



MAULANA AZAD COLLEGE

Department of Microbiology

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JANUARY 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 B.day of N.R.Pace	2	3	4	5 B.day of R.Lancefield	6	7 B.day of J.C.Fabricius
8	9 B.day of H.G.Khorana	10	11	12 National Youth Day	13	14
15	16 B.day of S.Mukherjee	17	18	19	20	21 B.day of F.Hoffmann
22	23	24 B.day of F.Cohn	25	26 Republic Day	27	28 B.day of G.A.Borelli
29	30 World Leprosy Day	31				

India on top to achieve zero Leprosy cases by 2030

DID YOU KNOW?

World Leprosy Day is an opportunity to celebrate people who have experienced leprosy, raise awareness of the disease, and call for an end to leprosy-related stigma and discrimination. The “United for Dignity” campaign calls for unity in honoring the dignity of people who have experienced leprosy. People who experience leprosy face mental wellbeing challenges due to stigma, discrimination, and isolation. Together we can lift up every voice and honor the experiences of people who have experienced leprosy.



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Har Gobind Khorana

9th January, 1922 –9 November 2011

Khorana was born into a poor family and attended the [University of the Punjab](#) at Lahore, India. Khorana confirmed Nirenberg's findings that the way the four different types of nucleotides are arranged on the spiral-staircase of the DNA molecule determines the chemical [composition](#) and function of a new cell. The 64 possible combinations of the nucleotides are read off along a strand of DNA as required to produce the desired amino acids, which are the building blocks of proteins. Khorana added details about which serial combinations of nucleotides form which specific amino acids. He also proved that the nucleotide code is always transmitted to the cell in groups of three, called codons. Khorana also determined that some of the codons prompt the cell to start or stop the manufacture of proteins. In 1960 Khorana accepted a position as co-director of the Institute for Enzyme research at the Institute for Enzyme Research at the [University of Wisconsin](#) at Madison. He became a professor of

biochemistry in 1962 and was named [Conrad A. Elvehjem](#) Professor of Life Sciences at Wisconsin-Madison. While at Wisconsin, "he helped decipher the mechanisms by which RNA codes for the synthesis of proteins" and "began to work on synthesizing functional genes" according to the American Chemical Society. During his tenure at this University, he completed the work that led to sharing the Nobel prize. The Nobel web site states that it was "for their interpretation of the genetic code and its function in protein synthesis". Har Gobind Khorana's role is stated as follows: he "made important contributions to this field by building different RNA chains with the help of enzymes. Using these enzymes, he was able to produce proteins. The amino acid sequences of these proteins then solved the rest of the puzzle."

Scientists	Name & Birthday	Contribution
	Norman R. Pace 1 st January, 1942	He worked on the synthesis, structure & function of RNA and the application of molecular biology tools to detect microbes in various environment.
	Rebecca Lancefield 5 th January, 1895	In the 1920s she discovered the M protein on the surface of pathogenic bacteria. Lancefield was also amongst the first to show that <i>Strep. pyogenes</i> infection was the cause of rheumatic fever.
	Subhash Mukherjee 16 January 1931	Subhash Mukherjee created the world's second and India's first child using in-vitro fertilisation.
	Felix Hoffmann 21 st January, 1868	Felix Hoffmann first made acetylsalicylic acid, better known today as aspirin, to ease his father's arthritis.

ENVIRONMENTAL MICROBIOLOGY

INTRODUCTION

- Environmental microbiology is the study of those microorganisms which exist in natural or artificial environments.
- It is the study of the composition and physiology of microbial communities in the environment.

VARIOUS AREAS

- Environmental microbes can affect so many aspects of life, and are easily transported between environments, with a number of different subspecialties, including soil, aquatic, and aeromicrobiology, as well as bioremediation, water quality, occupational health and infection control, food safety, and industrial microbiology.

SCOPES

- Microorganisms are present everywhere on earth which includes humans, animals, plants and other living creatures, soil, water and atmosphere.
- Microbes can multiply in all three habitats except in the atmosphere. Together their numbers far exceed all other living cells on this planet.

APPLICATION

- In modern environmental microbiology, pathogens and bioremediation remain fundamental to the field, but in both cases these subject areas have been greatly enhanced through the application of molecular genetics and biotechnology tools.





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FEBRUARY-2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 B.day of S.N.De	2	3 B.day of H.Cohen	4 World Cancer Day
5	6	7 B.day of K.Shiga	8	9	10 B.day of J.F.Enders	11
12	13	14	15	16 B.day of E.Haecke l	17 B.day of P.Piot	18 B.day of F.Redl
19	20 B.day of R.Dubos	21 B.day of A.V.Wa- ssermann	22	23	24	25
26	27 National Protein Day	28 National Science Day				

9.6 million people die from cancer every year & 70% of cancer deaths occur in low-to-middle income countries.

DID YOU KNOW ?

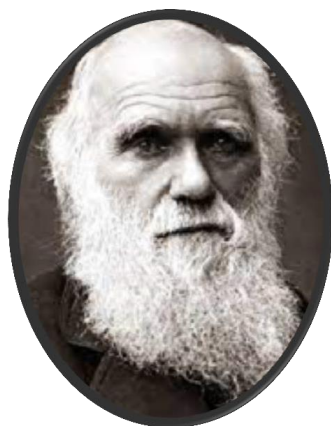
World Cancer Day held every 4 February is the global uniting initiative led by the Union for International Cancer Control (UICC). By raising worldwide awareness, improving education and catalysing personal, collective and government action, we are all working together to reimagine a world where millions of preventable cancer deaths are saved and access to life-saving cancer treatment and care is equitable for all - no matter who you are or where you live. Created in 2000, World Cancer Day has grown into a positive movement for everyone, everywhere to unite under one voice to face one of our greatest challenges in history.



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Charles Darwin

12th February, 1809 – 19th April, 1882

Darwin's greatest contribution to science is that he completed the Copernican Revolution by drawing out for biology the notion of nature as a system of matter in motion governed by natural laws. With Darwin's discovery of natural selection, the origin and adaptations of organisms were brought into the realm of science. The adaptive features of organisms could now be explained, like the phenomena of the inanimate world, as the result of natural processes, without recourse to an Intelligent Designer. The Copernican and the Darwinian Revolutions may be seen as the two stages of the one Scientific Revolution. They jointly ushered in the beginning of science in the modern sense of the word: explanation through natural laws. Darwin's theory of natural selection accounts for the design of organisms, and for their wondrous diversity, as the result of natural processes, the gradual

accumulation of spontaneously arisen variations (mutations) sorted out by natural selection. Which characteristics will be selected depends on which variations happen to be present at a given time in a given place. This in turn depends on the random process of mutation as well as on the previous history of the organisms. Mutation and selection have jointly driven the marvelous process that, starting from microscopic organisms, has yielded orchids, birds, and humans. The theory of evolution conveys chance and necessity, randomness and determinism, jointly enmeshed in the stuff of life. This was Darwin's fundamental discovery, that there is a process that is creative, although not conscious.

Scientists	Name & Birthday	Contribution
	John Franklin Enders 10th February, 1897	He is known for culturing poliovirus, isolating measlesvirus, developing measles vaccine. Franklin has been called -The Father of Modern Vaccines!
	Ernst Haeckel 16th February, 1834	He was a strong proponent of Darwinism and who proposed new notions of the evolutionary descent of human beings.
	Francesco Redi 18th February, 1626	He demonstrated that the presence of maggots in putrefying meat does not result from spontaneous generation but from eggs laid on the meat by flies.
	Linus Carl Pauling 28th February, 1901	Pauling is known as the "Father of Molecular Biology". Pauling's discovery of protein helical structure lead to the discovery of DNA's double-helical structure.

BIOTRANSFORMATION

INTRODUCTION

- Biotransformation is a metabolic process.
- It is the biochemical modification of one chemical compound or a mixture of chemical compounds.
- A series of reactions alter the chemical structures of these substances.
- The majority of biotransformation takes place within

FUNDAMENTALS

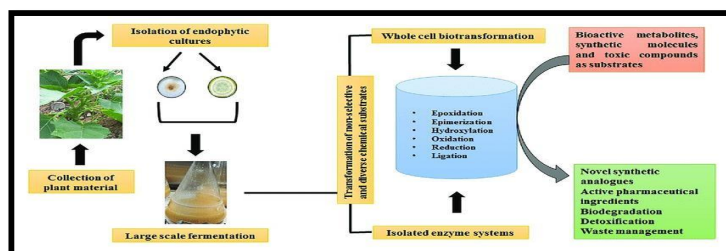
- The pathways of biotransformation are divided into phase I, phase II, and phase III.
- These reactions may occur simultaneously or sequentially.
- Several of the enzymes for phase I, phase II, and phase III reactions can also occur in extrahepatic tissues, such as adipose, intestine, kidney, lung and skins.

GREEN CHEMISTRY

- Some bacteria and the conversion of indole to indigo by *E.coli* expressing naphthalene dioxygenase gene are important examples of valuable biotransformations with regiochemical but no explicit stereochemical features.

SIGNIFICANCE

- The major purpose of biotransformation is to chemically modify (metabolize) poorly excretable lipophilic compounds to more hydrophilic chemicals that are readily excreted in urine and/or bile.
- Without metabolism, lipophilic xenobiotics accumulate in biota, increasing the potential for toxicity.





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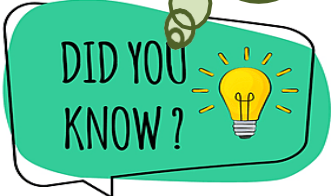
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MARCH 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3 World Wildlife Day B.DAY Of A.Kornberg	4
5	6	7 B.DAY D. Baltimore	8	9	10	11
12	13	14 B.DAY P. Ehrlich	15	16 National Vaccination Day	17	18
19	20 B.DAY M. Menten	21 World Down Syndrome Day	22	23	24 World TB (Tuberculosis) Day	25
26	27	28	29	30	31	

World Down Syndrome Day is celebrated by wearing odd socks on 21st March to raise



World Down Syndrome Day
 In December 2011, the General Assembly declared 21 March as World Down Syndrome Day. The General Assembly decided, with effect from 2012, to observe World Down Syndrome Day on 21 March each year. The 21st day of March (the 3rd month of the year) was selected to signify the uniqueness of the triplication (trisomy) of the 21st chromosome which causes Down syndrome. It is a condition in which a child is born with an extra 21st chromosome.



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David Baltimore

7 March, 1938 - Present

David Baltimore, (born March 7, 1938, New York, New York, U.S.), American virologist who shared the Nobel Prize for Physiology or Medicine in 1975 with Howard M. Temin and Renato Dulbecco. Working independently, Baltimore and Temin discovered reverse transcriptase, an enzyme that synthesizes DNA from RNA. After Renato Dulbecco discovered that tumour viruses operate by incorporating their DNA into the DNA of host cells, David Baltimore and Howard Temin –independently of one another–discovered that viruses with genomes consisting of RNA can also be inserted into host cells' DNA. This takes place through an enzyme known as reverse transcriptase. David Baltimore also classified the viruses on the basis of their genetic material called "Baltimore's Classification of Viruses".

Scientists	Name & Birthday	Contribution
	Maud Menten 20 March, 1879	She conducted the first electrophoretic separation of blood haemoglobin proteins in 1944. Best known for Michaelis-Menten Equation of Enzyme Kinetics.
	Paul Ehrlich 14 March, 1854	Father of Chemotherapy . Also contributed in development of staining tissue which made it possible to distinguish between different types of blood cells.
	Arthur Kornberg 3 March, 1918	He described his career as a –love affair with enzymes,.l. Discovered DNA polymerase , an enzyme critical to DNA replication.

Biofertilizers and Biopesticides

BIOFERTILIZERS ADVANTAGES

- Enhance nutrient availability.
- Increases yield by 10-25 %.
- encourage plant growth and enhance crop yields.
- Bio-fertilizers, enhance soil health by increasing crop yields.

BIOFERTILIZERS DISADVANTAGES

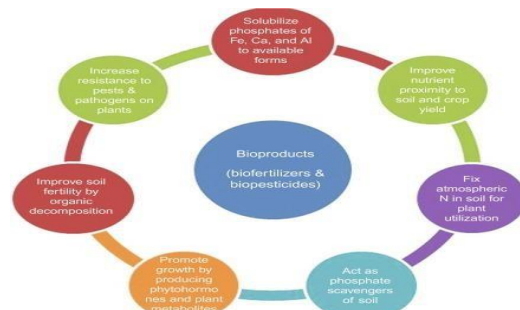
- Biofertilizers provide lower nutrient density than chemical fertilizers, so more product is often required for the same effect.
- Biofertilizer production requires specific machinery.
- Biofertilizers can be difficult to store and may have a much shorter shelf-life than chemical fertilizers.

BIOPESTICIDES ADVANTAGES

- Effective in very small quantities.
- Often decompose quickly.
- Lower exposures and largely avoiding the pollution problems caused by conventional pesticides.
- Produce little toxic residue, and are of minimal risk to human health.

BIOPESTICIDES DISADVANTAGES

- a slower rate of kill compared with conventional chemical pesticides.
- shorter persistence in the environment.
- susceptibility to unfavourable environmental conditions.
- Highly selective and host specific.





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APRIL 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30						1
2	3	4 B.D.M. Chakrabarty	5 B.DAY J. Lister	6 B.DAY J.D. Watson	7 World Health Day	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22 Earth Day
23	24 B.DAY R.D Kornbeg	25 World Malaria Day and National DNA Day	26	27	28	29

We share 40-50% of identical DNA with cabbage.

DID YOU KNOW?

NATIONAL DNA DAY
 Congress approved the first National DNA Day in April 2003 to celebrate both the completion of the Human Genome Project and the 50th anniversary of the discovery of the double helix structure of DNA. NHGRI at the National Institutes of Health sponsors National DNA Day. It commemorates the day in 1953 when James Watson, Francis Crick, Maurice Wilkins, Rosalind Franklin and colleagues published papers in the journal Nature on the structure of DNA. Furthermore, in early April 2003 it was declared that the Human Genome Project was very close to complete, and "the remaining tiny gaps were considered too costly to fill."



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James D. Watson

6 April 1928 – Present

The discovery of the double helix, the twisted-ladder structure of deoxyribonucleic acid (DNA) in 1953, by James Watson and Francis Crick marked a milestone in the history of science and gave rise to modern molecular biology, which is largely concerned with understanding how genes control the chemical processes within cells. In short order, their discovery yielded groundbreaking insights into the genetic code and protein synthesis. Major current advances in science, namely genetic fingerprinting and modern forensics, the mapping of the human genome, and the promise, yet unfulfilled, of gene therapy, all have their origins in Watson and Crick's inspired work. The double helix has not only reshaped biology, it has become a cultural icon, represented in sculpture, visual art, jewellery, and toys. Watson and Crick published their findings, titled "A Structure for Deoxyribose Nucleic Acid," in the British scientific weekly *Nature* on April 25, 1953.

Scientists	Name & Birthday	Contribution
	Ananda Mohan Chakrabarty 4 April, 1938	Developed genetically engineered <i>Pseudomonas</i> sp. For biodegradation of pollutants. Also known as Father of "Organic Superbug" .
	Joseph Lister 5 April, 1827	"Father of Antiseptic surgery" . Also developed serial dilution technique for quantitative analysis of bacterial colonies.
	Roger D. Kornberg 24 April, 1947	Awarded the Nobel Prize in Chemistry in 2006 for his studies of the process by which genetic information from DNA is copied to RNA, "the molecular basis of eukaryotic transcription."

sculpture, visual art, jewellery, and toys. Watson and Crick published their findings, titled "A Structure for Deoxyribose Nucleic Acid," in the British scientific weekly *Nature* on April 25, 1953.

AN OVERVIEW OF BIOPLASTICS (Biodegradable plastics)

What are Bioplastics?

- Bioplastics are biodegradable alternative to conventional petrochemical-based plastic and are safe for environment.
- Not all 'bioplastics' are degradable. E.g.- bio-polyethylene (bio-PE), bio-polypropylene (bio-

Bioplastics are Obtained from

- PHA (polyhydroxyalkanoate) is extracted from bacteria such as *pseudomonas*.
- Bioplastics are made wholly or in part from renewable biomass sources such as sugarcane and corn, or from microbe such as yeast.

Advantages in using Bioplastics

- Reduce carbon footprint.
- They providing energy savings in production.
- Do not contain additives that are harmful to health.
- Do not change the flavour or scent of the food contained in them.

Promoting Bioplastics

- Bangladesh have prohibited traditional plastic bags.
- Europe has considered taxing non-biodegradable plastic bags.
- Africa has baptized them as a new 'national flower' because they are so visible all over the landscape.





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MAY 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2 World Asthma Day	3	4	5	6
7	8 International Thalassemia Day, B.Day of Andre Lwoff	9	10	11	12	13
14	15	16 National Dengue Prevention Day	17 B.Day of Edward Jenner	18 World AIDS Vaccine Day	19	20
21	22 Intl. Biodiversity Day	23 B.Day of Linnaeus, Lederberg	24	25	26	27
28 B.Day of Stanley B.Prusiner	29	30	31 World Anti-Tobacco Day, B.Day of Richard Petri			

You can get HIV from sharing needles or getting tattoos or body piercings.

DID YOU KNOW?

Acquired immunodeficiency syndrome (AIDS) is defined as an HIV infection with either a CD4+ T cell count below 200 cells per μL or the occurrence of specific diseases associated with HIV infection. In the absence of specific treatment, around half of people infected with HIV develop AIDS within ten years. The most common initial conditions that alert to the presence of AIDS are pneumocystis pneumonia (40%), cachexia in the form of HIV wasting syndrome (20%), and esophageal candidiasis. Other common signs include recurrent respiratory tract infections.



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Edward Jenner

17 May 1749 – 26 January 1823

In 1796 English surgeon **Edward Jenner**, developed the concept of **vaccination** by immunizing an eight-year-old boy against smallpox using cowpox fluid. He later injected smallpox virus repeatedly into the boy, proving that he was indeed immune. Jenner also showed that the cowpox vaccine could be produced from the blister of a human patient rather than just the cow host. This proved the value of protective immunization against the deadly disease, which killed 10-20 percent of the population at the time. He is well known around the world for his innovative contribution to immunization and the ultimate eradication of **smallpox**. Jenner's work is widely regarded as the foundation of immunology—despite the fact that he was neither the first to suggest that infection with cowpox conferred specific immunity to smallpox nor the first to attempt cowpox inoculation for this purpose.

Scientists

Name & Birthdate

Contribution



Andre Lwoff

8 May , 1902

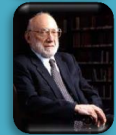
His Contributions in the discoveries regarding genetic control of **Enzyme** and Synthesis of **Virus**.



Carl Linnaeus

23 May , 1707

He is known as the “**Father of Modern Taxonomy**” and proposed Binomial nomenclature system.



Joshua Lederberg

23 May , 1925

Discovering that bacteria can mate and exchange gene (**Bacterial Conjugation**).



Stanley B. Prusiner

28 May , 1942

Discovery of diseases-causing proteins called **Prions**.



Julius Richard Petri

31 May , 1852

Invented **Petri Dish** in which microorganisms are cultured.

ROLE OF VARIOUS BIOMARKERS

DIAGNOSTIC BIOMARKERS

- They can be used as a diagnostic tool for the identification of patients with an abnormal condition or as a tool for staging the extent of disease, as an indicator of disease prognosis, or for the prediction and monitoring of response to an intervention.

MONITORING BIOMARKERS

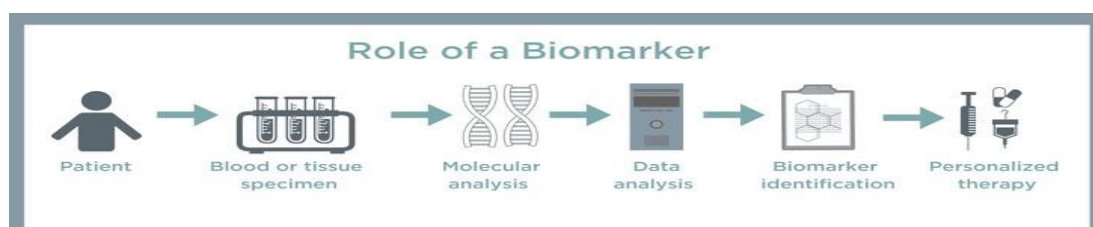
- To assess presence, status or extent of a disease or medical condition. To evaluate the response to the intervention.

PREDICTIVE BIOMARKERS

- To identify the probability of develop a clinical event (positive or negative) after the exposure to a medical product or environmental agent.

PROGNOSTIC BIOMARKERS

- To identify the likelihood of a clinical event, disease recurrence or progression in patients diagnosed with a disease or having a medical condition.





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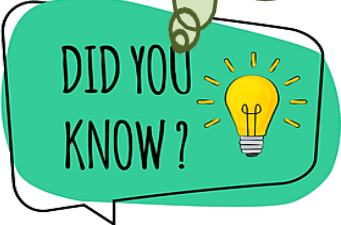
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JUNE 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5 World Environment Day	6	7 World Food Safety Day	8 B.Day of Francis Crick	9	10
11	12	13	14 World Blood Donor Day, B.Day of Karl Landsteiner	15	16	17
18	19 World Sickle Cell Awareness Week, B.Day of Ernst Chain	20	21	22 B.Day of Fanny Hesse	23	24
25	26	27 World Microbiome Day	28	29	30 B.Day of Paul Berg	

The only cure for sickle cell disease is a bone marrow or stem cell transplant.



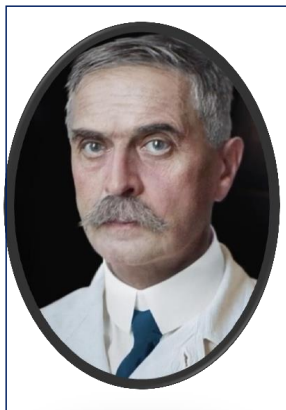
Sickle cell disease is a group of blood disorders typically inherited from a person's parents. The most common type is known as sickle cell anemia. It results in an abnormality in the oxygen-carrying protein haemoglobin found in RBC. This leads to a rigid, sickle-like shape under certain circumstances. Problems in sickle cell disease typically begin around 5 to 6 months of age. A number of health problems may develop, such as attack of pain, swelling in the hands and feet, anemia, bacterial infections and stroke. Long term pain may develop as people get older. The average life expectancy in the developed world is 40 to 60 years.



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Karl Landsteiner

14 June , 1868 – 26 June , 1943

On January 1, 1896, age 27, **Landsteiner** was appointed assistant in Vienna's Institute of Hygiene. Working there, he developed a passion for **immunology** and especially the immune response of **blood serum**, the pale yellow liquid that carries all the substances in blood around the body. He continued pursuing his immunology and blood serum work with enormous energy— over 50 of these papers concerned serology, the study of body fluids such as blood serum.

In 1900, age 32, Landsteiner studied the effects of mixing red blood cells from one person with serum from another. He found the mixtures often produced clumping of the red cells – or hemagglutination in medical jargon. Other scientists believed hemagglutination was a disease-linked response, but Landsteiner's blood cells and serum were taken from healthy people. In his

experiments some mixes of blood and serum led to no hemagglutination, while others did. He deduced the existence of three blood groups, which he called A, B, and C. Today these are known as **A, B, and O**. In 1902, His colleagues followed advice he gave them and identified a fourth type – the **AB** group. Landsteiner found that mixing blood from people of the same blood group resulted in no clumping. Mixing blood from people with different blood groups could result in hemagglutination, which he identified as an immune response. Previously, scientists had abandoned using blood transfusions because they could cause severe illnesses or death. Landsteiner showed blood transfusions failed because incompatible blood groups were mixed. He received **Nobel Prize** for Discovery of ABO blood grouping.

Scientists	Name & Birthday	Contribution
	Francis Crick 8 June, 1916	Co-Discoverer of the structure of the DNA molecule, Nobel Prize Winner.
	Ernst Chain 19 June, 1906	Received Nobel Prize for Industrial production and purification of Penicillin .
	Paul Berg 30 June, 1926	First to create Hybrid DNA or Recombinant DNA.

APPLICATION OF BIOSENSORS

APPLICATION IN MEDICAL SCIENCE

Glucose biosensors are widely used in clinical applications for diagnosis of diabetes mellitus, which requires precise control over blood-glucose levels. It can detect presence of a tumor, whether benign or cancerous, and also give information of whether treatment is effective in reducing or eliminating such cancerous cells.

APPLICATION IN INDUSTRIES

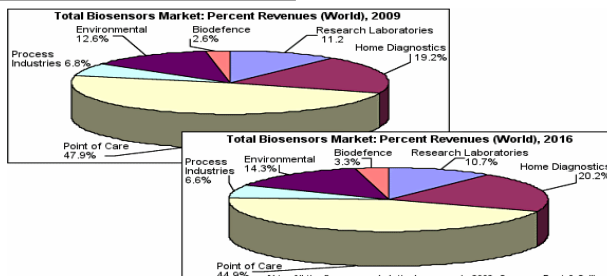
Biosensors are used in the food industry to measure carbohydrates, alcohols and acids, during quality control processes. It may also be used to check fermentation during the production of beer, yoghurt etc. It also used in detecting pathogens in fresh meat, poultry or fish. Enzymatic Biosensors can immobilize enzymes via their photo cross linkable polymer, enabling the quantification of organophosphate pesticides in milk. This application is vital to ensuring health and safety standards in the dairy industry.

APPLICATION IN ENVIRONMENT

Biosensors are used to check the quality of air and water. The devices can be used to pick up traces of organophosphates from pesticides or to check the toxicity levels of waste water, for example. Biosensors detect pollutants by measuring colour, light, fluorescence or electric current. Biosensors have been reported for the detection and monitoring of various environmental pollutants, using antibodies, aptamers, nucleic acids, and enzymes as recognition elements.

APPLICATION IN AGRICULTURE

Biosensors can play a major role in Agriculture. It can be used to forecast the possible occurrence of soil disease, which has not been feasible with the existing technology. The biological diagnosis of soil using biosensor means opening the approach to reliable prevention and decontamination of soil disease at an earlier stage.





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30	31					1 (B.Day of Gerald Edelman)
2	3	4	5	6 World Zoonoses Day	7	8
9	10	11	12	13	14	15 (B.Day of Carl Woese)
16	17	18 (B.Day of Robert Hooke)	19	20 (B.Day of George Mendel)	21	22 (B.Day of Selman Walksman)
23	24	25 (B.Day of Rosalind Franklin)	26	27	28	29

Covid 19, Plague, Salmonellosis, Rabies like various diseases are zoonotic disease.

Parkinson’s disease is a progressive disorder that affects the nervous system and the parts of the body controlled by the nerves. Symptoms starts unintended or uncontrollable movements, such as shaking, stiffness, and difficulty with balance and coordination. LRRK2 and GBA, Therapeutics has recently finished a clinical drug trial on a small molecule, LRRK2 inhibitor DNL201 and various other personalized treatment can be done.



George Mendel

20 July 1749 –6 January 1884

His innovative contribution to immunization and the ultimate eradication of smallpox . Jenner's work is widely regarded as the foundation of immunology—despite the fact that he was neither the first to suggest that infection with cowpox conferred specific immunity to smallpox nor the first to attempt cowpox inoculation for this purpose.

In 1796 an English surgeon, Edward Jenner, developed the concept of vaccination by immunizing an eight-year-old boy against smallpox using cowpox fluid. He later injected smallpox virus repeatedly into the boy, proving that he was indeed immune. Jenner also showed that the cowpox vaccine could be produced from the blister of a human patient rather than just the cow host. This proved the value of protective immunization against the deadly disease, which killed 10-20 percent of the population at the time. Edward Jenner is well known around the world for

Scientists	Name & Birthdate	Contribution
	Gerald Edelman 1 st July , 1929	An American Biologist , he was awarded Nobel prize in physiology and medicine for discovery of the structure of antibody molecules .
	Carl Woese 15 July , 1928	Define archaea by a revolutionary phylogenic taxonomy process of 16s Rrna analysis.
	Robert Hooke 18 July, 1635	Visualized first microorganism under his own made microscope.
	Selman Waksman 22 July, 1888	He works on decomposition of organism in soil, that enabled the discovery of streptomycin and other antibiotics
	Rosalind Franklin 25 July, 1920	Contribution to the discovery of the double helix structure of the DNA.

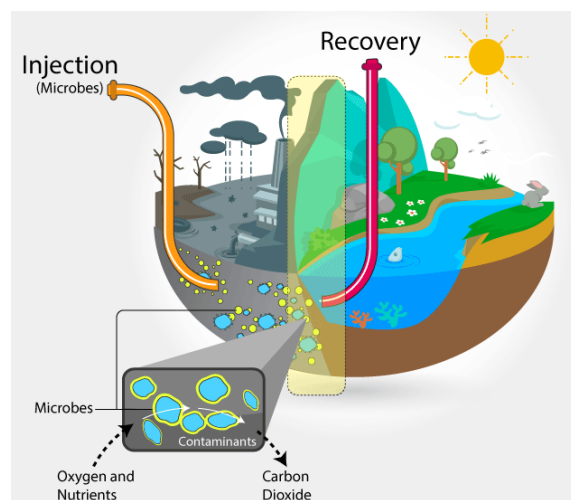
Bioremediation



Can you remember a day when you don't through any waste product???

Actually it's impossible right? Only in India per day **1.15 lakh metric tons** municipal waste is generated. So, what's the fate of those huge amounts of wastes?

- It's a process based on decay and decomposition activity of microbes. So, it's absolutely a natural process.
- Bioremediation is useful for the complete destruction of a wide variety of contaminations.
- Bioremediation can often be carried out on site, often without causing a major disruption of normal activities.
- It's very efficient process and as it's a microbes based degradation process, it's also less expensive than other available process.
- By this process the adverse effect of various heavy metals.





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AUGUST 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6 B.Day of A Fleming	7	8	9	10 (World BiofuelDay)	11 (B.day of Erwin Chargaff)	12
13 B.Day of S. Luria	14	15 (Independence Day)	16	17	18	19 B.Day of H.O. Smith
20 World Mosquito Day	21	22	23	24	25 B.Day of H.Krebs	26
27	28	29	30 B.Day of M. Hilleman	31		

Sickle Cell anemia, affected individuals are resistance to malaria.

DID YOU KNOW?

A It affects the shape of red blood cells, which carry oxygen to all part of the body. Red blood cells are usually round and flexible, so they move easily through blood vessels. In sickle cell anemia, some red blood cells are shaped like sickles or crescent moons. These sickle cells also become rigid and sticky, which can slow or block blood flow. Here in the RNA sequences GAG codon mutated to GUG. For this reason there Glu in the 6th position of beta chain replaced with the Val. Besides various disadvantages Sickle Cell anemia affected individuals are resistant to malaria. In Africa individuals carry both the allele for Sickle Cell anemia are died in the disease, and those who carried both unaffected alleles are non resistance to malaria, are died because of malaria, only heterozygous allele carrier remains



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Alexander Fleming

6 August 1881–11 March 1955

Sir Alexander Fleming was a Scottish Physician and pharmacologist. He is famous for discovering the broadly effective antibiotic substance, named as penicillin. It was discovered accidentally, after returning from a holiday Alexander Fleming noticed in his laboratory at St. Mary's Hospital in London, that a fungus, *Penicillium notatum*, had contaminated a culture plate of *Staphylococcus* bacteria he had accidentally left uncovered. The fungus had created bacteria-free zones wherever it grew on

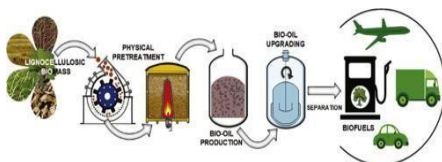
the plate. He found that *P. notatum* proved extremely effective at preventing *Staphylococcus* growth. Fleming found that his "mold juice" was capable of inhibiting a wide range of harmful bacteria, such as *Streptococcus* sp., *Meningococcus* sp. and the *Diphtheria* sp. From that discovery of Penicillin a huge pathway opened in case of medical science and microbiology.

Scientists	Name & Birthdate	Contribution
	Erwin Chargaff 11 August 1905	First discovered that in DNA the ratio of adenine (A) to thymine (T) and guanine (G) to cytosine (C) are equal. It's known as Chargaff Rule.
	Salvador Luria 13 August, 1912	Discover the replication mechanism and genetic structure of viruses.
	Hamilton O Smith 19 August, 1920	He discovered the type II restriction enzyme, known as molecular scissor, which has a huge impact in molecular biology.
	Hans Krebs 25 August, 1900	He discovered the tricarboxylic acid cycle (TCA)-commonly known as Krebs Cycle .
	Maurice Hilleman 30 August, 1919	He's specialized in vaccinology developed over 40 vaccines.

Biofuel... "from nature for nature"...



- Besides increasing of pollutions and decreasing the amount of fossil fuel, stands us in front of a big question mark. What should be the appropriate alternative of fossil fuel, which has as much as efficiency as fossil fuels and also cost effective.
- The most convincing way out is Biofuel. After production of bio ethanol from edible or non-edible crops in first and second generation, the whole processes have a shift to algal Biofuel.
- Up to 70 percent of Algal biomass is usable oils.
- Algae survive in water of high salt content and use water that was previously deemed unusable.



- Rapid growth rates of algae are very useful for spontaneous production.
- Selective strains of algae have a high per activity yield.
- Algal Biofuel is nontoxic for living organisms.
- Algal Biofuel is absolutely biodegradable.
- Its produce far less pollution than the fossil fuels.
- It's very cost effective efficient alternative.



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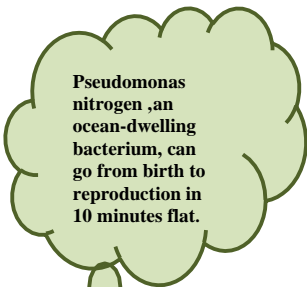
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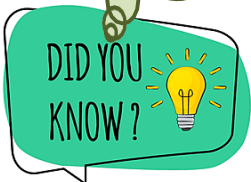


SEPTEMBER 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1 National Nutrition Week, B. Day of Sergei Winogradsky	2
3 B. Day of Frank Macfarlane Burnet	4 National Wildlife Day	5	6	7	8	9
10 B. Day of Thomas D. Brock	11	12	13 B. Day of H.C. Gram	14	15	16 World Ozone Day
17 International Microorganism Day	18	19	20	21	22	23
24	25	26	27	28 World Rabies Day	29 World Heart Day	30



Pseudomonas nitrogen ,an ocean-dwelling bacterium, can go from birth to reproduction in 10 minutes flat.



The rabies vaccine is a vaccine used to prevent rabies. There are a number of rabies vaccines available that are both safe and effective. They can be used to prevent rabies before, and, for a period of time, after exposure to the rabies virus, which is commonly caused by a dog bite or a bat bite. Doses are usually given by injection into the skin or muscle. After exposure, the vaccination is typically used along with rabies immunoglobulin. It is recommended that those who are at high risk of exposure be vaccinated before potential exposure. Rabies vaccines are effective in humans and other animals, and vaccinating dogs is very effective in preventing the spread of rabies to humans. A long-lasting immunity to the virus develops after a full course of treatment.



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Hans Christian Gram

13 September, 1853 – 14 November, 1938

In Berlin, in 1884, Gram developed a method for distinguishing between two major classes of bacteria. This technique, known as Gram staining, continues to be a standard procedure of medical microbiology. This work gained Gram an international reputation. The staining method later played a major role in classifying bacteria. Gram was a modest man, and in his initial publication he remarked, "I have therefore published the method, although I am aware that as yet it is very defective and imperfect; but it is hoped that also in the hands of other

Scientists	Name & Birthday	Contribution
	Sergei Winogradsky 1 September, 1856	Proposed Winogradsky column, identification of biological nitrogen fixation bacteria.
	Frank Macfarlane Burnet 3 September, 1899	Virologist & Nobel Prize Laureate for clonal selection theory.
	Thomas D. Brock 10 September, 1926	Founder of Thermophilic Bacteria. (<i>Thermus aquaticus</i> & <i>Sulfolobus</i> spp.)

investigators it will turn out to be useful." A Gram stain is made using a primary stain of crystal violet and a counterstain of safranin. Bacteria that turn purple when stained are termed 'Gram-positive', while those that turn red when counterstained are termed 'Gram-negative'. Gram's initial work concerned the study of human red blood cells. He was among the first to recognise that macrocyles were characteristic of pernicious anaemia. During 1891, Gram taught pharmacology, and later that year was appointed professor at the University of Copenhagen. In 1900, he resigned his professorship of pharmacology to become professor of medicine. As a professor, he published four volumes of clinical lectures which became used widely in Denmark. He retired from the University of Copenhagen in 1923, and died in 1938.

TYPES OF WASTE MANAGEMENT

RECYCLING

- Recycling makes a huge difference in protecting the environment.
- Amongst the various types of waste management, recycling means that garbage is not disposed of in landfills or water sources by making usable litter components.

INCINERATION

- This type of waste management includes the disposal of waste materials by means of burning.
- The thermal treatment is another name for this disposal method.
- You may incinerate on a commercial scale and dispose of a broad variety of waste materials.

LANDFILL

- It is one of the most popular types of waste management systems in the world.
- It includes the collection, transportation, disposal and burying of waste in designated property.
- Many towns are planning deserted and barren areas to cope with waste.

ANIMAL FEED

- Food waste is a serious issue and needs serious consideration.
- According to the United States Department of Agriculture, between 30 and 40 percent of all food created by the United States is spent on food by retailers and customers.
- This is a major problem as the food





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OCTOBER 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 Wild life Week	2	3 B. Day of F. Griffith	4	5	6	7
8	9	10	11	12 World Arthritis Day	13	14
15	16	17	18	19	20	21
22	23	24 B.Day of Leewenhoek, World Polio Day	25	26 World Obesity Day	27	28 B. Day of D. Ivanovsky
29	30	31				

Polio cases have decreased more than 99% since 1988 from an estimated 350,000 cases to 416 cases in 2013.

DID YOU KNOW?

Arthritis isn't a single disease; the term refers to joint pain or joint disease, and there are more than 100 types of arthritis and related conditions. People of all ages, races and sexes live with arthritis, and it is the leading cause of disability in the U.S. It's most common among women, and although it's not a disease of aging, some types of arthritis occur in older people more than younger people. Common arthritis symptoms include swelling, pain, stiffness and diminished range of motion in joints. Symptoms vary from mild to severe and may come and go. Some may stay about the same for years, but symptoms can also progress and get worse over time. Severe arthritis can result in chronic pain, difficulty performing daily activities and make walking and climbing stairs painful and grueling. Arthritis can also cause permanent joint changes.



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Antonie Van Leeuwenhoek

(24 October 1632 - 26 August 1723)

In response, in 1673 the society published a letter from van Leeuwenhoek that included his microscopic observations on mold, bees, and lice. Van Leeuwenhoek's work fully captured the attention of the Royal Society, and he began corresponding regularly with the society regarding his observations. At first he had been reluctant to publicize his findings, regarding himself as a businessman with little

scientific, artistic, or writing background, but de Graaf urged him to be more confident in his work. By the time van Leeuwenhoek died in 1723, he had written some 190 letters to the Royal Society, detailing his findings in a wide variety of fields, centered on his work in microscopy. He only wrote letters in his own colloquial Dutch; he never published a proper scientific paper in Latin. He strongly preferred to work alone, distrusting the sincerity of those who offered their assistance. The letters were translated into Latin or English by Henry Oldenburg, who had learned Dutch for this very purpose. He was also the first to use the word animalcules to translate the Dutch words that Leeuwenhoek used to describe microorganisms. Despite the initial success of van Leeuwenhoek's relationship with

the Royal Society, soon relations became severely strained. His credibility was questioned when he sent the Royal Society a copy of his first observations of microscopic single-celled organisms dated 9 October 1676. [Previously, the existence of single-celled organisms was entirely unknown. Thus, even with his established reputation with the Royal Society as a reliable observer, his observations of microscopic life were initially met with some skepticism.

Scientists	Name & Birthday	Contribution
	<u>Frederick Griffith</u> 3 October, 1877	Discovery of Pneumococcal Transformation
	<u>Dmitri Ivanovsky</u> 28 October, 1864	Discovery of Viruses, TMV.

MOLECULAR ECOLOGY

Bacterial diversity

- Molecular ecological techniques are used to study in situ questions of bacterial diversity.
- Many microorganisms are not easily obtainable as cultured strains in the laboratory, which would allow for identification and characterization.

Fungal diversity

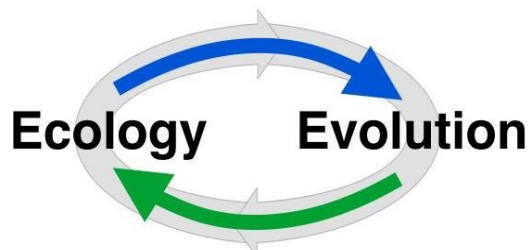
- Exploration of fungal diversity in situ has also benefited from next-generation DNA sequencing technologies.
- The use of high-throughput sequencing techniques has been widely adopted by the fungal ecology community since the first publication of their use in the field in 2009.

Molecular clock hypothesis

- It states, DNA sequences roughly evolve at the same rate and because of this the dissimilarity can be used to tell how long ago they diverged from one another.
- The first step is it must be calibrated based on the approximate time the two lineages studied diverged.

Metapopulation theory

- Metapopulation consists of spatially distinct populations that interact with one another on some level and move through a cycle of extinctions.
- It explains systems in which spatially distinct populations undergo stochastic changes in population sizes which may lead to extinction at the population level.





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NOVEMBER 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7 National Cancer Awareness Day	8	9	10	11
12 World Pneumonia Day	13	14 World Diabetes Day	15	16 B.Day of S.A. Waksman	17	18
19 G.E. Palade	20	21	22	23 B.Day of R.R. Colwell	24	25
26	27	28	29	30 B.Fay of J.C.Bose		

About 99.9% of your DNA is same as everyone else's. Its only 0.1% of your DNA that makes you

DID YOU KNOW?

IS TELOMERE THE KEY TO LIVE LONGER?

Researchers have discovered a new structure of telomeric DNA with the aid of physics and a tiny magnet. Telomeres are seen by many scientists as the key to living longer. They protect genes from damage but get a bit shorter each time a cell divides. If they become too short, the cell dies. This breakthrough discovery will help us understand aging and diseases like cancer.



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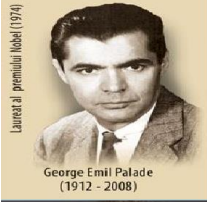

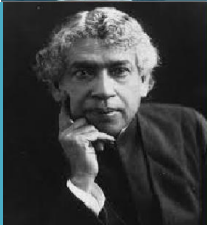


Selman Abraham Waksman was a Jewish Russian Empire- born American inventor, **biochemist** and **microbiologist** whose research into the **decomposition of organisms** that live in **soil** enabled the discovery of **streptomycin** and several other **antibiotics**.



Selman A. Waksman
July 22, 1888 – August 16, 1973

A professor of biochemistry and microbiology at **Rutgers University** for four decades, he discovered a number of antibiotics, and he introduced procedures that have led to the development of many others. The proceeds earned from the licensing of his patents funded a foundation for microbiological research, which established the **Waksman Institute of Microbiology** located on the Rutgers University **Busch Campus** in Piscataway, New Jersey (USA). In 1952, he was awarded the Nobel Prize in **Physiology** or **Medicine** for "ingenious, systematic and successful studies of the soil microbes that led to the discovery of streptomycin"

Scientists	Name & Birthdate	Contribution
 Laureat premiului Nobel (1974) George Emil Palade (1912 - 2008)	George Emil Palade 19th November	He was a Romanian American cell biologist. His most notable discovery is the ribosomes of the endoplasmic reticulum for which he was awarded Nobel Prize in Physiology and Medicine in 1974. Rita Rossi Colwell
	Rita Rossi Colwell 23th November	Rita Rossi Colwell is an American environmental microbiologist who is known for her study of ecology of cholera. Colwell is the founder and Chair of CosmosID, a bioinformatics company.
	Jagadish Chandra Bose 30th November	Indian plant physiologist and physicist whose invention of highly sensitive instruments for the detection of minute responses by living organisms to external stimuli enabled him to anticipate the parallelism between animal and plant tissues.

CONTRIBUTION OF BIOTECH CROPS TO SUSTAINIBILITY

INCREASES CROP PRODUCTIVITY	HELPS CONSERVE BIODIVERSITY	HELPS MITIGATE CLIMATE CHANGE	REDUCES AGRICULTURE'S ECO-FOOTPRINT
<ul style="list-style-type: none"> Contributes to food feed, & fibre Security Sustain a large demanding need for the developing countries like India, South Africa, Bangladesh, etc. More affordable food due to reduced production cost. Heathy and tastier foods for consumers. 	<ul style="list-style-type: none"> Land saving technology allowing higher productivity per hectare. Prevents deforestation thus protecting biodiversity of a region. Prevents water, soil and environmental pollution as a whole. Prevents biomagnification from accumulation of toxic chemicals. 	<ul style="list-style-type: none"> Helps to fight against Global warming by saving on fossil fuels. Reduced agricultural greenhouse gas (GHG) emissions. Disease & drought-resistant plants require fewer environmental resources (such as water, fertilizers, etc) 	<ul style="list-style-type: none"> Reduced CO2 emissions equivalent to removing 11.9 million cars from the road for 1 year. 18.7% decreased environmental impact from use of herbicides & insecticides. Use of herbicide tolerant biotech crops conserves soil moisture and fertility for longer periods.





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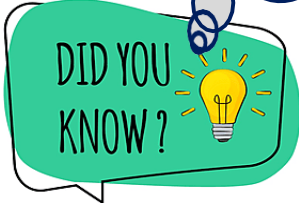
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DECEMBER 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31					1 World AIDS Day	2
3 B.Day of R.J. Kuhn	4 B.Day of A.D. Hershey	5	6	7	8	9
10	11 B.Day of H.H. Robert Koch	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27 B.Day of L.Pasteur	28	29 Int. Day for Biological Diversity	30

Your Body is only **11 months old.** Almost every cell in your body is replaced every 11 months.



Cancer was first described by the 'Ancient Egyptians'

The world's oldest documented case of cancer was found on papers (papyrus) from ancient Egypt. It talked about a tumor found in the breast. The cancer was treated by destroying the tissue with a hot instrument called "the fire drill." Today, we call this "cauterization." Some writings have shown that the ancient Egyptians could distinguish between cancerous (malignant) and noncancerous (benign) tumors. The writing also says about the disease, "There is no treatment."



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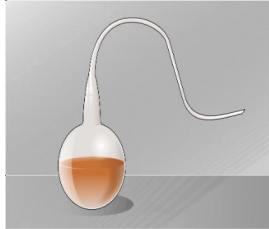
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27 December 1822 – 28 September 1895)

Louis Pasteur

Louis Pasteur was a French chemist and microbiologist renowned for his discoveries of the principles of **vaccination, microbial fermentation, and pasteurization.**



His research in chemistry led to remarkable breakthroughs in the

understanding of the causes and preventions of diseases, which laid down the foundations of **hygiene, public health and much of modern medicine.** His works are credited to saving millions of lives through the developments of **vaccines for rabies and anthrax.** He is regarded as one of the founders of modern bacteriology and has been honored as the "father of bacteriology" and as the "father of microbiology"

Scientists	Name & Birthdate	Contribution
	Richard Johann Kuhn 3 December 1900	Richard Johann Kuhn was an Austrian-German biochemist who was awarded the Nobel Prize in Chemistry in 1938 "for his work on carotenoids and vitamins".
	Alfred Day Hershey Dec. 4, 1908	Alfred Day Hershey is an American biologist who, along with Max Delbrück and Salvador Luria, won the Nobel Prize for Physiology or Medicine in 1969. The prize was given for research done on bacteriophages (viruses that infect bacteria).
	Heinrich Hermann Robert Koch 11 December 1843	Koch was a German physician and microbiologist. As the discoverer of the specific causative agents of deadly infectious diseases including tuberculosis, cholera and anthrax, he is regarded as one of the main founders of modern bacteriology.

SUSTAINABLE BIOTECH IN INDUSTRIES

LAB CULTIVATED MEAT

The meat industry is a huge polluter. Biotechnology could significantly reduce the use of land, water, and energy by growing meat without the animal, directly from a small sample of muscle and fat cells. This approach would also reduce the use of antibiotics in meat production as it can be created in sterile lab conditions.

FLAVOURINGS

Most flavorings were traditionally extracted from plants. Today, however, many of them are produced through petrochemical processes. Biotechnology could provide an environmentally friendly alternative that does not require as much land and resources as traditional methods.

COSMETICS

Many natural cosmetics contain active ingredients sourced from plants. However, for some of these ingredients, the amount obtained from a plant can be quite small compared to the amount of land, water, and energy that are needed to produce it.

CLOTHING

Fast fashion is a big sustainability issue. Biotechnology could put a stop to its environmental impact by replacing polluting chemical processes and making textile waste recyclable and biodegradable. Enzymes are already used routinely to wash and bleach clothing and to prevent wool from shrinking. New technologies could allow us to go further by using microbes to produce textiles.

