative current–distance traces (current converted to conductance) of Aq-DNA (blue) and u-DNA (red) in aqueous solution, showing plateaus originated from the formation of the DNA junctions. Control experiments performed in the

(b) Absence of DNA molecules showing smooth exponential decay (black trace).

(c) Conductance histograms of Aq-DNA (in blue) and u-DNA (in red), showing the difference in the conductance peaks. The peak was fitted with a Gaussian distribution and the peak position was taken as the conductance.

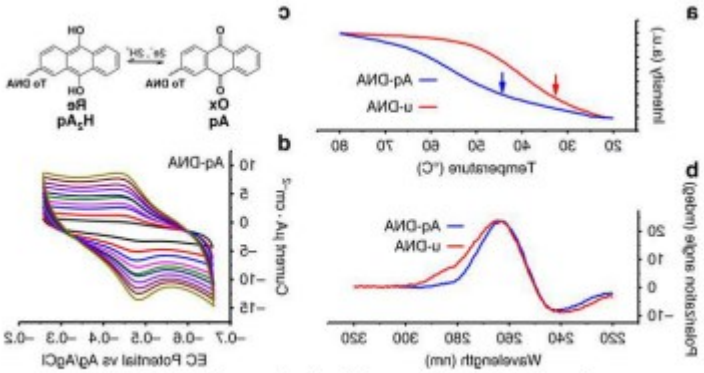


Figure 2: Characterizations of DNA molecules.

(a) Melting temperature curves for Aq-DNA and u-DNA with ultraviolet–vis absorption spectroscopy, where arrows indicate the melting points.

(b) (b)Circular dichroism study for Aq-DNA and u-DNA, where the negative band at around 245 nm, and positive band at 265 nm indicates double helical structure for both Aq-DNA and u-DNA. (c) Reversible redox reaction of the anthraquinone moiety involving two electrons in aqueous solution. (d) Cyclic voltammograms of Aq-DNA immobilized on gold substrate with potential sweeping rate varying from 0.01 (black line) to 0.1 V·s −1 (green line) showing oxidation and reduction peaks

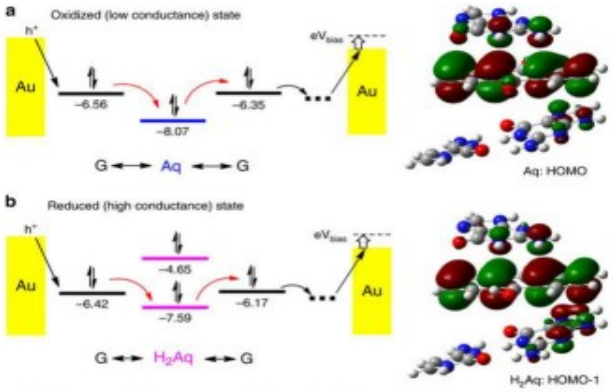


Figure 6: Energy diagram and molecular orbital spatial distribution.

(a) For oxidation state, HOMO level of Aq is the closest to the HOMO levels of Guanine. Hole hops from the left Guanine (non-paired) to Aq, then to the right Guanine (paired with C) as indicated by the red arrows. Molecular orbital spatial distribution indicates the HOMO level mainly localized on Aq.

(b) For reduction state, HOMO-1 level of H 2 Aq is the closest to the HOMO levels of Guanine. Comparing with the oxidation state, the energy alignment between H 2 Aq and Guanines is better. Molecular orbital spatial distribution also indicates the HOMO-1 level mainly loc.alized on H 2 Aq. The unit is eV for all the energy levels.

IV. CONCLUSION

This provides a unique way for studying important reactions implicated in disease, or photosynthesis reactions for novel renewable energy applications.

It creates an exciting new avenue for DNA based Nano electronics application.

BIOMETRICS

TECHNOLOGY GOES FULL CIRCLE

VENKATA MOUNIKA

APPROACH

Introduction

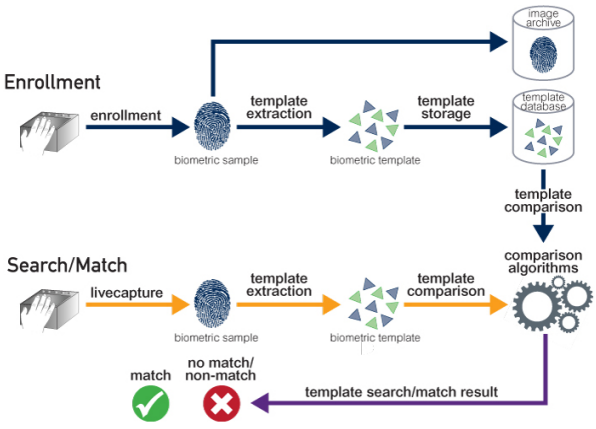
The global biometrics market is growing at a rapid pace due to the need for increased security and to combat the rising instances of security breaches, identity theft and data hacking. Governments and business alike are looking for authentication technologies that not only provide reliable security but are also extremely difficult to fake. Biometrics is one such solution that fulfils all these conditions as well as provides a great deal of convenience to the users. This technology authenticates individuals based on their bodily or behavioural characteristics such as fingerprints, iris, gait etc. and therefore it is extremely unlikely that intruders can fake the user's identity.

Biometric systems can seem complicated, but they all use the same three steps:

- **Enrolment**: The first time you use a biometric system, it records basic information about you, like your name or an identification number. It then captures an image or recording of your specific trait.

- **Storage**: Contrary to what you may see in movies, most systems don't store the complete image or recording. They instead analyse your trait and translate it into a code or graph. Some systems also record this data onto a smart card that you carry with you.

- **Comparison**: The next time you use the system, it compares the trait you present to the information on file. Then, it either accepts or



rejects that you are who you claim to be.

Systems also use the same three components:

A **sensor** that detects the characteristic being used for identification.

A **computer** that reads and stores the information

Software that analyses the characteristic, translates it into a graph or code and performs the actual comparisons

Trends in Biometric Technology

Iris Biometric Technology is Ubiquitous!

Iris recognition is the automated process of recognizing a person on the basis of unique pattern of iris. The iris is the annular region of the eye bounded by the pupil and sclera (white part of the eye). In the iris recognition, digital templates of iris are compared against the stored templates.

Multimodal Biometric Authentication Systems is what we need now!

The next trend in biometrics is the use of multiple biometric authentication systems for human identification. Multimodal solution with **both a fingerprint and finger vein modality** .Multimodal biometric authentication systems are expected to be more reliable against these issues due to the presence of multiple, independent biometric traits. Multimodal biometric authentication systems are expected to be used more in the future due to their effectiveness in providing more accurate results and stronger security.

Gait biometrics for sure!

Gait refers to the peculiar way one walks and it is complex spatio-temporal biometrics. It can be used to identify a person from a distant point. Therefore, this biometric is appropriate in surveillance scenario where the identity of a person can be surreptitiously established. Recognition based on gait is one of the newer biometrics and needs to be researched in detail. Gait is a behavioural biometric and influenced by a number of factors such as body weight, walking surface, footwear, nature of clothing, etc

Conclusion

As the technology world is evolving there are more and more trends and demand in the field of identity management. All these trends and demands are generated from one basic need – the need for a more accurate and secure way of identifying an individual. The intelligent ones are already learning to adopt with these trends in order to gain competitive advantage, are you?

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BIOPRINTING

J ROSHNI

Introduction

Three dimensional (3D) bioprinting is the utilization of 3D printing and 3D printing–like techniques to combine cells, growth factors, and biomaterials to fabricate biomedical parts that maximally imitate natural tissue characteristics.

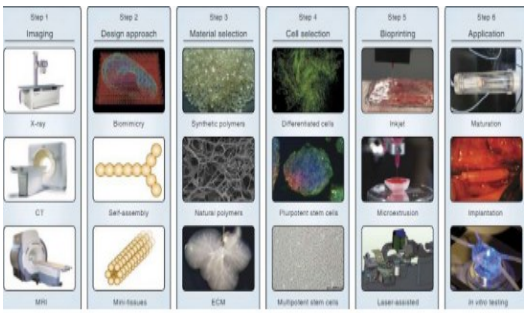
Generally, 3D bioprinting utilizes the layer-by-layer method to deposit materials known as bioinks to create tissue-like structures that are later used in medical and tissue engineering fields.

3D bioprinting generally follows three steps

- pre-bioprinting
- bioprinting
- post-bioprinting

Artificial skin

Most tissue-engineered skins are created by expanding normal skin cells in the laboratory on porous biodegradable scaffolds. An ideal bioprinted skin should have certain attributes such as being biocompatible, desired mechanical properties to match the tissue, an appropriate surface chemistry and be highly porous with a network of interconnected pores that will allow cells to attach and be able to transport nutrients and remove wound exudates.



Artificial liver

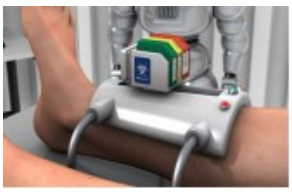
To build liver tissue of 5 mm size Pandorum needed 10 million liver cells, which were arranged in three-dimensional architecture, a bio-material made up of glucose, proteins and living cells extracted from a particular type of insect is used as ink, which is placed in three interchangeable dispensers of the printer's head controlled by lasers.

Human space exploration and planet colonisation

Despite these challenges, beating artificial heart cells, cartilage implants, skin repairs, functional kidney tissues have been printed successfully on Earth. The present topic addresses the possibility of performing regenerative medicine in space, which may guarantee sustainable life support on long term/long distance planetary exploration missions, opening to stable planet colonisation

In Situ Bioprinting

The aforementioned research progress will in time permit organs to be bioprinted in a lab from a culture of a patient's own cells. Such developments could therefore spark a medical revolution.



Cosmetic Applications

These would evaporate existing flesh and simultaneously replace it with new cells to exact patient specification. People could therefore download a face scan from the Internet and have it applied to themselves. Alternatively, some teenagers may have their own face scanned, and then reapplied every few years to achieve apparent perpetual youth.

Conclusion:

This seems like a much better alternative to the donor program, you aren't removing another persons organs. It is a very ethical method because your own cells are utilized in the process.

In any situation you would be able to leave the donor program and create the organ that you are in need of. That frees up the program for other people, who could need it more. Together with developments in nano-technology and genetic engineering, bioprinting may also prove a powerful tool for those in pursuit of life extension. Mainstream bioprinting will also inevitably drive further the New Industrial Convergence, with doctors, engineers and computer scientists all increasingly learning to manipulate living tissue at its most basic cellular level.

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3.https://www.ncbi.nlm.nih.gov/pubmed/?term=Regenerative+medicine+and+3D+bioprinting+for+human+space+exploration+and+planet+colonisation
4. https://www.livemint.com/Politics/rivzBlyrJznK1nn2JeKFZK/Pandoru m-develops-Indias-first-artificial-liver-tissue-usin.html
5. https://www.explainingthefuture.com/bioprinting.html

Success Speech

GATE 2019
GRADUATE APTITUDE TEST IN ENGINEERING

THE "GATE" WAY

Knowing Is Not Enough; We Must Apply. Wishing Is Not Enough; We Must Do. And the doing must begin right in the class.It should begin by preparing self-explanatory notes.Work smart by prioritizing certain subjects in which you can score most of the marks. You must be able to answer questions from any nook and corner of that subject. Going through previous years question papers and repeated solving of bits in the subject of your choice will be the major game changers. They will help you realise your strengths and weaknesses and therefore, will fetch you time to focus more on the important topics.
Get ample sleep and do not stress yourselves out All the very best.

-J ROSHNII

Cracking the GATE is neither easy as your assumption nor difficult as your imagination. Here are some tips which helped me and might help you to get through the GATE exam. Focus mainly on all the 4-credit subjects. Practice the previous years' question papers as much as you can. To attempt the numerical answer type questions, focus on all the formulae. Try to score the maximum possible marks in the General aptitude and Engineering mathematics section. Take a break from social media, work hard and concentrate on what you study. Revise the topics which you have already learned. Don't be stressed and only attempt the questions which you are confident at. Best wishes for your future!

-SRAVYA

"Success is the sum of small efforts, repeated day in and day out" as the famous quote by Robert J. Collier says we should practice more often in order to achieve your dream. Never give upon yourself as you yourself can estimate the valuable worth of you. So I would suggest you to never miss out on any classes without a valid reason as we often do it. It is very easy to crack the GATE examination even without strenuous preparation just by listening the classes. A little pushover to the classes you attend, like memorizing and practicing make you the ultimate topper. It's never too late to begin with so start dreaming high and work with an aim. Be the way you are and amaze the world with your trueself and achieve you dream.

-T DEVIKA

I firmly believe in words "All power is within you.You can do anything and everything.Believe in that"- I knew it was not going to be easy, but then, I also knew it was not something impossible. I did some self introspection to analyze what went wrong and worked on my weakness head-on, so that no stone is left unturned. It was after all a do-or-die game for me. Yes, there were times I felt like giving up. But I didn't because there is something I truly believe in.Don't learn the subjects, just love them! Start as early as possible and make your aim high. Best of luck.

- P R K REDDY

I take immense pleasure to state that your CGPA has nothing to do with your GATE score. Even if you're having less CGPA in academics, start preparing by choosing the important topics related to your core branch just as I did. Don't neglect Aptitude and Mathematics which are very important sections to crack GATE. As I've been preparing to clear the government exams, my preparation for aptitude helped me to answer this section well and get a good score in GATE. Good Luck!

-P GANESH SAGAR

Report on Industrial Visit
(27/10/2018)
Department of Biotechnology
NIT Andhra Pradesh

Visit to Paramesu Biotech Pvt. Ltd.

Objective:

In order to inculcate the habit of practical learning through application, the Department of Biotechnology, National Institute of Technology Andhra Pradesh organized an industrial trip to Paramesu Biotech Pvt Ltd

The visit was organized with the prior permission and guidance of our director Prof. C.S.P Rao and the faculty members of the Department of Biotechnology.

Details of the journey:

The trip started from the campus of NIT-AP at 8:00 am. It took nearly 30 minutes to reach the industry. The session of visual and practical learning started at 8:30 am and all the students were able to impart the knowledge by the time we concluded the visit.

About the Industry:

Paramesu biotech Pvt Ltd is basically manufacturer and supplier of maize starch powder. It is established in 2015 at Khammam - Devarapalli Rd, Devarapalli, Andhra Pradesh 534313

Group photograph of NIT AP students, faculties of department of biotechnology with The GM of Paramesu Biotech Pvt. Ltd.

End of the Report

Consolidated report of BEA 2018-19

The Biotechnical Engineering Association (BEA) was prosperously inaugurated on the **6th October 2018**. The chief guest of the inaugural function was Dr.Narahari Sastry G, Sr. Prinicipal Scientist, CSIR- Indian Institute of Chemical Technology, Hyderbad.

Inauguration of BEA was followed by a guest talk by by Dr.G Narahari Sastry on Future trends, Oppurtunities and Challenges in Biotechnology. He updated us on the healthcare industry and high quality research facilities in India.His talk also included immunotherapy, cancer therapy and big data analysis which are of interest to biotechnology students. He also imparted the importance of having role models in ones life by apprising the work of some nobel-prize laureates in the field of chemistry and biology.

On **24th October 2018**, a guest Lecture was delivered by Dr. Satya Eswari, Assistant professor, National Institute of Technology Raipur titled "Use of Green Surfactants in cost-effective water treatment, as anti-cancer and anti-microbial agents" for 3rd and 4th-year students of Biotechnology Department. Additionally, the speaker addressed functional trends in food and drugs, Biosurfactant based microbial fuel cell behavior and biosensor based on this phenomenon.

On **27th October 2018**, an industrial visit to Paramesu Biotech Pvt Ltd. was organized with the prior permission and guidance of our director Prof. C.S.P Rao and the faculty members of the Department of Biotechnology. Paramesu biotech Pvt Ltd is basically manufacturer and supplier of maize starch powder. It was a good experience, which has provided exposure to industrial life. The students are benefited in terms of Technical details provided by the company and various career opportunities in downstream industries. The visit seems to be very Informative and gives good learning experience. It was the unique example of "EDUTAINMENT" i.e. Education and Entertainment.

On **20th April 2019**, Biotechnical Engineering Association has organized a guest lecture. The guest was Mr.Ganesh, from Mylan Industries . He started off by discussing extensively on 'Better biosimilar for better future'. He also spoke on various avenues of Biotechnology, Biopharmaceuticals and snapshot of biologics manufacturing. He also well-acquainted the students with trends and divisions of biopharmaceutical industries, internships and higher studies in biotechnology field. His talk was immensely helpful for the students to ponder over prospects in Biotechnology.

The association also conducted several other activities as described below:

***Interaction*:**

A formal interaction between all the four years of the department was held where students got an opportunity to discuss their future plans after B.Tech and shared their opinions about biotechnology.

***Sports session*:**

Biotechnical Engineering Association also arranged a sports session for II ,III and IV year students to create a friendly atmosphere among them. It was important to create a cordial relationship between the seniors, sophomores and juniors. This helped in flushing out all the apprehension persisting in the juniors.

"**Biofest-2019"** was conducted during Vulcanzy-2019 by Biotechnical Engineering Association on 22nd and 23rd March 2019. The following events were conducted during the fest.

Orchard Scavenger : A plant hunt

To imbibe the knowledge of scientific names of plants, Biotechnology department has organized a treasure hunt event where students in a group of 5 or less participated to solve the clues.

Forensics: Catch the Convict

To test the presence of mind , time management and the ability to collect evidence and its analysis, Department of Biotechnology has organised Forensics. The first team to crack the crime scene by solving the given clues was declared winner.

Lumiere: Team up to light up the world

A perfect platform to utilise the creative abilities in an individual by lightening up maximum number of LED bulbs using fruits and vegetables. Challenge lies in how many less fruits were used to generate the most electricity.

Largely, in this academic year, the association broadly achieved its moto of bringing students come closer to current trend of science and technology in the field of Biotechnology and at the same time provided a platform for students to achieve wider perspective towards life, in both, academical and non-academical point of view.

BIOTS 2017-2021

PRAGNA RAJ

VARSHINI

ANUSHA

VEERA

VANI BHAI

CHAVVI RAJ

RAKESH

AKHIL

AMAN RAO

NIKITHA

STANNY SEKHAR

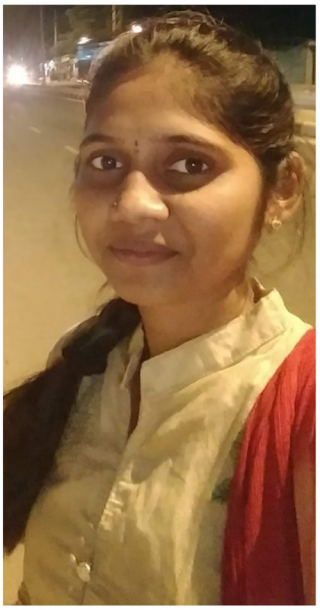
MANIKANTA

BIOTS 2017-2021

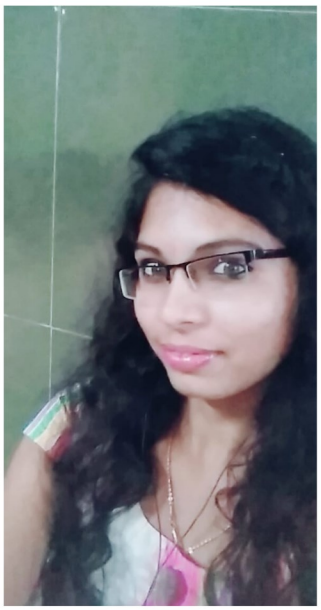
DEVA

AZHAR

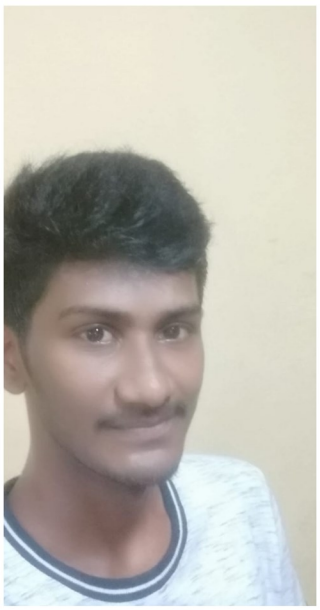
JAHANVI



RACHANA



MOUNIKA



RAJESH

ANUSHA

UDAY KIRAN

AKHIL

NIVEDITHA

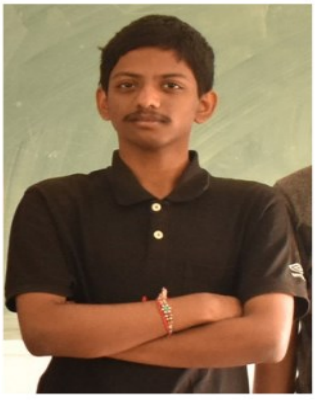
BIOTS 2016-2020

THANUJA

ALEKHYA

PRATAP

JHANSI



VIKAS

HARSHITHA

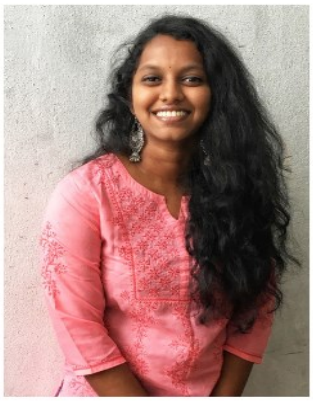
LAKSHMI

BHARADWAJ

AKHIL

KIRANMAYI

KRISHNA



HARSHINI

VINAY

BIOTS 2015-2019

ROSHINI

SRAVYA

KAVITHA

SASI

MOUNIKA

HARITHA

GANESH

RAMA KRISHNA

KAVYA

SHUBHAM

SRITEJA

DEVIKA

THARUN

JAHNAVI

OUR FACULTY

Dr Seenivasan A
Assistant Prof & HOD

Dr T Jagan mohan Rao
Assistant Prof

Dr Lakshmi M
Faculty

Dr E Rajeswara Reddy
Faculty

Ms Priyanka G
Faculty

Mr Suresh L
Lab Assistant

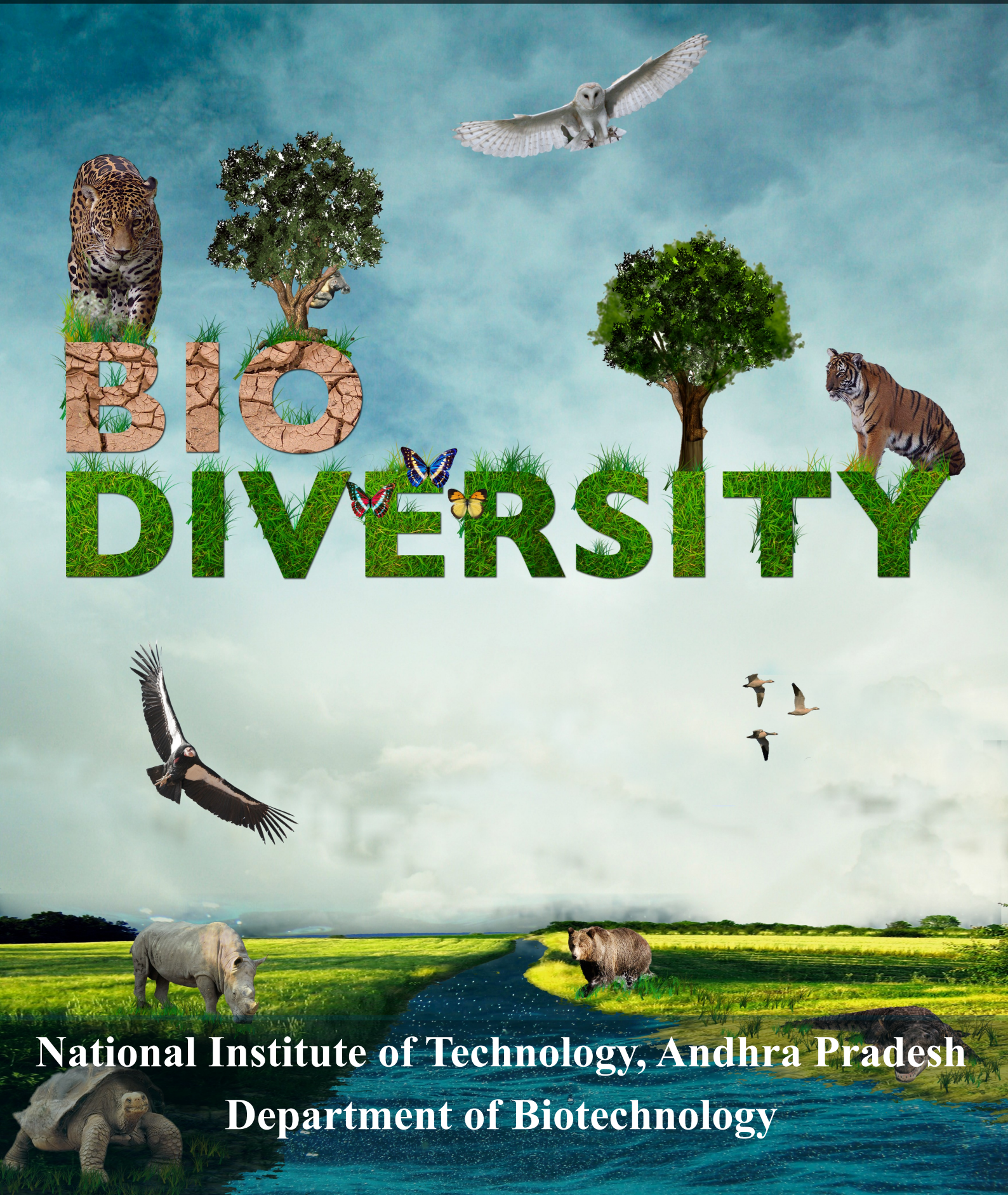
Mr Sureh P
Faculty

Dr Nithya M
Faculty

Dr Manasa P
Faculty & Faculty Advisor BEA

Humans have destroyed more than 30% of the natural world since 1970.

This has led to animals migrating to new and unnatural habits to live in. Conservation of the world's biodiversity is vital to help maintain the natural balances disrupted by recent human activity. If we don't act now this will have a devastating effect on our ecosystems and the world's biodiversity.



National Institute of Technology, Andhra Pradesh
Department of Biotechnology