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Bio-Rhythms

(An Initiative of Amity Institute of Biotechnology)

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Value of Teacher

Teacher is just like a Bridge by the help of which we can cross the life. Teacher is just an Eye by the help of which we can see the real world. Teacher is just like a Pillar by the help of which a nation can stand. Teacher is just like a Mother by the help of which we can become educated person. Teacher is just like a Lantern by the help of which we can light our life. Teacher is just like Skeleton by the help of which we can stand our life.

– From Editorial Team

The Human Immune System

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One of the key components of the human body that protects against both known and undiscovered diseases is the immune system. When we take a deep dive into the immune system, we discover that it is made up of a variety of cells, including lymphocytic cells (B and T cells), NK cells, macrophages, and many more. Simply said, the immune system functions in two stages: first, it encounters alien substances, such as bacteria, fungi, viruses, or protozoa, and second, it remembers the interaction (means how it encountered that alien substances).

According to how it works, our immune system is split into two parts: an innate immune system (also known as a non-specific immune system) and an acquired immune system (i.e. specific). When a foreign material enters the body, the innate immune system begins to work and either kills it or engulfs it. This is a natural or normal function. The transition from the innate immune system to the acquired immune system is subtle. If the innate system is unable to destroy or absorb the foreign item, it will transport it to the closest checkpoint (lymph nodes) and present it there using an APC cell, which could be a macrophage or a dendritic cell. After presenting it, lymphocytic cells begin producing antibodies with T cells' assistance. When a pathogen enters the body for the second time, the acquired immune system responds much more quickly than the first time because memory cells that are formed by B lymphocytic cells speed up the process of producing antibodies or killing the foreign pathogen. When we examine immune system cells, we learn that they have the special ability to identify, eliminate, remember, and then respond once more to alien particles, making us more tolerant of life in this planet.

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Edible Vaccines Vs. Traditional Vaccines: A Perspective Approach in Biotechnology

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Edible vaccines are one of the biggest achievements within the branch of biotechnology for developing vaccines that are edible and helping in immunizing people.

An antigenic substance prepared by using causative agent of a disease or a synthetic substitute, helps in providing immunity against various diseases are known as vaccines. Development of vaccines was one of the biggest accomplishments of nineteenth century. With the help of vaccine, spreading of infectious disease such as diphtheria, tetanus, hepatitis, etc. can be reduced. Traditional methods of vaccines have several limitations. Some of the major issues are safety concern, storage problem and also due to several failures, idea of alternative vaccine delivery methods arises which lead to the development of edible vaccines. Compared to the traditional vaccine methods, edible vaccines are easier and safer and don't demand sterile injection conditions, storage facilities, sophisticated equipment and machines for the vaccine production. Edible vaccines are transgenic plant and animal-based manufacturing of vaccines that triggers immune responses of animals or in simple words it can be defined as plant or animal made pharmaceuticals. In the year 1990s the concept of edible vaccines was developed by Arntzen and it proved that it can overcome the limitations of traditional vaccines. The first trial of edible vaccine was accomplished by incorporating a surface antigen i.e., Streptococcus mutants from hepatitis B in tobacco plant. Edible vaccines can be produced by incorporating the required gene into plant by gene delivery method. There are several plants used for edible vaccine some of which are banana, potato, carrot, etc. It has some disadvantages but there are many benefits also as for persons who are allergic to injections can take oral vaccines and it is also cost-effective. There is high future scope of it as if we intake vaccines through fruits then they can reduce the risk of side effects and are also less vulnerable to change in temperature. As the benefits of edible vaccines are prominent so its side effects can be overcome with proper research and development and it can bring about an era where there is better control over infectious diseases.

Apoptosis: A Review of Programmed Cell Death

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Apoptosis is a form of programmed cell death that occurs in multicellular organisms. Biochemical events lead to characteristic cell changes and death. These changes include blebbing, cell shrinkage, nuclear fragmentation, chromatin condensation DNA fragmentation , and mRNA decay. The average adult human loses between 50 and 70 billion cells each day due to apoptosis.For an average human child between eight and fourteen years old, approximately twenty to thirty billion cells die per day.

Apoptosis is the process of programmed cell death. It is used during early development to eliminate unwanted cells; for example, those between the fingers of a developing hand. In adults, apoptosis is used to rid the body of cells that have been damaged beyond repair. Apoptosis also plays a role in preventing cancer. If apoptosis

Success can come to you by courageous devotion to the task lying in front of you…..! - ***Nobel-Laureate C V Raman***

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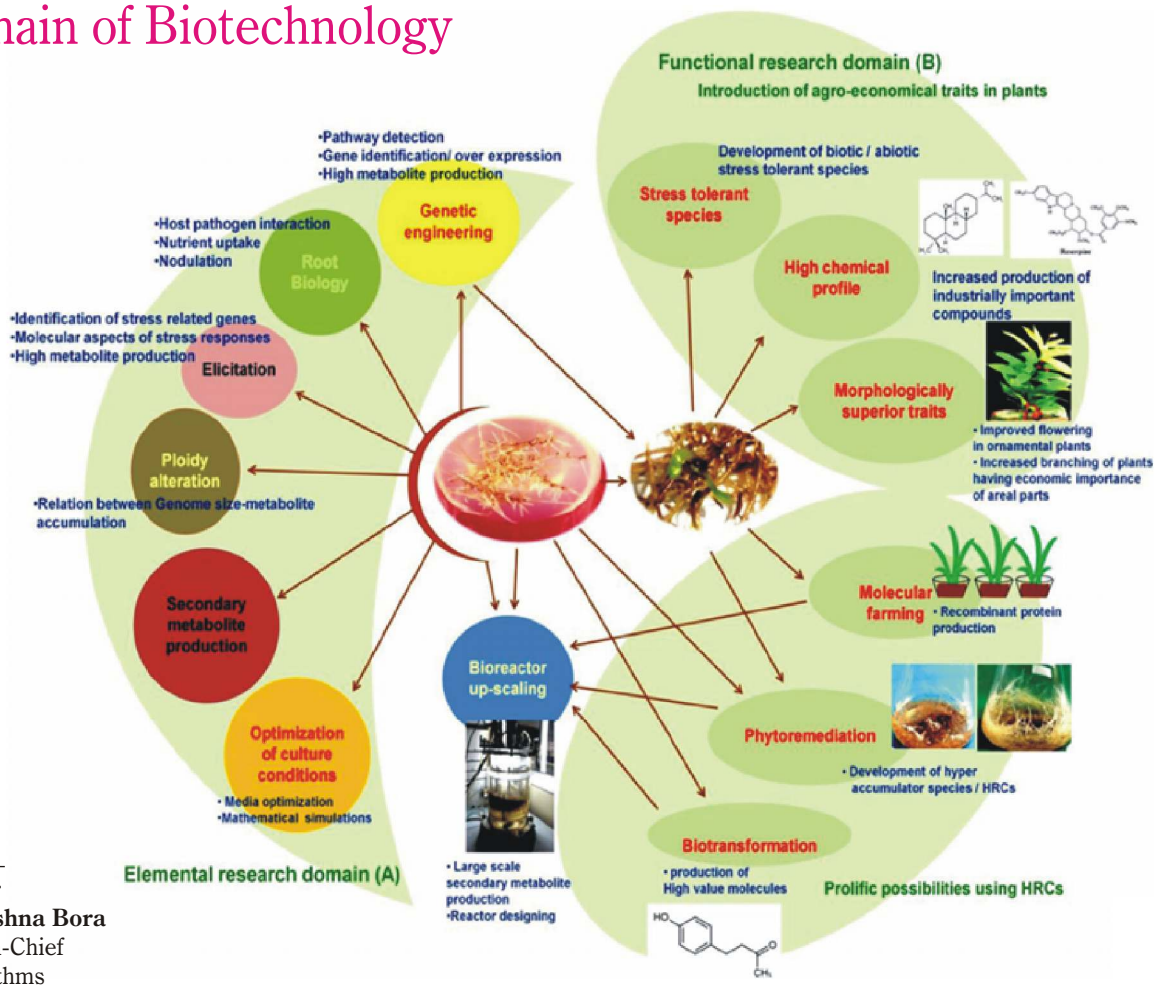
is for some reason prevented, it can lead to uncontrolled cell division and the subsequent development of atumour.

Light and electron microscopy have identified the various morphological adjustments that arise at some point of apoptosis. In the course of early process of apoptosis, cell shrinkage and pyknosis are visible by light microscopy. With cell shrinkage, the cells are smaller in size, the cytoplasm is dense and the organelles are more tightly packed. Pyknosis is the result of chromatin condensation and this is the most characteristic feature of apoptosis. On histologic examination with hematoxylin and eosin stain, apoptosis includes single cells or small clusters of cells. The apoptotic cell appears as a round or oval mass with dark eosinophilic cytoplasm and dense purple nuclear chromatin fragments. Electron microscopy can better define the subcellular changes. Early throughout the chromatin condensation phase, the electron-dense nuclear material characteristically aggregates peripherally under the nuclear membrane although there can also be uniformly dense nuclei.

Essential & Functional Research Domain of Biotechnology



Courtesy:
Dr. Jutishna Bora
Editor-in-Chief
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Thiomargaritamagnifica: The Largest Bacteria Ever Found

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Caribbean mangroves are teeming with life. Black and scarlet crabs dart across the towering, tangled tree roots and white herons spear fish with their bills.

Also present in the brackish water are the fine, white filaments. These little organisms may not seem like much, but in terms of size and scientific significance, they are enormous. The largest known bacteria, *Ca. Thiomargaritamagnifica,* is violating all of the criterias. Researchers discovered these enormous bacteria hiding in Guadeloupe's mangroves, which they discovered, that was published on Thursday, June 23, 2022, in Science. Although *T. magnifica* is not the first giant bacterium, it is the biggest, being 12 times longer than the previous record-holder, another member of the *Thiomargarita* family, and visible without a microscope. "They are the size and the shape of an eyelash, that's 4,500 times longer than most bacteria, which are visible to the naked eye."When researchers examined the internal workings of the enormous bacteria, they discovered yet another surprise. They illuminated its DNA, membranes, and ribosomes—tiny structures that translate genetic information into proteins—using dye and molecular tools. They anticipated the fluorescence to cover the entire cell. Because bacteria are so basic, their DNA usually floats around freely inside of them. Only species with higher levels of complexity, such as animals, maintain their DNA in specific cell structures. But when the researchers examined the sample under a microscope, they noticed that the DNA and ribosomes were grouped together in several tiny pockets, each of which was encased in a membrane. There is no relevant genetic data here.The discovery of *Thiomargaritamagnifica* has led to an almost endless stream of inquiries. Finding a way to keep *T. magnifica* alive and reproducing in a lab, however, is the first step in this search. The possibility of growing *T. magnifica* in the lab will be greatly expanded if the researchers are successful.

Effects of Junk Food on Human Health

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"Eat healthy and live healthy" is one in every one of the fundamental necessities for long life.

Food is the fundamental need of human being. It is a combination of various supplements like sugar, protein, fat, nutrients and minerals. These supplements are fundamental for development, advancement and support of good well being over the course of life. Junk food is also known as fast food, which are not difficult to make and simple to devour. They are low in dietary benefits and have just lying fat in it causing sick impacts the health of customer. Unhealthy food contains elevated degree of refined sugar, white flour, trans fats, polyunsaturated fat salt and various food added substance, for example, Monosodium glutamate (MSG) and atrazine, and ailing in protein, nutrients and fiber.

Inexpensive food is ordinarily high in sugar, salt, and immersed or trans fats. The body's response to these supplements beings about a scope of transient effects when an individual eats cheap food. Fast food breaks down quickly, causing a rapid spike in blood sugar because of the refined carbohydrates and added sugars. Abundance sodium admission additionally has connections to liquid maintenance. A single

Escape is very difficult to negotiate, underwater….! - ***Darion D'Anjou***

serving of fast food could increase inflammation throughout the body. This inflammation acts as a trigger for asthma attacks. Long Term Impacts is on the grounds that most junk food high in sugar, fat, immersed fat, handled fixing, and calories. In the event that individual eats a larger number of calories than they consume every day, they put on weight, which might prompt corpulence. The diet comprises of high measures of sugar, salt, and immersed fat from a couple of sources. A link between junk food consumption and as increase in asthma, rhino conjunctivitis, and eczema.

Food Adulteration

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Food is the substance that we get from plants or animals that could be final or intermediate. Adulteration of food means addition of unhealthy or non-food items to increase the weight of the raw or prepared original food. It can be done intentionally or unintentionally. It also means that discarding of valuable or important food components for different purposes. We have also seen that there are different types of food that we know are very vulnerable to adulteration like dairy products, honey, butter, meat, juices, etc. This issue highlighted several times by media, mainly at the time of festivals and to check this, many individuals and organizations are appointed and many legal actions taken against accused. They used to expose by taking sample from the food and testing it in labs by using different testing methods like physical, chemical, biochemical and other techniques.

Awareness in people is much more important than any other things. Awareness can lead to decreasing in the case of adulteration. Awareness can be done easily without doing any investment. It will be very helpful in controlling adulteration.

Role of Biotechnology in Treatment and Diagnosis

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Biotechnology is applied to various fields and many industries such as food, pharmaceuticals, medicine, and agriculture. It has scope in both research and engineering. Biotechnology involves the exploitation of living organisms or the use of biological processes organism or system to develop technologies and products that will help to improve the quality of human life.Biotechnology helps in the diagnosis of disease which includes PCR, RT-PCR and Real time PCR tests. By the help of these PCR test presence of bacteria and virus can be detected at early stage of infection. Antibody based diagnosis of disease involves enzyme-linked immunosorbent assay (ELISA) which helps in measuring antibodies, antigens and proteins. DNA hybridization-based diagnosis refers to Southern blotting, Northern blotting. DNA sequence-based diagnosis involves single nucleotide polymorphism, gene sequencing, finding repeats of triplet codon. Also, it helps in the treatment of diseases. It can be treated by addition or deletion of gene which cause disease or mask the expression of disease-causing gene. Also, antibodies associated with toxin can be used to kill cancer cells. Biosynthesis and production of natural drugs are also helping in the better treatment. Antibiotics is used to treat microbial disease.

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Biotechnology has a variety of applications in the field of medicine which includes Recombinant Insulin as insulin is required by diabetic patients to remove excess sugar from the blood and if a diabetic patient has a very low level of insulin or no insulin in the body so external insulin is needed to control blood glucose levels, Gene therapy is used to treat genetic disorders by the insertion of a normal gene or correct gene for the defective or inactive gene, Pharmacogenomics has helped in the production of drugs that are best suited to an individual's genetic makeup which can be applied in diseases such as cancer, depression, HIV and asthma, Molecular Diagnosis can help in early diagnosis and to get knowledge about abnormal changes made in body due to a disease. Biotechnology has made major advances in molecular biology and industrial biotechnology. The scope of biotechnology is extending to various branches of Biology. Some of these includes tissue culture, development of transgenic plants and animals and development of antibodies.

Artificial Intelligence: The Helper or The Threat?

Ms. Srija Bhattacharya
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"AI is likely to be the best or the worst thing to happen to humanity." – Stephen Hawing

Artificial Intelligence is an emerging technology that facilitates intelligence and human capabilities of sense, comprehend, and act with the use of machines. In a simpler term, it is an intelligence shown or demonstrated by machines, as opposed to the natural intelligence shown by humans. The principles of human intelligence have always been of certain interest for the field of science. Having understood the nature of processes that help people to reflect, scientists started proposing projects aimed at creating the machine that would be able to work like a human brain and make decisions as we do. With this growing impact of technology and science in our everyday life, it has become even more important for us to trace scientific discoveries and the changes which they trigger. However, it is not always that people take the newly introduced invention as something that is going to change the society for the better. They take time to come in terms and understand the value and the importance of the given invention.

Artificial intelligence, or robots, one of the scandalous and brilliant inventions in today's era, causing people's concern for the world safety, has become one of the leading branches of the modern science, which troubles the mankind at the present. According to people, who support the idea of artificial intelligence development, it will bring numerous benefits to the society and our everyday life. At first, the machine with artificial intelligence is going to be the best helper for the humanity in problem-solving and for the completion of tasks that require a good memory, and it is safer to assign such tasks to machines as their capacity of memory is by far more developed than one that people have. What is more, the machines with artificial intelligence help people to find the information that the people need, in moments. If we look at artificial intelligence from this point of view, it acts as our teacher despite the fact that it is our creation. Importantly, people believe that artificial intelligence should be developed as it gives new opportunities to the humanity. Nevertheless, there are ones who are not so optimistic about the development and perfection of artificial intelligence. Their

skeptical attitude about that is likely to be rooted in their concerns about the future of human society. To begin with, people who are skeptical about artificial intelligence believe that it is impossible to create the machine that will show the mental process similar to the one that people have i.e., the decisions made by such a machine will be based only on the logical connections between the objects. There is no doubt that artificial intelligence programs do not have to be paid a salary every month in an office. What is more, these programs usually do not make mistakes and it gives them an obvious advantage over human employees. If artificial intelligence develops rapidly, many people will turn out to be unnecessary in their companies. Automated vendor machines are the best examples to show how AI can rob humanity of its natural setting. Due to the self-running vendor machines, many energy and snack vendors have closed shopped due to lack of market. Nobody in investing on vending stores anymore since one can easily purchase a vending machine and find a vending space. Another disadvantage being thatthe programmers and manufacturers can use the robots to instil lawful behaviours for self-interests. A robot can influence people to change their entire thoughts, and worse of it all is the fact that people can hark into the program of the robot and deprive a person physically and mentally.

Determining whether AI is a friendly innovation or it is a global mistake depends on the functions that the innovation is intended to achieve. To conclude, artificial intelligence development is a problem that leaves nobody indifferent as it is closely associated with the future of the humanity. With the help of robots, people can both build and destruct, which means that the new invention must not fall into the hands of the unwise and the wrong.

Advantages of Extremophiles in Biotechnology

Ms. Poonam Yadav
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Extremophiles are organisms that thrive in the most volatile environments on the planet and it is due to their talents that they have begun playing a large role in biotechnology. These organisms live every where in the environments of high acidity or salinity to areas with limited or no oxygen are places they call home. These organisms have become more and more important to biotechnology as their genomes have been uncovered, revealing a plethora of genetic potential. Currently the main uses of extremophiles lies in processes such as PCR, biofuel generation and biomining, but there are many other smaller scale operations at play.

To overcome this issue scientists have turned to extremophiles due to their natural abilities to handle extreme conditions. These abilities are linked to genes which can be isolated, extracted and replicated in the lab. With this the genetic information can be implanted in the given enzymes, polymers, proteases and other various organic compounds to give them desired resistance. This allows for biological and chemical processes to be completed rapidly as the careful, long winded strategies can be bypassed. Extremophiles, both themselves and their DNA, are helping scientists to optimize lengthy research techniques and processes. DNA polymerase, isolated from thermophilic microorganisms for use in the polymerase chain reaction, which is employed to clone and amplify genes for diagnostic purpose in human and veterinary.

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Achievements

Dr. Amit Kumar Dutta received "Outstanding Healthcare Professional Award 2022"

frontiers

Welcome to the Review Editor Board

Dear Dr PANDEY,

We are delighted to welcome you as Review Editor on the Editorial Board of Plant Biotechnology (specialty section of Frontiers in Bioengineering and Biotechnology and Frontiers in Plant Science).

Dr. Dhananjay Kumar Pandey welcomed to the Editorial Board in Frontier in Plant Science (Indexed in PubMed, Scopus, Web of Science-SCIE with IF 6.6)

Students' Achievements

Mr. Prince Kumar
B.Sc (H) - Biotechnology
Batch: 2019-2022
Qualified: JAM 2022
IIT Roorkee & GAT-B (DBT-GoI)

Ms. Dolly
B.Sc (H) - Biotechnology
Batch: 2019-2022
Qualified: JAM 2022
IIT Roorkee & GAT-B (DBT-GoI)

Ms. Mitali
B.Sc (H) - Biotechnology
Batch: 2019-2022
Qualified: JAM 2022
IIT Roorkee

Ms. Shristi Kishore
B.Tech- Biotechnology
Batch: 2019-2023
Qualified: GATE-2022 (IITs)