Shri Shivaji Education Society Amravati's
Science College, Nagpur

Accredited with CGPA of 3.51 at 'A+' Grade by NAAC, Bangalore A College With Potential for Excellence An Institutional Member of APQN
Recognized Centre for Higher Learning & Research A Mentor College Under PARAMARSH Scheme, UGC New Delhi
A Mentor College Under Paris Sparsh Scheme of Maharashtra State An ISO 21001 : 2018 Certified Institution

Department of Microbiology & Biotechnology

Organizes

Calendar Making Competition 2025

on

Theme : *Microbiology & Biotechnology for Industrial Development*

Submission of Entries : Dt. 06/09/2024 on micronaac2023@gmail.com

Objective : To Promote Creativity and self expression among Students. This Displays a blend of Exceptional Creativity and imagination with great Enthusiasm.

Registration : Online Registration through Google form Link is Mandatory
https://forms.gle/imJ8HCUbUArBJ3Fx7t

Prize Money and Memento : Rs. 500/- to 3 Winner Groups: 2 from UG and 1 from PG Category
* Memento to all the Winners

Certificate : E-Certificate to all the Participants

Dr. Arvind Deshmukh
President
Microbiologists Society, India

Convener
Dr. Pranita Gulhane

Dr. Omraj Deshmukh
Principal
Science College, Congress Nagar, Nagpur

Co-Ordinator
Prof. Atul Bobdey

Organizing Committee

Ms. Sanchari Sarkar
Ms. Ankita Manapure
Ms. Shivani Gohane
Ms. Payal Talekar
Ms. Manasi Borkar

Ms. Nupur Deshmukh
Ms. Anjali Pogade
Dr. Sapna Baghel
Ms. Pallavi Butle
Ms. Surabhi Bawankar

Ms. Mayuri Bhad
Ms. Priya Gaidhane
Ms. Sarika Tekade
Ms. Achala Waghmare

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

Department of Microbiology

Session 2024-2025

Organizes

"CALENDAR MAKING COMPETITION"

Date: 06-09-2024

The Department of Microbiology and Biotechnology recently hosted an exciting calendar-making competition themed "Microbiology and Biotechnology for Industrial Development" under the chairmanship of Hon'ble Prof. Omraj Deshmukh, Principal, Science College Nagpur, Coordinator- Respected Prof. Atul Bobdey and Convener- Dr. Pranita Gulhane. This event saw enthusiastic participation from both postgraduate and undergraduate students, who showcased their exceptional creativity and artistic talents. The competition highlighted innovative approaches to incorporating microbiological themes into visually striking calendar designs. Among the winners in the postgraduate category were Arya Walode, Akanksha Bisen, and Aastha Sakharwade, while Vaidehi Telang and Leena Gholse took top honors in the undergraduate category. All participants received certificates of appreciation, recognizing their artistic contributions and celebrating their creative achievements.

The event not only showcased the students' creative potential but also fostered a sense of community within the department, bringing together a vibrant group of aspiring scientists and artists. Attendees enjoyed a lively exhibition of the calendars, sparking discussions about the intersection of art and science. The competition served as an inspiration for future projects, encouraging students to explore new ways to communicate scientific concepts through creative expression. Overall, the event was a resounding success, reinforcing the department's commitment to nurturing both academic and artistic endeavors.

Action Taken: The competition, which saw participation from a total of 41 students, resulted in enhanced teamwork and collaboration skills among participants, as they worked together to brainstorm and create their calendars. It also fostered a deeper understanding of the role of microbiology and biotechnology in industrial development, encouraging students to think critically about real-world applications. Additionally, the event boosted students' confidence in their creative abilities and provided them with a platform to express their ideas visually. Overall, it inspired greater interest in interdisciplinary projects and strengthened the sense of community within the department.


पंथ-संप्रदाय एक दिसू दे, मतभेद नसू दे।
Latitude: 21.128121
Longitude: 79.08234
Altitude: 270.0±1 m
Accuracy: 20.0 m
Time: 09-10-2024 12:08
Note: Micromania 2024


पर्व पंथ-संप्रदाय एक दिसू दे, मतभेद नसू दे।
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Longitude: 79.082382
Elevation: 334.46±74 m
Accuracy: 77.2 m
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Note: Micromania 2024


असा दे। हे सर्व पंथ-संप्रदाय एक दिसू दे, मतभेद नसू दे।


SCIENCE COLLEGE
CONGRESS NAGAR, NAGPUR-12
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Longitude: 79.082342
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Note: Micromania 2024
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Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

Department of Microbiology

Session 2024-2025

Organizes

"CALENDAR MAKING COMPETITION"

Date: 06-09-2024

Sr. No.	Name of Participants	Class	Group
1	Vaidehi Telang	B.Sc IInd Microbiology	Group 1
2	Leena Gholse		
3	Aparna Kurrewar	MSc Ist Microbiology	Group 2
4	Tannu Atkari		
5	Rameshwari Shende		
6	Riya Suryavanhi	MSc Ist Microbiology	Group 3
7	Pallavi Garade		
8	Samiksha Tajane		
9	Raveena Khadse		
10	Rajnandini Bisen		
11	Medha Sagar Palliwar	BSc Ist (CMBT)	Gropu 4
12	Harshili Kombade		
13	Sanskruti Raju Motghare		
14	Jaivi meshram		
15	Kashish patel		
16	Anushree Ghosh	BSC Ist (CMBT)	Group 5
17	Ruzain Nawaz Sheikh		
18	Aabha Tupkar		
19	Vanshika vilas Nandeshwar		
20	Vedhakshi Ninawe		
21	Arya walode	MSc IInd Microbiology	Group 6
22	Akanshya Bisen		
23	Astha Sakharwade		
24	Aditi Bhandarkar	BSC Ist Microbiology	Group 7
25	Anjali Dubey		
26	Rachita Gulkari		
27	Adwiti Nandagawli		
28	Himanshi sakharwade	BSc Ist (CMBT)	Group 8

29	Shreya khade		
30	Payal Doifode		
31	Priti jadhav		
32	Yasmine Sheikh		
33	Sayali Dhakate	BSc I[st] Microbiology	Group 9
34	Saloni Patale		
35	Shruti Walke		
36	Shravani Dharmik		
37	Samidha Nagdeve		
38	Depam Vadera	BSc I[st] Microbiology	Group 10
39	Siddhant Dhanorkar		
40	Ritisha Kukadkar		
41	Neha Ashitkar		

Dr. Pranita Gulhane

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

Department of Microbiology

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"CALENDAR MAKING COMPETITION"

Date: 06-09-2024

FEEDBACK FORM

Q.1) How would you rate the overall organization of the competition?
a) Excellent
b) Good
c) Satisfactory

Q.2) How effective was the competition in encouraging creativity and innovation?
a) Very effective
b) Effective
c) Neutral

Q.3) How did the competition affect your motivation to explore further opportunities in design or related fields?
a) Highly motivated
b) Somewhat motivated
c) Neutral

Q.4) Did you find the competition to be a valuable experience for your personal or academic growth?
a) Yes
b) No

Q.5) Would you participate in similar events organized by the department in the future?
a) Yes
b) No

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Department of Microbiology

Session 2024-2025

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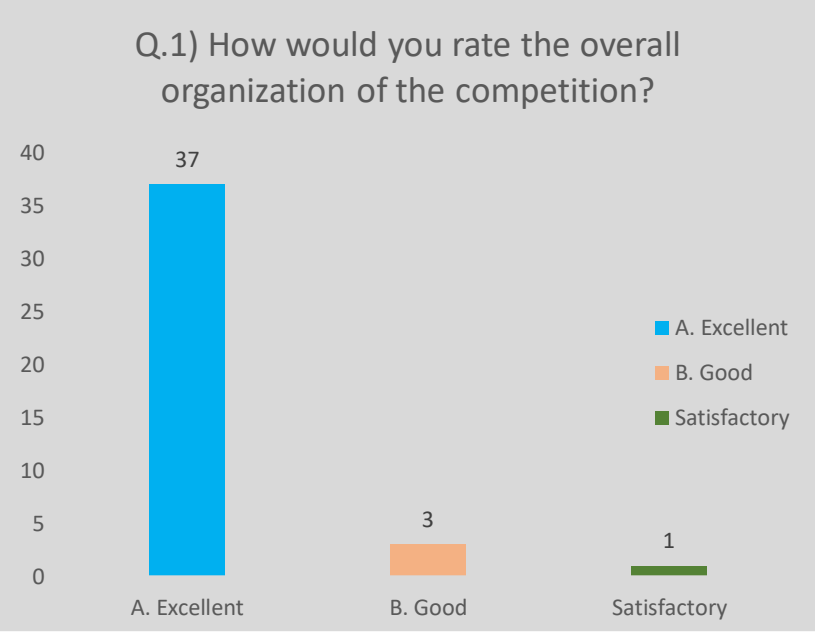
"CALENDAR MAKING COMPETITION"

Date: 06-09-2024

FEEDBACK RESPONSES

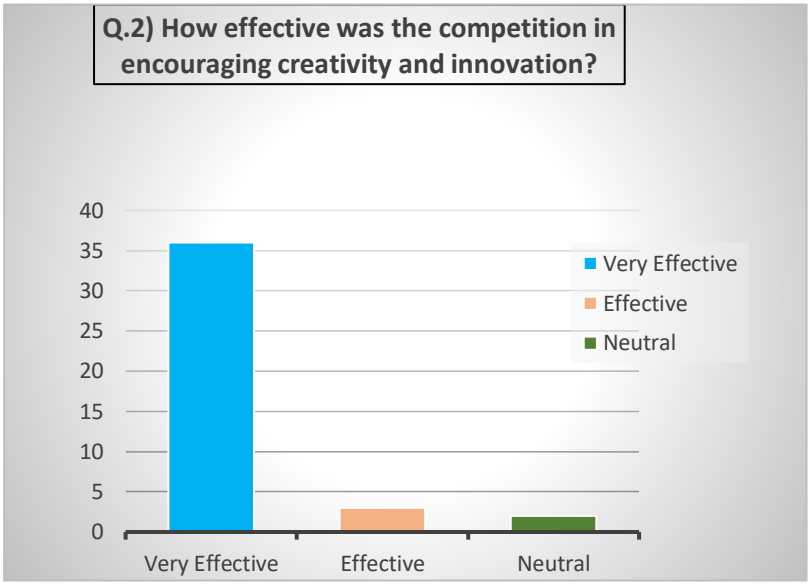
Q.1) How would you rate the overall organization of the competition?

Rating	No. of Students	Percentage
Excellent	37	90 %
Good	3	8 %
Satisfactory	1	2 %
Total	41	100%



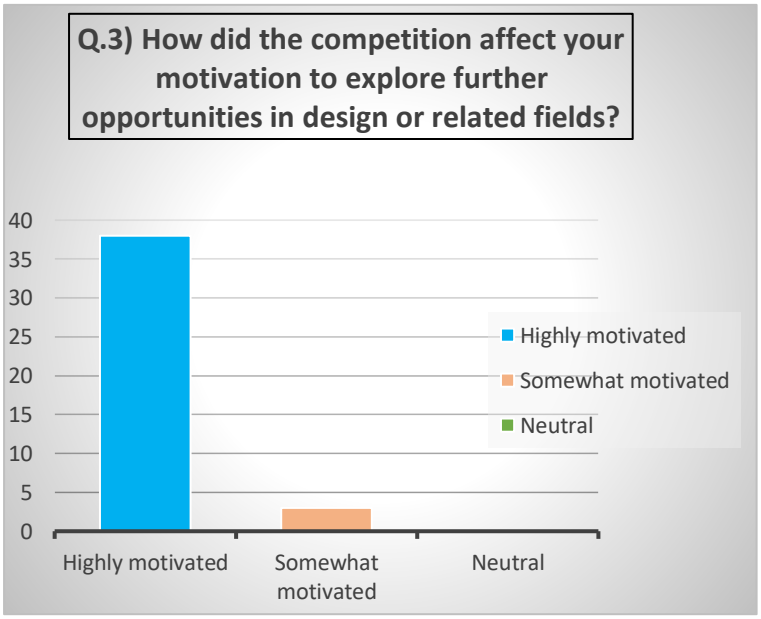
Q.2) How effective was the competition in encouraging creativity and innovation?

Rating	No. of Students	Percentage
Very Effective	36	88 %
Effective	3	7 %
Neutral	2	5 %
Total	41	100%



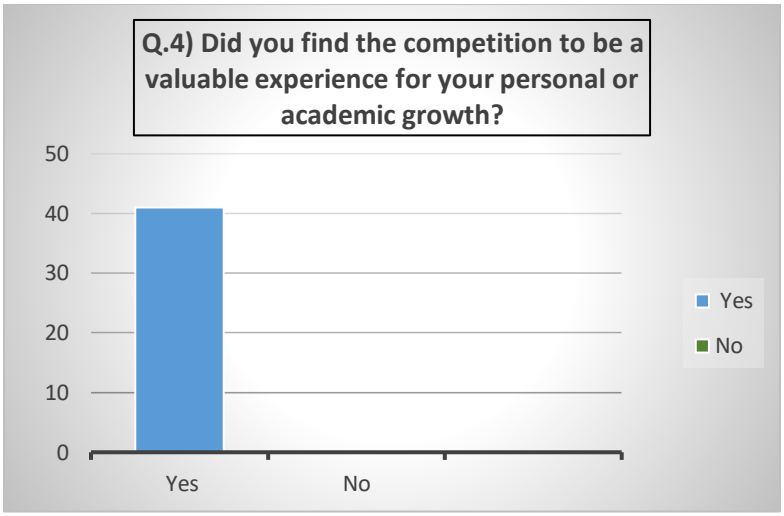
Q.3) How did the competition affect your motivation to explore further opportunities in design or related fields?

Rating	No. of Students	Percentage
Highly motivated	38	93%
Somewhat motivated	3	7 %
Neutral	0	0%
Total	41	100%



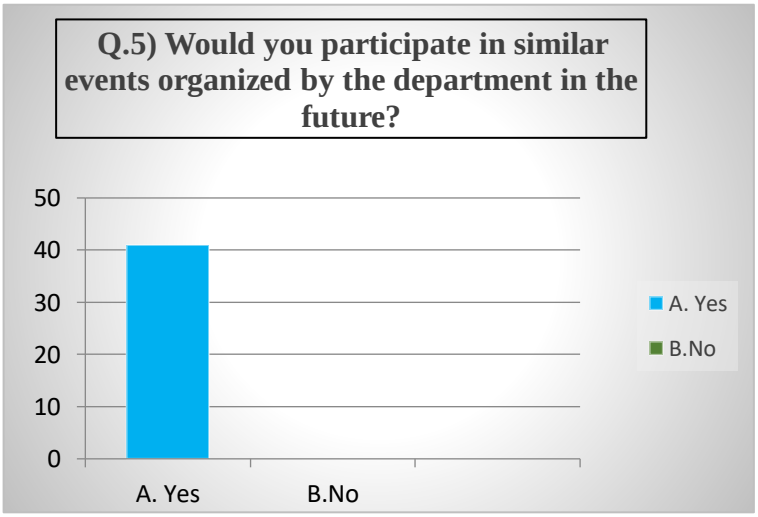
Q.4) Did you find the competition to be a valuable experience for your personal or academic growth?

Rating	No. of Students	Percentage
Yes	41	100%
No	0	0 %



Q.5) Would you participate in similar events organized by the department in the future?

Rating	No. of Students	Percentage
Yes	41	100 %
No	0	0 %



Dr. Pranita Gulhane

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JANUARY 2025

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19 National Youth Day	20	21	22	23	24	25
26 Republic Day	27	28	29	30	31 World Leprosy Day	

TYPES OF WINES

WHITE WINE

White wine is a wine that is fermented without skin contact. The colour can be straw-yellow, yellow-green, or yellow-gold. It is produced by the alcoholic fermentation of the non-coloured pulp of grapes, which may have a skin of any colour. White wine has existed for at least 4,000 years. The wide variety of white wines comes from the large number of varieties, methods of winemaking, and ratios of residual sugar. White wine is mainly from "white" grapes, which are green or yellow in colour, such as the Chardonnay, Sauvignon blanc and Riesling. Some white wine is also made from grapes with coloured skin, provided that the obtained wort is not stained. Pinot noir, for example, is commonly used to produce champagne. Among the many types of white wine, dry white wine is the most common. More or less aromatic and tangy, it is derived from the complete fermentation of the wort. Sweet wines, on the other hand, are produced by interrupting the fermentation before all the grape sugars are converted into alcohol; this is called Mutage or fortification. The methods of enriching wort with sugar are multiple: on-ripening on the vine, passerillage (straining), or the use of noble rot. Sparkling wines, which are mostly white, are wines where the carbon dioxide from the fermentation is kept dissolved in the wine and becomes gas when the bottle is opened. White wines are often used as an apéritif before a meal, with dessert, or as a refreshing drink between meals. White wines are often considered more refreshing and lighter in both style and taste than the majority of their red wine counterparts. Due to their acidity, aroma and ability to soften meat and deglaze cooking juices, white wines are often used in cooking.

RED WINE

Red wine is gaining market share in many countries, even though white wine remains preferred in Australia. Red wine consumption is experiencing significant growth there. In Japan, red wine consumption now surpasses white wine, accounting for 48% of total wine consumed compared to 43% for white wine. While red wine's market share may be increasing relative to other types of wines, overall wine consumption volume is declining in several countries. For example, wine consumption in Argentina has consistently decreased, reaching a -10% change from 2003 to 2004.

Red wine is a type of wine made from dark-colored grape varieties. The color of the wine can range from intense violet, typical of young wines, through to brick red for mature wines and brown for older red wines. The juice from most purple grapes is greenish-white, the red color coming from anthocyan pigments present in the skin of the grape. Much of the red wine production process involves extraction of color and flavor components from the grape skin.

SPARKLING WINE

Sparkling wine is a wine with significant levels of carbon dioxide in it, making it fizzy. While it is common to refer to this as champagne, European Union countries legally reserve that word for products exclusively produced in the Champagne region of France. Sparkling wine is usually either white or rosé, but there are examples of red sparkling wines such as the Italian Brachetto, Bonarda and Lambrusco, and the Australian sparkling Shiraz. The sweetness of sparkling wine can range from very dry brut styles to sweeter doux varieties (French for 'hard' and 'soft', respectively).The sparkling quality of these wines comes from its carbon dioxide content and may be the result of natural fermentation, either in a bottle, as with the traditional method, in a large tank designed to withstand the pressures involved (as in the Charmat process), or as a result of simple carbon dioxide injection in some cheaper sparkling wines. In European Union countries, the word "champagne" is reserved by law only for sparkling wine from the Champagne region of France. The French terms Mousseux and Crémant refer to sparkling wine not made in the Champagne region, such as Blanquette de Limoux produced in Southern France. Sparkling wines are produced around the world, and are often referred to by their local name or region, such as Prosecco, Franciacorta, Trento DOC, Oltrepò Pavese Metodo Classico and Asti from Italy (the generic Italian term for sparkling wine being spumante), Espumante from Portugal, Cava from Spain, and Cap Classique from South Africa. Sparkling wines have been produced in Central and Eastern Europe since the early 19th-century. "Champagne" was further popularised in the region, late in the century, when József Törley started production in Hungary using French methods, learned as an apprentice in Reims.

ROSE WINE

Pink wine happily spans the colour space between red and white wine, in a way, rosé is more like a state of mind.
Rosé happens when the skins of red grapes touch wine for only a short time. Where some red wines ferment for weeks at a time on red grape skins, rosé wines are stained red for just a few hours.
The winemaker has complete control over the color of the wine, and removes the red grape skins (the source of the red pigment) when the wine reaches the perfect color.
As you can imagine, nearly any red wine grape (from Cabernet Sauvignon to Syrah) can be used to make rosé wine, however there are several common styles and grapes that are preferred for rosé.

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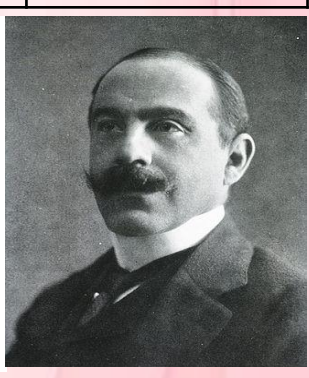
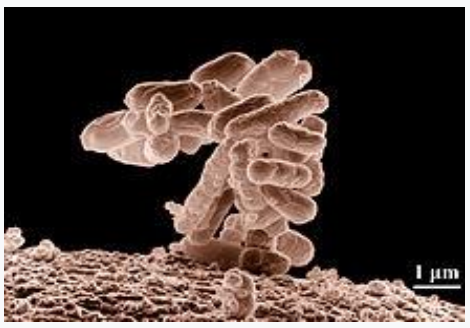
FEBRUARY 2025

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4 World Cancer Day	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27 World Protein Day	28 National Science Day	



Bacteria

Escherichia coli



Scientific classification	
Domain:	Bacteria
Phylum:	Pseudomonadota
Class:	Gammaproteobacteria
Order:	Enterobacterales
Family:	Enterobacteriaceae
Genus:	*Escherichia*
Species:	***E. coli***

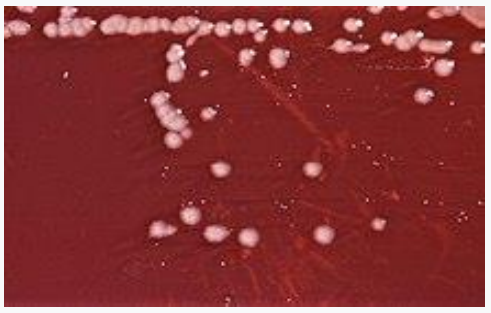
Binomial name

Escherichia coli
(Migula 1895)
Castellani and Chalmers 1919

Synonyms

- *Bacillus coli communis* Escherich 1885

Pseudomonas



P. aeruginosa colonies on an agar plate

Scientific classification	
Domain:	Bacteria
Phylum:	Pseudomonadota
Class:	Gammaproteobacteria
Order:	Pseudomonadales
Family:	Pseudomonadaceae
Genus:	***Pseudomonas*** Migula 1894

Type species

Pseudomonas aeruginosa

Synonyms

- "*Stutzerimonas*" Lalucat et al. 2022[1]
- *Flavimonas* Holmes et al. 1987
- *Chryseomonas* Holmes et al. 1986
- *Serpens* Hespell 1977 (Approved Lists 1980)

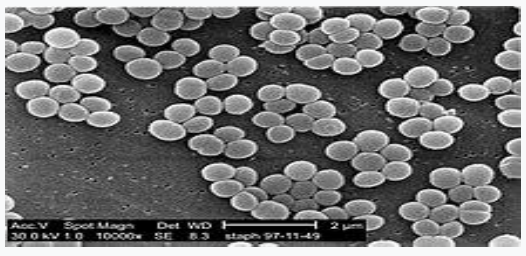
Bacillus

Bacillus subtilis, stained

Scientific classification	
Domain:	Bacteria
Phylum:	Bacillota
Class:	Bacilli
Order:	Bacillales
Family:	Bacillaceae
Genus:	***Bacillus*** Cohn

Staphylococcus

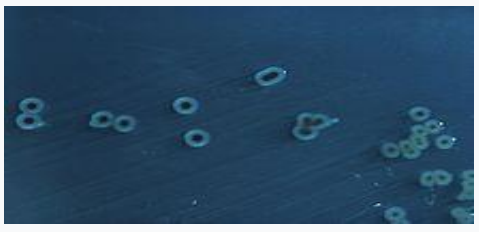
S. aureus colonies



Scientific classification	
Domain:	Bacteria
Phylum:	Bacillota
Class:	Bacilli
Order:	Bacillales
Family:	Staphylococcaceae
Genus:	***Staphylococcus*** Rosenbach 1884

Salmonella enterica

S. enterica Typhimurium colonies



Scientific classification	
Domain:	Bacteria
Phylum:	Pseudomonadota
Class:	Gammaproteobacteria
Order:	Enterobacterales
Family:	Enterobacteriaceae
Genus:	*Salmonella*
Species:	***S. enterica***

Binomial name

Salmonella enterica
(ex Kauffmann & Edwards 1952) Le Minor & Popoff 1987

Corynebacterium

Corynebacterium ulcerans colonies on a blood agar plate

Scientific classification	
Domain:	Bacteria
Phylum:	Actinomycetota
Class:	Actinomycetia
Order:	Mycobacteriales
Family:	**Corynebacteriaceae** Lehmann and Neumann 1907 (Approved Lists 1980)[2]
Genus:	***Corynebacterium*** Lehmann and Neumann 1896 (Approved Lists 1980)[1]

Type species

Corynebacterium diphtheriae

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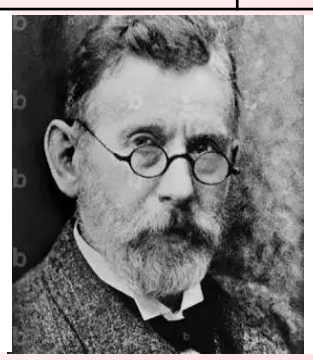
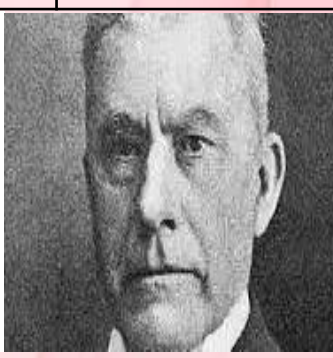
MARCH 2025

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3 World Wildlife Day	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24 World Tuberculosis Day	25	26	27	28 World Triglycerides Day	29
30	31					





RESEARCH ORGANISATION

BHABHA ATOMIC REASERCH CENTER (BARC)

The **Bhabha Atomic Research Centre** (**BARC**) is India's premier nuclear research facility, headquartered in Trombay, Mumbai, Maharashtra, India. It was founded by Homi Jehangir Bhabha as the **Atomic Energy Establishment, Trombay** (**AEET**) in January 1954 as a multidisciplinary research program essential for India's nuclear program. It operates under the Department of Atomic Energy (DAE), which is directly overseen by the Prime Minister of India. BARC is a multi-disciplinary research center with extensive infrastructure for advanced research and development covering the entire spectrum of nuclear science, chemical engineering, material sciences and metallurgy, electronic instrumentation, biology and medicine, supercomputing, high-energy physics and plasma physics and associated research for Indian nuclear programme and related areas. BARC's core mandate is to sustain peaceful applications of nuclear energy. It manages all facets of nuclear power generation, from the theoretical design of reactors to, computer modeling and simulation, risk analysis, development and testing of new reactor fuel, materials, etc. Its other research focus areas are applications for isotopes in industries, radiation technologies and their application to health, food and medicine, agriculture and environment, accelerator and laser technology, electronics, instrumentation and reactor control and material science, environment and radiation monitoring etc
Its primary facilities are located in Trombay, with new facilities also located in Challakere in Chitradurga district of Karnataka. A new Special Mineral Enrichment Facility which focuses on enrichment of uranium fuel is under construction in Atchutapuram near Visakhapatnam in Andhra Pradesh, for supporting India's nuclear submarine program and produce high specific activity radioisotopes for extensive research.

Dr. Bhaba with other Scientists

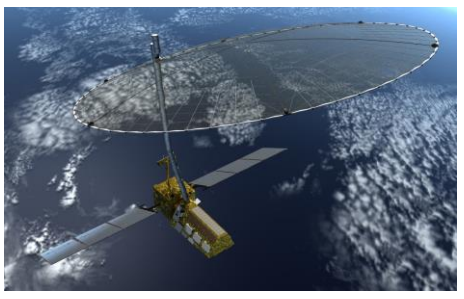
NEERI

CSIR-NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE

The **National Environmental Engineering Research Institute** (**NEERI**) in Nagpur was originally established in 1958 as the **Central Public Health Engineering Research Institute** (**CPHERI**).It has been described as the "premier and oldest institute in India." It is an institution listed on the Integrated Government Online Directory. It operates under the aegis of the Council of Scientific and Industrial Research (CSIR), based in New Delhi. Indira Gandhi, the Prime Minister of India at the time, renamed the Institute NEERI in 1974.
The Institute primarily focused on human health issues related to water supply, sewage disposal, diseases, and industrial pollution.
NEERI operates as a laboratory in the field of environmental science and engineering and is one of the constituent laboratories of the Council of Scientific and Industrial Research (CSIR). The institute has six zonal laboratories located in Chennai, Delhi, Hyderabad, Kolkata, Nagpur, and Mumbai. NEERI operates under the Ministry of Science and Technology of the Indian government. NEERI is a partner organization of India's POP National Implementation Plan (NIP)

INDIAN SPACE RESEARCH ORGANISATION (ISRO)

Indian Space Research Organisation (ISRO) Ais India's national **space agency**. It operates as the principal research and development arm of the Department of Space (DoS), which is directly overseen by the Prime Minister of India, with the Chairman of ISRO also serving as the chief executive of the DoS. ISRO has the world's largest constellation of remote-sensing satellites and operates the GAGAN and IRNSS (NavIC) satellite navigation systems. It has sent three missions to the Moon and one to Mars. ISRO is primarily responsible for space-based operations, space exploration, international space cooperation and the development of related technologies.
ISRO is one of the six government space agencies in the world that possess full launch capabilities, the ability to deploy cryogenic engines, the ability to launch extraterrestrial missions and the ability to operate a large fleet of artificial satellites. ISRO is also one of only four governmental space agencies in the world to have soft landing (unmanned) capabilities.
ISRO was formerly known as the Indian National Committee for Space Research (INCOSPAR). It was set up at the behest of the then-Prime Minister Jawaharlal Nehru at the recommendation of Dr. Vikram Sarabhai in 1962, a prescient scientist. INCOSPAR was renamed ISRO in 1969 and was subsumed into the Department of Atomic Energy (DAE). In 1972, the Government of India set up a Space Commission and the DoS, bringing ISRO under its purview.
The establishment of ISRO had institutionalised space research activities in India. It has since then been managed by the DoS, which also governs various other institutions in India in the domain of astronomy and space technology.
ISRO built India's first satellite, Aryabhata, which was launched by the Soviet space agency Interkosmos in 1975. In 1980, ISRO launched satellite RS-1 onboard SLV-3, making India only the seventh country on the planet to undertake orbital launches.
SLV-3 was followed by ASLV, which was subsequently succeeded by the development of many medium-lift launch vehicles, rocket engines, satellite systems and networks enabling the agency to launch hundreds of domestic and foreign satellites and various deep space missions.
ISRO's programmes have played a significant role in the socio-economic development of India and have supported both civilian and military domains in various aspects including disaster management, telemedicine, navigation and reconnaissance missions.



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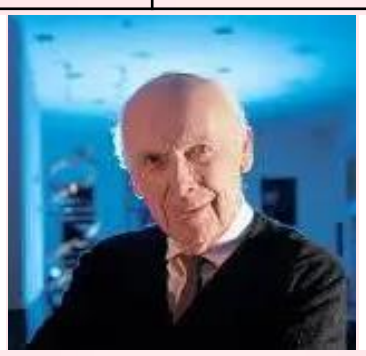
APRIL 2025

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7 World Health Day	8	9	10	11	12
13	14	15	16	17 World Hemophilia Day	18	19
20	21	22 World Earth Day	23	24	25	26
27	28	29	30			



TYPES OF CHEESE

MOZZARELLA CHEESE

Mozzarella, mild, smooth-textured cheese made in its authentic Italian version from the milk of the water buffalo; imitations of varying quality are commonly made of cow's milk.

Fresh mozzarella is white, but the occasional yellow/brown color of mozzarella comes from the enzyme R110. Due to its high moisture content, it is traditionally served the day after it is made but can be kept in brine for up to a week or longer when sold in vacuum-sealed packages. Fresh mozzarella can be heard to make a distinct squeaky sound when it is chewed or rubbed.

Low-moisture mozzarella can be kept refrigerated for up to a month, though some shredded low-moisture mozzarella is sold with a shelf life of up to six months. Mozzarella is used for most types of pizza and several pasta dishes or served with sliced tomatoes and basil in Caprese salad.

COTTAGE CHEESE

Cottage cheese is curdled milk product with a mild flavour and a creamy, heterogeneous, soupy texture, made from skimmed milk. An essential step in the manufacturing process distinguishing cottage cheese from other fresh cheeses is the addition of a "dressing" to the curd grains, usually cream, which is mainly responsible for the taste of the product. Cottage cheese is not aged. Cottage cheese can be low in calories compared to other types of cheese — similar to yogurt; this makes it popular among dieters and some health devotees. It can be used with various foods such as yogurt, fruit, toast, and granola, in salads, as a dip, and as a replacement for mayonnaise

CHEDDAR CHEESE

Cheddar cheese (or simply **cheddar**) is a natural cheese that is relatively hard, off-white (or orange if colourings such as annatto are added), and sometimes sharp-tasting. It originates from the English village of Cheddar in Somerset, southwest England.
Cheddar is produced all over the world, and *cheddar cheese* has no Protected Designation of Origin (PDO). In 2007, the name West Country Farmhouse Cheddar was registered in the European Union and (after Brexit) the United Kingdom, defined as cheddar produced from local milk within Somerset, Dorset, Devon and Cornwall and manufactured using traditional methods. Protected Geographical Indication (PGI) was registered for Orkney Scottish Island Cheddar in 2013 in the EU, which also applies under UK law.
Globally, the style and quality of cheeses labelled as cheddar varies greatly, with some processed cheeses packaged as "cheddar". Cheeses similar to Red Leicester are sometimes marketed as "red cheddar".

SWISS CHEESE

The term "**Swiss cheese**" is one used of any variety of cheese that resembles Emmental cheese, a yellow, medium-hard cheese that originated in the area around Emmental, Switzerland. It is classified as a Swiss-type or Alpine cheese. The term is generic; it does not imply that the cheese is actually made in Switzerland. Some types of Swiss cheese have a distinctive appearance, as the blocks or rounds of the cheese are riddled with holes known as "eyes". Cheese without eyes is known as "blind".
"Swiss cheese" is now produced in many countries, including the United States, Finland, Estonia, and Ireland. It is sometimes made with pasteurized or part-skim milk, unlike the original from Switzerland made with raw milk. The United States Department of Agriculture uses the terms Swiss cheese and Emmentaler cheese interchangeably. In Australia, both terms are used, along with Swiss-style cheese, in some cases differentiating the two. The term Swiss cheese is sometimes used in India, although it is also often referred to as Emmental.

Production

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MAY 2025

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8 World Thalassaemia Day	9	10
11 Technology Day	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31 NO Tobacco Day



LAB INSTRUMENTS

Bunsen Burner : Used for heating substances and performing flame tests.

Microscope : Used to view small objects or specimens at a high magnification.

Beaker : Used for mixing, heating, and holding liquids and chemicals.

Test Tube : Used for holding and mixing small amounts of liquids and conducting experiments.

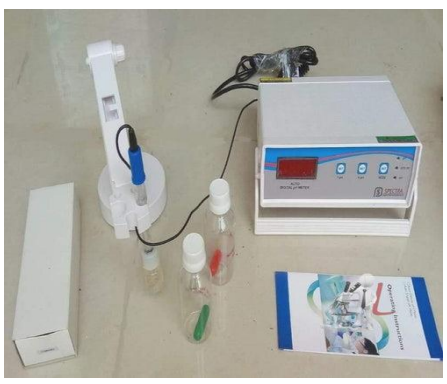
Graduated Cylinder : Used for accurate measurement of liquid volumes.

Hot Plate : Used for heating substances in the laboratory.

Centrifuge : Used to separate components of a liquid or suspension based on density or mass.

Petri Dish : Used for cultivating cells, bacteria, or small organisms in controlled conditions.

Thermometer : Used to measure temperature in the laboratory.



pH Meter : Used to measure the acidity or alkalinity of a solution.

Autoclave : Used to sterilize equipment and media by using high-pressure steam.

Analytical Balance : Used for precise weighing of substances.

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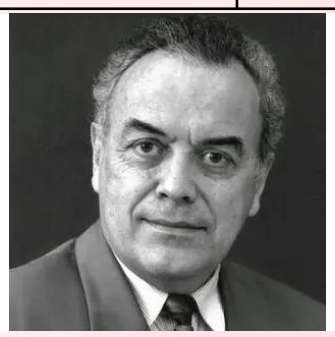
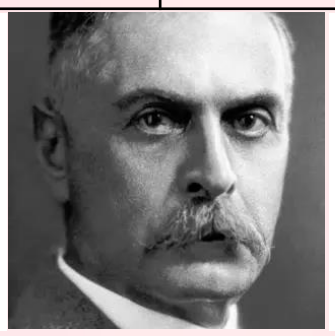
JUNE 2025

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5 World Environment Day	6	7 World Food Safety Day
8 World Brain Tumor Day	9	10	11	12	13	14
15	16	17	18	19	20	21 International Yoga Day
22	23	24	25	26	27	28
29	30					





MEDICINAL PLANTS

Scientific name	Name	Description	Pictures
Ocimum tenuiflorum	Tulsi or holy basil	It is used for a variety of purposes in traditional medicine; tulsi is taken in many forms: as herbal tea, dried powder, fresh leaf or mixed with ghee. Essential oil extracted from Karpoora tulasi is mostly used for medicinal purposes and in herbal cosmetics.	
Oenothera	Evening primrose	Its oil has been used since the 1930s for eczema, and more recently as an anti-inflammatory, but there is insufficient evidence for it having any effect.	
Panax spec.	Ginseng	Asian ginseng may affect glucose metabolism and lower blood sugar levels, but the poor quality of research prevents conclusions about such effects.	
Papaver somniferum	Opium poppy	The plant is the plant source of morphine, used for pain relief. Morphine made from the refined and modified sap is used for pain control in people with severe cancer.	
Pelargonium sidoides	Umckaloabo, or South African Geranium	Possibly useful for treating respiratory infections.	
Piper methysticum	Kava	The plant has been used for centuries in the South Pacific to make a ceremonial drink with sedative and anesthetic properties, with potential for causing liver injury.	
Piscidia erythrina / *Piscidia piscipula*	Jamaica dogwood	The plant is used in traditional medicine for the treatment of insomnia and anxiety, despite serious safety concerns. A 2006 study suggested medicinal potential.	
Plantago lanceolata	Plantain	It is used frequently in herbal teas and other herbal remedies. A tea from the leaves is used as a highly effective cough medicine. In the traditional Austrian medicine *Plantago lanceolata* leaves have been used internally (as syrup or tea) or externally (fresh leaves) for treatment of disorders of the respiratory tract, skin, insect bites, and infections.	
Platycodon grandiflorus	Platycodon, balloon flower	The extracts and purified platycoside compounds (saponins) from the roots may exhibit neuroprotective, antimicrobial, anti-inflammatory, anti-cancer, anti-allergy, improved insulin resistance, and cholesterol-lowering properties.	

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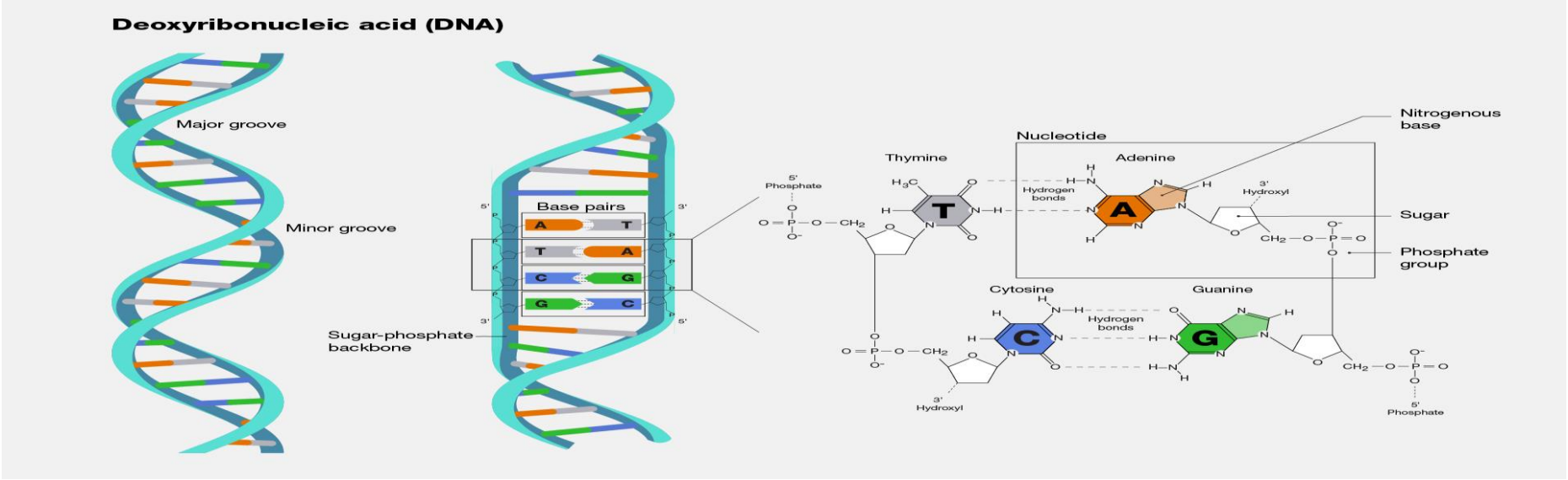
JULY 2025

SUN	MON	TUE	WED	THU	FRI	SAT
		1 Doctors Day	2	3	4	5
6	7	8	9	10	11 World Population Day	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28 World Hepatitis Day	29	30	31		

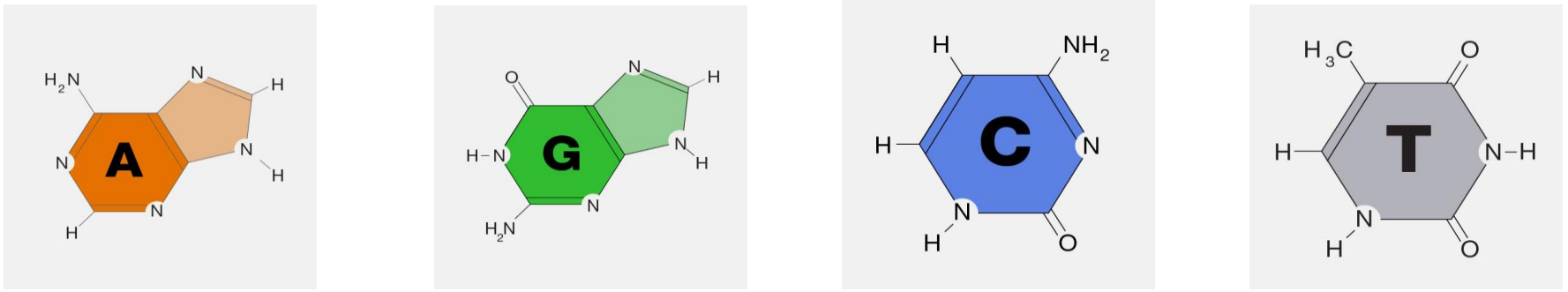
DNA (Deoxyribose Nucleic Acid)

Deoxyribonucleic acid (**DNA**) is a polymer composed of two polynucleotide chains that coil around each other to form a double helix. The polymer carries genetic instructions for the development, functioning, growth and reproduction of all known organisms and many viruses. DNA and ribonucleic acid (RNA) are nucleic acids. Alongside proteins, lipids and complex carbohydrates (polysaccharides), nucleic acids are one of the four major types of macromolecules that are essential for all known forms of life.

The two DNA strands are known as polynucleotides as they are composed of simpler monomeric units called nucleotides.[2][3] Each nucleotide is composed of one of four nitrogen-containing nucleobases (cytosine [C], guanine [G], adenine [A] or thymine [T]), a sugar called deoxyribose, and a phosphate group. The nucleotides are joined to one another in a chain by covalent bonds (known as the phosphodiester linkage) between the sugar of one nucleotide and the phosphate of the next, resulting in an alternating sugar-phosphate backbone. The nitrogenous bases of the two separate polynucleotide strands are bound together, according to base pairing rules (A with T and C with G), with hydrogen bonds to make double-stranded DNA. The complementary nitrogenous bases are divided into two groups, the single-ringed pyrimidines and the double-ringed purines. In DNA, the pyrimidines are thymine and cytosine; the purines are adenine and guanine.

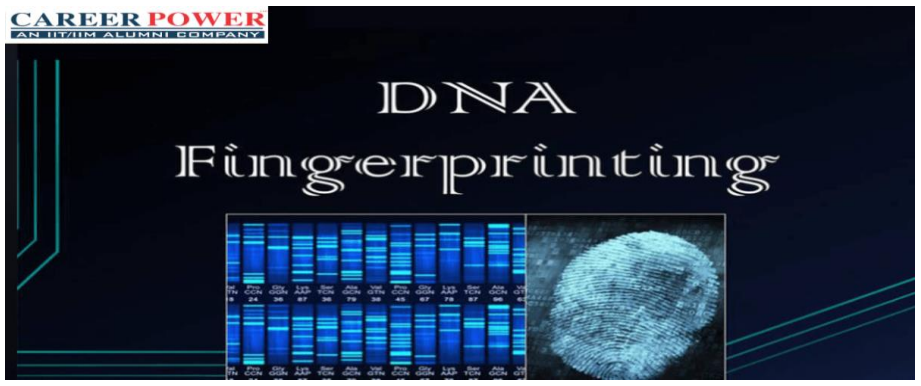


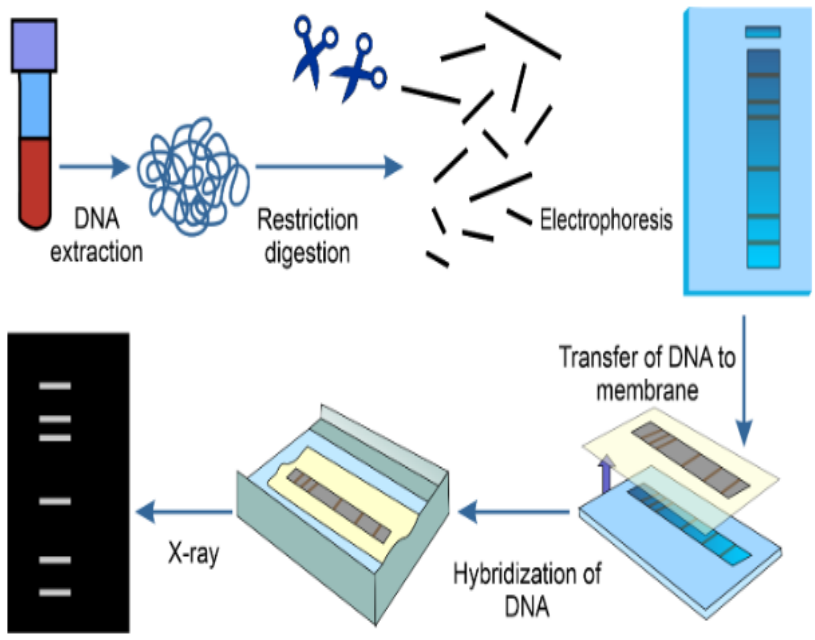
ADENINE **GUANINE** **CYTOSINE** **THYMINE**



DNA Fingerprinting

DNA fingerprinting, in genetics, method of isolating and identifying variable elements within the base-pair sequence of DNA (deoxyribonucleic acid). The technique was developed in 1984 by British geneticist Alec Jeffreys, after he noticed that certain sequences of highly variable DNA (known as minisatellites), which do not contribute to the functions of genes, are repeated within genes. Jeffreys recognized that each individual has a unique pattern of minisatellites (the only exceptions being multiple individuals from a single zygote, such as identical twins).





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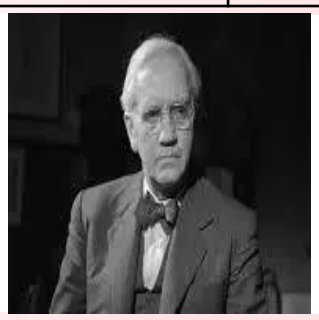
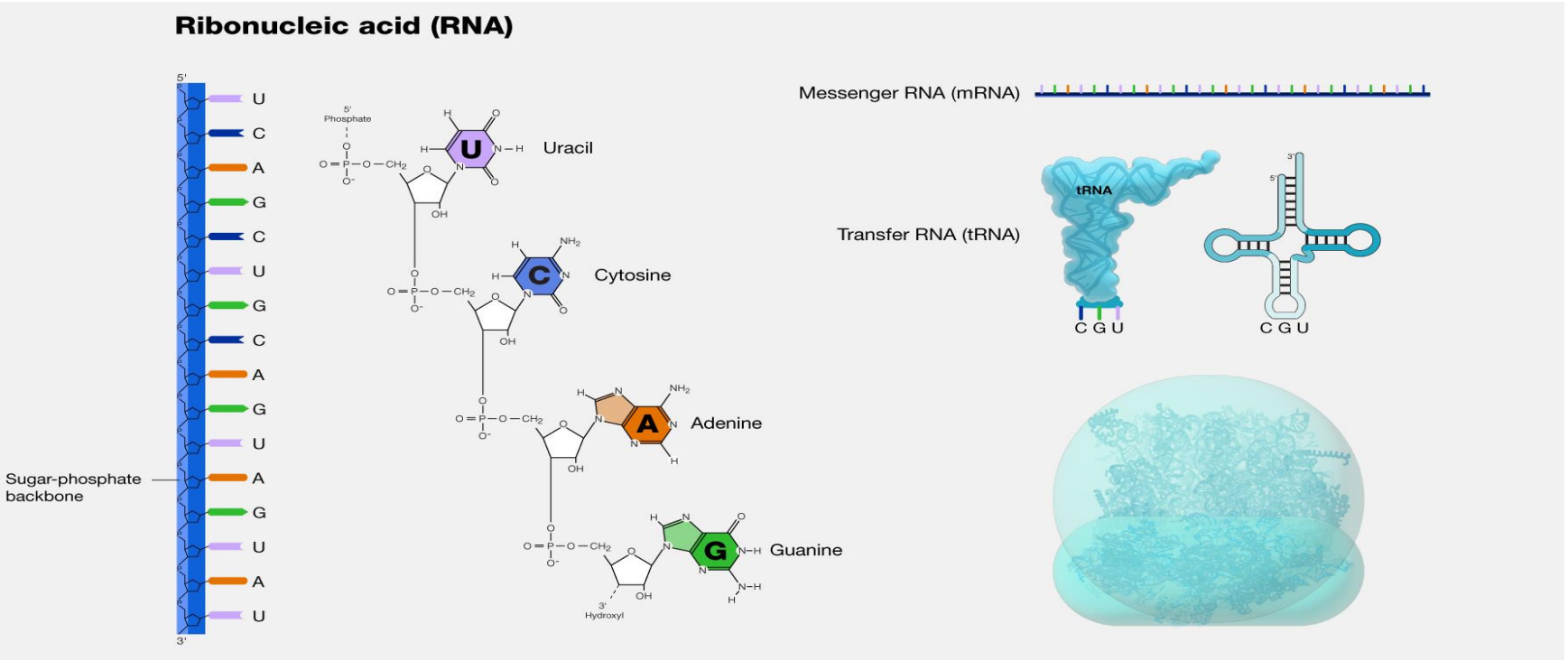
AUGUST 2025

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9 International Yoga Day
10	11	12	13	14	15 Independence Day	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						



RNA (Ribonucleic Acid)

Ribonucleic acid (RNA) is a nucleic acid present in all living cells that has structural similarities to DNA. Unlike DNA, however, RNA is most often single-stranded. An RNA molecule has a backbone made of alternating phosphate groups and the sugar ribose, rather than the deoxyribose found in DNA. Attached to each sugar is one of four bases: adenine (A), uracil (U), cytosine (C) or guanine (G). Different types of RNA exist in cells: messenger RNA (mRNA), ribosomal RNA (rRNA) and transfer RNA (tRNA). In addition, some RNAs are involved in regulating gene expression. Certain viruses use RNA as their genomic material.



Types and functions of RNA -

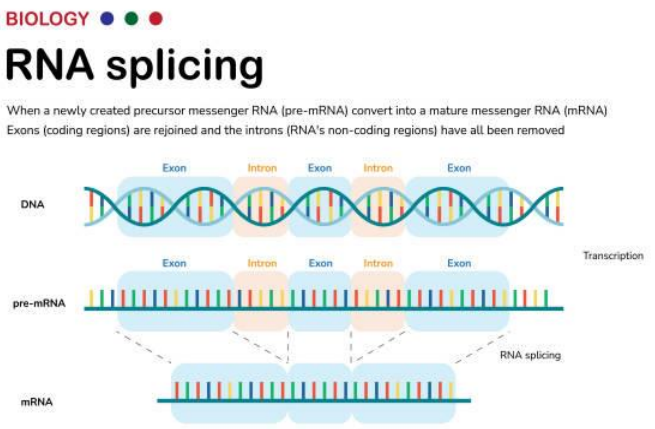
Of the many types of RNA, the three most well-known and most commonly studied are messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA), which are present in all organisms. These and other types of RNAs primarily carry out biochemical reactions, similar to enzymes. Some, however, also have complex regulatory functions in cells. Owing to their involvement in many regulatory processes, to their abundance, and to their diverse functions, RNAs play important roles in both normal cellular processes and diseases. In protein synthesis, mRNA carries genetic codes from the DNA in the nucleus to ribosomes, the sites of protein translation in the cytoplasm. Ribosomes are composed of rRNA and protein. The ribosome protein subunits are encoded by rRNA and are synthesized in the nucleolus. Once fully assembled, they move to the cytoplasm, where, as key regulators of translation, they "read" the code carried by mRNA. A sequence of three nitrogenous bases in mRNA specifies incorporation of a specific amino acid in the sequence that makes up the protein. Molecules of tRNA (sometimes also called soluble, or activator, RNA), which contain fewer than 100 nucleotides, bring the specified amino acids to the ribosomes, where they are linked to form proteins. In addition to mRNA, tRNA, and rRNA, RNAs can be broadly divided into coding (cRNA) and noncoding RNA (ncRNA). There are two types of ncRNAs, housekeeping ncRNAs (tRNA and rRNA) and regulatory ncRNAs, which are further classified according to their size. Long ncRNAs (lncRNA) have at least 200 nucleotides, while small ncRNAs have fewer than 200 nucleotides. Small ncRNAs are subdivided into micro RNA (miRNA), small nucleolar RNA (snoRNA), small nuclear RNA (snRNA), small-interfering RNA (siRNA), and PIWI-interacting RNA (piRNA). The miRNAs are of particular importance. They are about 22 nucleotides long and function in gene regulation in most eukaryotes. They can inhibit (silence) gene expression by binding to target mRNA and inhibiting translation, thereby preventing functional proteins from being produced. Many miRNAs play significant roles in cancer and other diseases. For example, tumour suppressor and oncogenic (cancer-initiating) miRNAs can regulate unique target genes, leading to tumorigenesis and tumour progression. Also of functional significance are the piRNAs, which are about 26 to 31 nucleotides long and exist in most animals. They regulate the expression of transposons (jumping genes) by keeping the genes from being transcribed in the germ cells (sperm and eggs). Most piRNA are complementary to different transposons and can specifically target those transposons.

Circular RNA (circRNA) is unique from other RNA types because its 5′ and 3′ ends are bonded together, creating a loop. The circRNAs are generated from many protein-encoding genes, and some can serve as templates for protein synthesis, similar to mRNA. They can also bind miRNA, acting as "sponges" that prevent miRNA molecules from binding to their targets. In addition, circRNAs play an important role in regulating the transcription and alternative splicing of the genes from which circRNAs were derived.

RNA SLICING -

RNA splicing is the process by which the newly synthesized pre-mRNA, also known as hnRNA, (heterogeneous nuclear RNA) is processed and forms the mature **mRNA**. hnRNA is processed in the nucleus and converted to mRNA, which then comes to the cytoplasm and undergoes translation or protein synthesis. It is a post-transcriptional modification. In prokaryotes such as bacteria, the newly transcribed RNA is ready for translation and both the processes can even occur simultaneously in the mRNA. Most of the eukaryotic genes are transcribed in the form of pre-Mrna and have to be processed before undergoing protein synthesis.

In the RNA splicing process, the non-coding intervening regions called 'introns' are removed and the coding regions known as 'exons' are joined together. Spliceosome catalyses the RNA splicing process. Ribozymes (catalytic RNA) catalyse their own splicing. Additionally, 5' capping with the modified Guanine nucleotide and tailing with Poly-A (Adenylate) residues at 3' end is also done to protect the coding segments and to provide stability to the mature mRNA.



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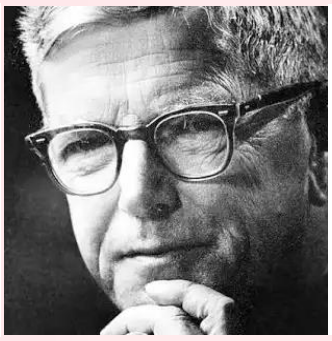
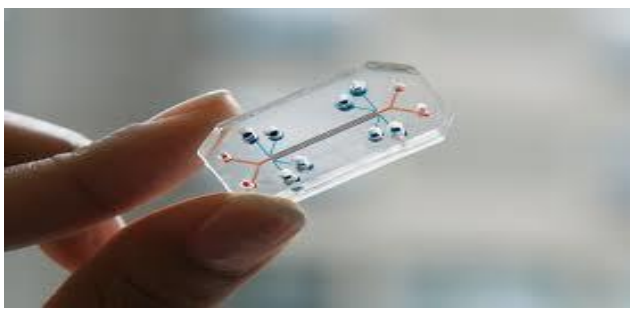
SEPTEMBER 2025

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8 National Literacy Day	9	10	11	12	13
14	15	16 World Ozone Day	17 International Microbes Day	18	19	20
21 World Alzheimer Day	22	23	24	25	26	27
28	29	30				



Lab on a chip: state of the art

➢ Definition



- Devices that integrate multiple laboratory functions on a single chip
- Size of only millimeters to a few square centimeters
- Handling of extremely small fluid volumes down to less than pico liters

➢ Applications

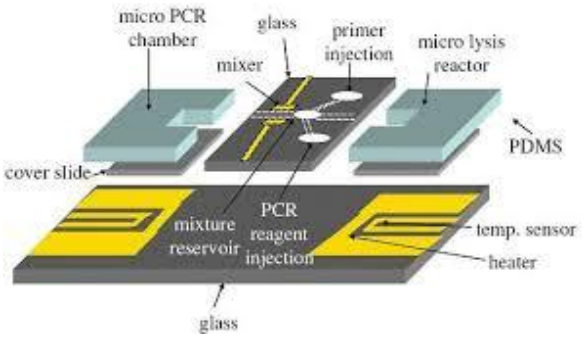
•Microfluidic dispenser
•Concentration gradient generator
•Electrophoretic separator
•Micro bio-reactor
•PCR chip for DNA amplification
•Quantitative DNA sensor chip
•Flow cytometer Lab-on-a-Chip
•Immunoassay Lab-on-a-Chip for bacteria (e.g., E.coli, H. pylori)
•Real-Time PCR detection chips (for detecting E. coli, cancers, etc)
•Blood sample preparation Lab-on-a-Chip •Cellular analysis Lab-on-a-Chip

➢ Advantages

❑Low fluid volumes consumption (less waste, lower costs of expensive reagents)
❑Less sample fluid needed for the analysis
❑ Short mixing times (short diffusion distances)
❑ Fast heating
❑ Better process control (faster response of the system by chemical reactions)
❑ Suitable for high-throughput analysis
❑Lower fabrication costs for chips fabricated in mass production
❑Safer platform for chemical, radioactive or biological studies (low stored fluid volumes and energies)

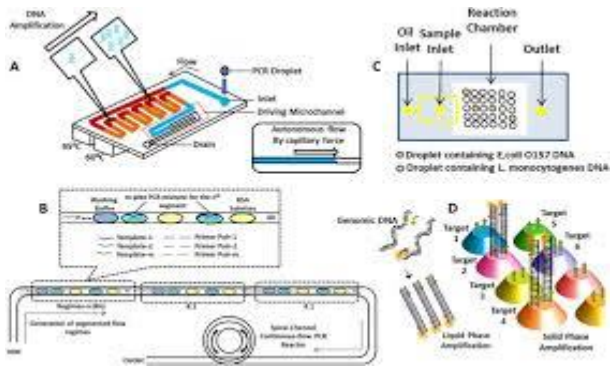
EXAMPLES

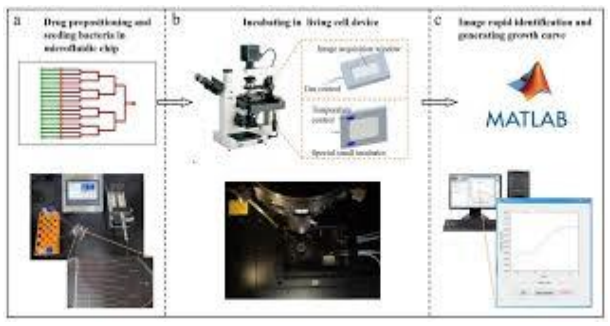
▪ Thermoelectric techniques for PCR thermalization in microfluidic devices



For integrated microfluidic devices, it is convenient to use thermoelectric techniques since they are readily compact. Indeed, many PCR devices and lab-on-chip used **Peltier elements** directly put in contact with their microfluidic devices to heat locally their PCR chamber (9–12). Peltier and other heating blocks present the disadvantage to have a relatively important thermal mass and slower temperature ramping rates . To overcome this problem, samples can be rapidly displaced between heating elements at fixed temperature, instead of constantly changing the temperature of heating elements.

▪ Microfluidic Chip for rapid microorganism and cell detection





• **Detection**: Microfluidic chips can detect a variety of microorganisms, including bacteria, viruses, and fungi. They can also be used to detect airborne microorganisms.

• **Speed**: Microfluidic chips can provide results in minutes or hours, compared to days or weeks for traditional culturing techniques.

• **Sensitivity**: Microfluidic chips can be highly sensitive.

Cost: Microfluidic chips are low cost.

• **Portability:** Microfluidic chips are portable.

• **Applications:** Microfluidic chips can be used to prevent and control air pollution and major outbreaks. They can also be used to determine permissive cell lines for emerging viruses.

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OCTOBER 2025

	MON	TUE	WED	THU	FRI	SAT
			1 Blood Donation Day	2	3 World Habitat Day	4
5	6	7	8	9	10	11
12 World Arthritis Day	13	14	15	16 World Food Day	17	18
19	20	21	22	23	24 World Polio Day	25
26	27	28	29	30	31	

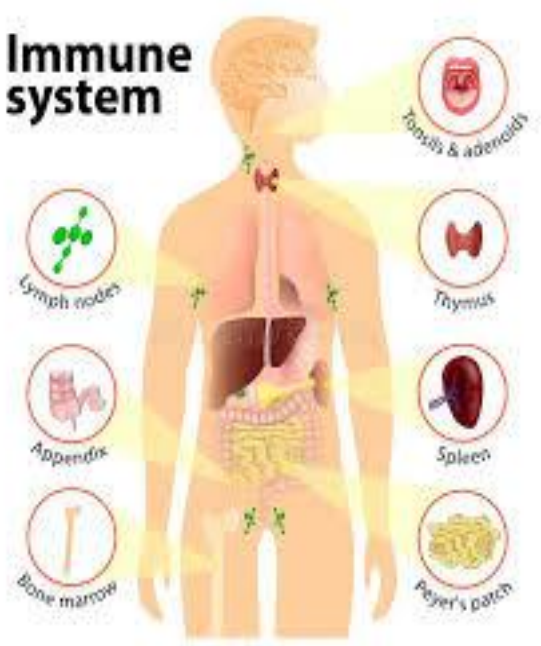
Immune System

- The immune system is a network of biological systems that protects an organism from diseases. It detects and responds to a wide variety of pathogens, from viruses to parasitic worms, as well as cancer cells and objects such as wood splinters, distinguishing them from the organism's own healthy tissue. Many species have two major subsystems of the immune system. The innate immune system provides a preconfigured response to broad groups of situations and stimuli. The adaptive immune system provides a tailored response to each stimulus by learning to recognize molecules it has previously encountered. Both use molecules and cells to perform their functions.
- Nearly all organisms have some kind of immune system. Bacteria have a rudimentary immune system in the form of enzymes that protect against viral infections. Other basic immune mechanisms evolved in ancient plants and animals and remain in their modern descendants. These mechanisms include phagocytosis, antimicrobial peptides called defensins, and the complement system. Jawed vertebrates, including humans, have even more sophisticated defense mechanisms, including the ability to adapt to recognize pathogens more efficiently. Adaptive (or acquired) immunity creates an immunological memory leading to an enhanced response to subsequent encounters with that same pathogen. This process of acquired immunity is the basis of vaccination.

The innate immune system	The acquired immune system
This is your child's rapid response system. It is the first to respond when it finds an invader. It is made up of the skin, the eye's cornea, and the mucous membrane that lines the respiratory, gastrointestinal, and genitourinary tracts. These all create physical barriers to help protect your child's body. They protect against harmful germs, parasites (such as worms), or cells (such as cancer). The innate immune system is inherited. It is active from the moment your child is born. When this system recognizes an invader, it goes into action right away. The cells of this immune system surround and cover the invader. The invader is killed inside the immune system cells (called phagocytes).	The acquired immune system, with help from the innate system, makes special proteins (called antibodies) to protect your body from a specific invader. These antibodies are developed by cells called B lymphocytes after the body has been exposed to the invader. The antibodies stay in your child's body. It can take several days for antibodies to form. But after the first exposure, the immune system will recognize the invader and defend against it. The acquired immune system changes during your child's life. Immunizations train your child's immune system to make antibodies to protect them from harmful diseases.

Function

•Keeping invaders (like germs) out of your body.
•Destroying invaders.
•Limiting how much harm the invaders can do if they're inside your body.
•Healing damage to your body.
•Adapting to new challenges and threats.



How can I improve my immunity?

•following a varied diet that favors fresh fruit and vegetables, whole foods, and lean protein
•limiting the intake of added salts, fats, sugars, and alcohol
•exercising regularly
•getting enough sleep
•maintaining a suitable body weight
•avoiding smoking

How do antibiotics help fight infections?

Antibiotics can be used to help your child's immune system fight infections by bacteria. But antibiotics don't work for infections caused by viruses. Antibiotics were developed to kill or disable certain bacteria. That means that an antibiotic that works for a skin infection caused by a certain bacteria may not work to cure diarrhea caused by a different bacteria. Using antibiotics for viral infections or using the wrong antibiotic to treat a bacterial infection can help bacteria become resistant to the antibiotic so it won't work as well in the future. It's important to take antibiotics as prescribed and for the right amount of time. If antibiotics are stopped early, the bacteria may develop a resistance to the antibiotics. Then the infection may come back again and be harder to treat.
Most colds and acute bronchitis infections won't respond to antibiotics. You can help decrease the spread of more aggressive bacteria by not asking your child's healthcare provider for antibiotics in these cases.

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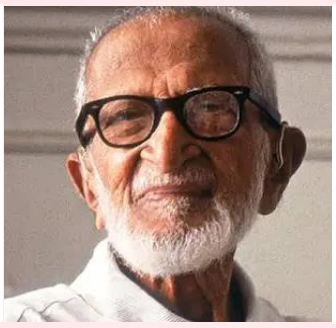
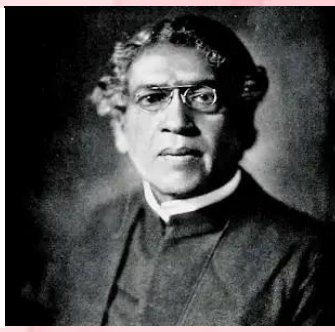
NOVEMBER 2025

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12 World Pneumonia Day	13 World Antibiotic Awareness Week	14 World energy Conservation& World Diabetes Day	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						





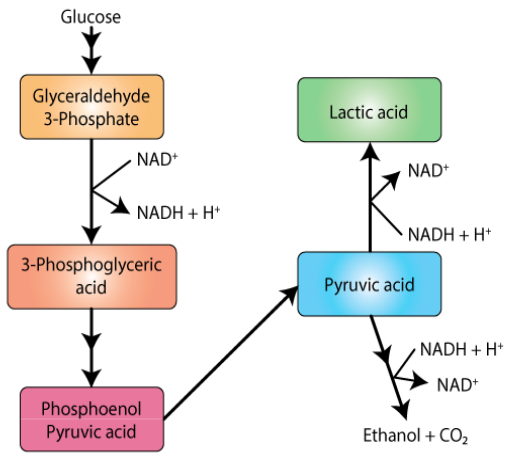
FERMENTATION

Fermentation – Definition

- Fermentation is an enzyme catalysed, metabolic process whereby organisms convert starch or sugar to alcohol or an acid anaerobically releasing energy. The science of fermentation is called "zymology".

Process of Fermentation

Fermentation is an anaerobic biochemical process. In fermentation, the first process is the same as cellular respiration, which is the formation of pyruvic acid by glycolysis where net 2 ATP molecules are synthesised. In the next step, pyruvate is reduced to lactic acid, ethanol or other products. Here NAD+ is formed which is re-utilized back in the glycolysis process.

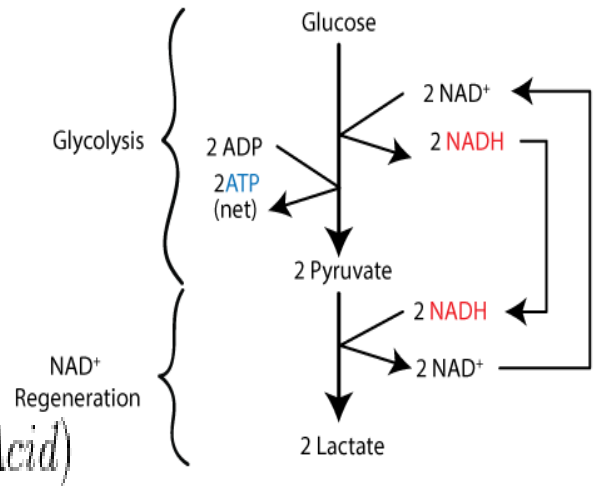


→ Types of Fermentation

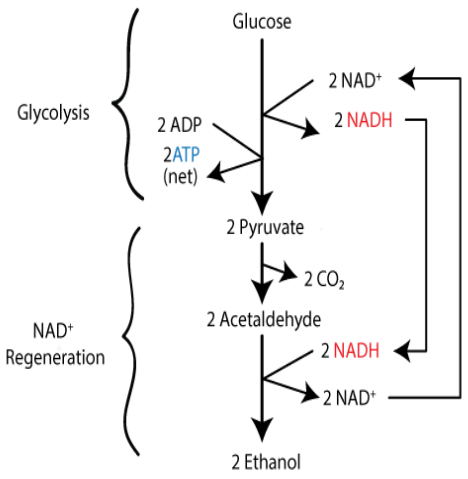
- **Homo fermentation:** only one type of product formation
- **Hetero fermentation:** more than one product formed

1. Lactic Acid Fermentation

Lactic acid is formed from pyruvate produced in glycolysis. NAD+ is generated from NADH. Enzyme lactate dehydrogenase catalyses this reaction. Lactobacillus bacteria prepare curd from milk via this type of fermentation. During intense exercise when oxygen supply is inadequate, muscles derive energy by producing lactic acid, which gets accumulated in the cells causing fatigue



$$C_6H_{12}O_6(Glucose) \xrightarrow[Lactate.dehydrogenase]{Lactobacillus} 2CH_3CHOHCOOH(LacticAcid)$$



2. Alcohol Fermentation

This is used in the industrial production of wine, beer, biofuel, etc. The end product is alcohol and CO_2. Pyruvic acid breaks down into acetaldehyde and CO_2 is released. In the next step, ethanol is formed from acetaldehyde. NAD+ is also formed from NADH, utilized in glycolysis. Yeast and some bacteria carry out this type of fermentation. Enzyme pyruvic acid decarboxylase and alcohol dehydrogenase catalyse these reactions.

$$C_6H_{12}O_6(Glucose) \xrightarrow[Decarboxylase]{Dehydrogenase} 2CH_3CHO(Acetaldehyde) + 2CO_2 \rightarrow 2C_2H_5OH(Ethanol)$$

3. Acetic acid Fermentation

Vinegar is produced by this process. This is a two-step process.
The first step is the formation of ethyl alcohol from sugar anaerobically using yeast.
In the second step, ethyl alcohol is further oxidized to form acetic acid using acetobacter bacteria. Microbial oxidation of alcohol to acid is an aerobic process.

$$C_2H_5OH(ethanol) + O_2 \xrightarrow{acetobacter} CH_3COOH(acetic\ acid) + H_2O$$

4. Butyric acid Fermentation

This type of fermentation is characteristic of obligate anaerobic bacteria of genus clostridium. This occurs in retting of jute fibre, rancid butter, tobacco processing and tanning of leather. Butyric acid is produced in the human colon as a product of dietary fibre fermentation. It is an important source of energy for colorectal epithelium. Sugar is first oxidized to pyruvate by the process of glycolysis and then pyruvate is further oxidized to form acetyl-CoA by the oxidoreductase enzyme system with the production of H_2 and CO_2. Acetyl-CoA is further reduced to form butyric acid. This type of fermentation leads to a relatively higher yield of energy. 3 molecules of ATP are formed.

$$C_6H_{12}O_2 \xrightarrow[butyricum]{clostridium} C_4H_8O_2 + 2CO_2 + 2H_2$$

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DECEMBER 2025

SUN	MON	TUE	WED	THU	FRI	SAT
	1 World AIDS Day	2 National Pollution Prevention Day	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23 Farmers Day	24	25	26	27 Dr. Panjabrao Deshmukh Jayanti
28	29	30	31			

BIOTECHNOLOGY START-UPS IN INDIA

1) Pandorum Technologies

CEO and Co-founder - Tuhin Bhowmick

- Located in Bangalore, Karnataka, Pandorum Technologies is creating functional human tissues that can be used for medical research. Using 3D printing technology, the company is working on creating human liver tissue that can act as a replacement during liver transplantation or failures.

2) XCode Life Sciences

CEO and Co-founder - Saleem Mohammed

- Located in Chennai, Tamil Nadu, XCode Life Sciences develops testing kits that provide detailed information on nutrition, exercise, health, and ancestry. The company's personal genomics testing kits deliver reliable and useful genomic information aimed at improving human health and quality of life.

3) Oncostem Diagnostics

CEO & Founder - Manjiri Bakre

- Located in Bangalore, Karnataka, Oncostem Diagnostics creates predictive and prognostic tests intended to identify patterns of cancer recurrence risk. The company's method entails combining the disease's molecular signature with clinicopathological criteria that have been used in the prognostic evaluation of cancer for years, allowing doctors to create the best treatment plans for their patients.

4) Zumutor Biologics

CEO and Co-founder - Kavitha Iyer Rodrigues

- Located in Bangalore, Karnataka, Zumutor Biologics aims to provide targeted NK cell therapies. The company creates high-diversity human antibody libraries to discover new immunotherapies and monoclonal antibodies, allowing doctors to access innovative immunotherapies that target innate immunity and modulate the tumor microenvironment.

5) Sea6 Energy

CSO and Co-founder - Sri Sailaja Nori

- Located in Bangalore, Karnataka, Sea6 Energy focuses on producing ethanol from seaweed and converting it into biofuel, plant growth stimulants, animal feed ingredients, and other renewable resources. This helps solve feedstock problems like land use, freshwater requirements, and opportunity costs.

6) Vyome Therapeutics

CEO - Venkat Nelabhotla

- Located in New Delhi, Delhi, Vyome Therapeutics develops novel medicines and treatments for the treatment of inflammatory illnesses with locally active therapeutics. The company's novel medicines are identified and developed to treat refractory skin conditions such as persistent dskin fungal infections, resistant acne, and other skin bacterial infections using novel formulations for site-targeted applications.

7) GANIT Labs

Founder - Binay Panda

- Located in Bangalore, Karnataka, Ganit Labs uses genomic sequencing to sequence and interpret data from various organisms. The company is government-funded and a non-profit organization.

8) MedGenome

CEO - Vedam Ramprasad

- Located in Bangalore, Karnataka, MedGenome operates a genomics diagnostics and research platform to understand the genetic markers for metabolic disorders, cancer, and rare diseases. Using computing, analytics, and bioinformatics, the company can provide deep insights into these diseases on a molecular level.

9) Mapmygenome

CEO and Founder - Anu Acharya

- Located in Hyderabad, Andhra Pradesh Mapmygenome provides molecular diagnostics services. Based on these services, the company provides detailed genetic insights on drug responses, inherited conditions, and diseases.

10) Farcast Biosciences

CEO- Mohit Malhotra

- Located in Bangalore, Karnataka, Farcast Biosciences uses its innovative platform to preserve the tumor microenvironment. This enables doctors to evaluate the correct therapy that will be most beneficial to the patient before any treatment begins.

11) Bugworks Research

CEO and Co-founder - Anand Anandkumar

- Located in Bangalore, Karnataka, Bugworks Research develops novel antibiotic drugs to tackle problems associated with AMR (Antimicrobial Resistance). The company is also building small molecules against solid tumors, which can be used as both stand-alone and combined therapeutics.

12) Bharat Biotech

Chairman & Managing Director - Dr. Krishna Ella

- Located in Telangana, Hyderabad, Bharat Biotech develops biotherapeutics and vaccines that are safe and effective. Some of the products they have launched are REGEN-D to treat diabetic foot ulcers, a vaccine against typhoid called Typbar TCV® that received WHO-Prequalification in January 2018, and COVAXIN — a vaccine against Covid-19

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01 JANUARY 2025

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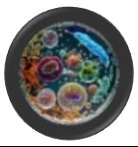	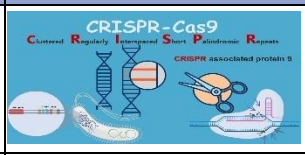		1	2	3	4
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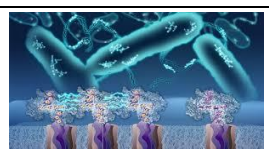
26 REPUBLIC DAY	27	28	29	30	31	

HAR GOBIND KHORANA

Born: January 9, 1922, Raipur, Pakistan

Died: 2011, Concord, United States

Education: University of Cambridge, University of Panjab, Government College University Lahore,

Har Gobind Khorana was an Indian-American biochemist. While on the faculty of the University of Wisconsin–Madison, he shared the 1968 Nobel Prize for Physiology or Medicine with Marshall W. Nirenberg and Robert W. Holley for research that showed the order of nucleotides in nucleic acids, which carry the genetic code of the cell and control the cell's synthesis of proteins.

Khorana made another contribution to genetics in 1970, when he and his research team were able to synthesize, the first artificial copy of a yeast gene. His later research explored the molecular mechanisms underlying the cell signalling pathways of vision in vertebrates. His studies were concerned primarily with the structure and function of rhodopsin, a light-sensitive protein found in the retina of the vertebrate eye. Khorana also investigated mutations in rhodopsin that are associated with retinitis pigmentosa, which causes night blindness.

- 27 January 2020

Scientists demonstrated a "Trojan horse" designer-nanoparticle that makes blood cells eat away - from the inside out - portions of atherosclerotic plaque that cause heart attacks.

- 12 January 2022

Researchers announced the development of a new CRISPR-Cas13 tool for RNA editing.

- 10 January 2023

Scientists discovered a new species of bacteria, *Electrina magnifica,* which can produce electricity.

Firefly Petunia in US market

Light Bio is not only the company to have worked on glowing plants, but it is the first to bring one to market. Scientist at STONY BROOK UNIVERSITY made a self-glowing plant in 2010 using genes from bioluminescent marine bacteria; they found that the light was too dim. Entrepreneur Antony Evans turned glowing plants into a campaign in 2013 that raised close to half a million dollars but eventually failed to deliver. Four years later, in 2017, engineers at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY attempted their own version, but the plant could glow for only 3.5 hours before it had to be submerged in a special liquid.

The tide shifted in 2018, when Karen Sarkisyan, a synthetic biologist who later cofounded Light Bio, identified a group of genes from the bioluminescent mushroom called *Neonothopanus nambi*. Together with an international team of scientists, he inserted those genes into a tobacco plant, and it glowed brightly, with no assistance.

LIGHT BIO:

Light Bio, an innovative synthetic biology startup, will now begin to sell its groundbreaking bioluminescent petunias in the United States!

With support from Ginkgo, Light Bio is reimagining the horticultural industry by introducing a new category of plants that emit an ethereal glow to enrich homes, gardens, and public spaces.

People are fascinated with glowing plants, and scientists have now revealed how to make them even brighter.

This significant achievement, documented in nature methods, details genetic modifications which enhance bioluminescence in a variety of plants by up to 100 times. The team of 26 scientists, working across 9 research organizations, created the brighter plants by optimizing genes isolated from multiple species of luminous mushrooms.

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02 **FEBRUARY** **2025**

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- 27 February 2020

The World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic.

- 10 February 2020

A team of scientists discovered a new antibiotic, halicin, effective against drug-resistant bacteria.

- 05 February 2022

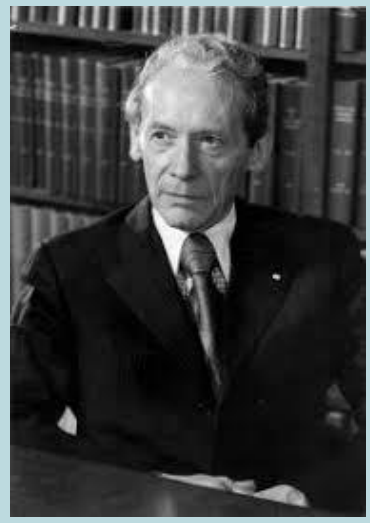
Researchers announced the development of a new CRISPR-Cas9 gene editing tool for treating genetic diseases.

Charles Philippe Leblond

Born: February 5, 1910, LILLIE, FRANCE

Died: April 10, 2007, MONTREAL, CANADA

Education: University of Paris, Yale University



In 1937, Leblond joined the Laboratoire de Synthese Atomique in Paris, which was involved in preparing radioactive elements. Here, under the guidance of Antoine Lacassagne, he showed that radio-iodine-128 injected into a rat promptly accumulated in the thyroid gland. To localize the label within the thyroid tissue, Leblond set out to use autoradiography, the novel technique devised by Lacassagne in 1924. Unfortunately, this first attempt failed as the very short half-life of the isotope left too little radioactivity to be detected by the photographic emulsion.

With thinner emulsion coats and appropriate isotopes such as tritium, this resulted in a hundredfold improvement in resolution and led to an explosion of the use of autoradiography in cell biology.

BIOPLASTICS

Bioplastics are typically plastics manufactured from bio-based polymers stand to contribute to more sustainable commercial plastic life cycles as part of a circular economy, in which virgin polymers are made from renewable or recycled raw materials. Carbon-neutral energy is used for production and products are reused or recycled at their end of life (EOL). Compared with fossil-based plastics, bio-based plastics can have a lower carbon footprint and exhibit advantageous materials properties; moreover, they can be compatible with existing recycling streams and some offer biodegradation as an EOL scenario if performed in controlled or predictable environments.

Bioplastics that are 100% bio-based are currently produced at a scale of ~2 million tonnes per year and are considered a part of future circular economies to help achieve some of the United Nations' (UN) Sustainable Development Goals, such as by diverting from fossil resources, introducing new recycling or degradation pathways and using less toxic reagents and solvents in production processes. Depending on type, bioplastics can offer improved circularity by using renewable (non-fossil) resources, a lower carbon footprint, biodegradation as an alternative end-of-life (EOL) option and improved material properties. These benefits, however, are highly dependent on several factors, including the chemical structure, the manufacturing process and the most likely EOL scenario. All these factors have to be evaluated across the life cycle, along metrics such as climate impact, ecotoxicity and recyclability, using tools such as a life cycle assessment (LCA) to elucidate the environmental benefit over alternatives. Similar to traditional plastics, bioplastics also raise concerns relating to the leaching of monomers, oligomers and additives, and, therefore, require the same scrutiny in product design and formulation.

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03 **MARCH** 2025

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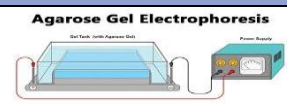
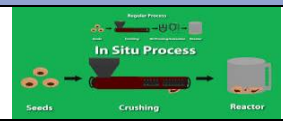
30	31					1
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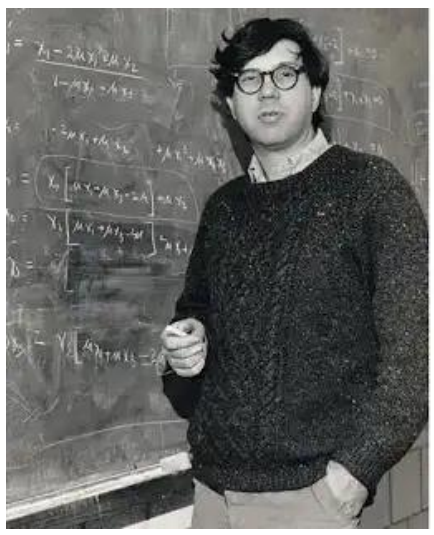

Richard Lewontin

Born: March 29, 1929, New York City, U.S.

Died: July 4, 2021, Cambridge

Education: Harvard college, Harvard University, Columbia University

Richard Lewontin was a groundbreaking geneticist, best known for bringing molecular tools into evolutionary biology and for his advocacy against the use of science to rationalize structural inequity. Lewontin and his collaborators revealed how natural selection acts to shape variation, exploring its effect on genes, groups and individuals. Moving between mathematical and statistical analysis, fieldwork and laboratory experiment, they set the course of molecular population genetics.

During his time at Rochester in the early 1960s, attempts to study genetic variation in natural populations were approaching an impasse. On a visit to the University of Chicago, Lewontin met Jack Hubby, who was adapting the biochemical technique of electrophoresis (which separates molecules by charge and size) to study the fruit fly *Drosophila*. They realized that detecting small differences between proteins could provide a new means of measuring genetic variability.

March 12, 2020

Industrial biotech company, Novozymes, launched a new enzyme-based solution for biofuel production.

March 10, 2022

Researchers from MIT developed a new microbial fuel cell for wastewater treatment in industrial settings.

March 5 2023

Biotech company, Zymergen, announced the development of a new-based bioplastic for industrial application.

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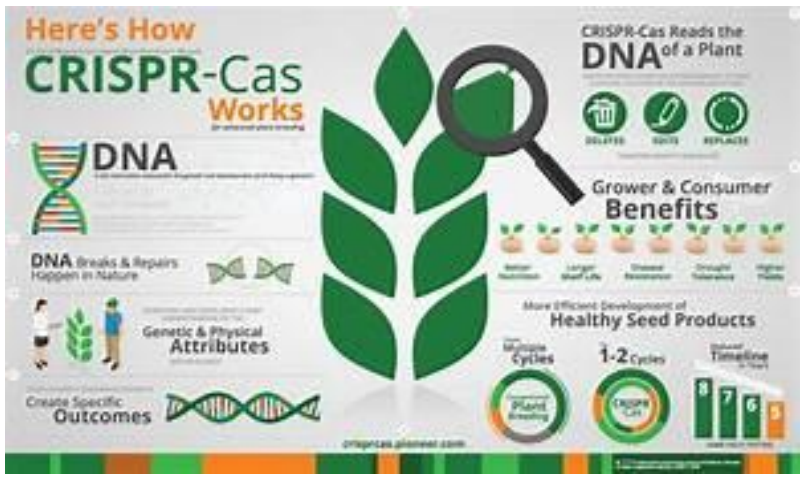

Genomics in Crop Improvement

Genome editing techniques have been developed to introduce precise and predictable genome modifications into plants to obtain desired traits, and they are giving rise to precision breeding techniques that are defining the next-generation of plant breeding. CRISPR (clustered regularly interspaced short palindromic repeats)-Cas (CRISPR associated) has emerged as one of the most advanced systems for engineering crop genomes. This technology has been rapidly expanding and applied to major cereals such as rice, wheat, and maize to other crops that are important for food security, such as potato and cassava. In addition, recently developed CRISPR-associated tools such as base editors and prime editors have greatly expanded the scope of genome editing, allowing for the creation of precise nucleotide substitutions and targeted DNA deletions and insertion. CRISPR-Cas technologies, in combination with modern breeding methods, will play an important role in crop improvement programs. In this review, I describe the current status of plant genome editing with an emphasis on the genetic modifications that can be produced using these techniques as well as application of plant genome editing as the next-generation plant breeding technology for crop improvement.

Plant genome editing technologies

Plant genome editing is carried out using programmable sequence-specific nucleases (SSNs). SSNs include engineered homing endonucleases or meganucleases, zinc-finger nucleases (ZFNs), transcription activator-like effector nucleases (TALENs), and the CRISPR-Cas system. These nucleases make DNA double-strand breaks (DSBs) at target sites, and precision genome modifications are achieved via DNA repairs pathways. While meganucleases, ZFNs, and TALENs recognize target sequences via protein-DNA interactions, the CRISPR-Cas system targets DNA sequences through Watson-Crick base pairing, relying on the homology between the target DNA and a programmable “guide” RNA. Because of its low cost, simplicity, and high efficiency, the CRISPR-Cas system has become the most widely used system for plant genome editing. Here, I introduce the general plant genome editing procedure and describe the many genetic modifications that can be produced through genome editing in plants.

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04 **APRIL** **2025**

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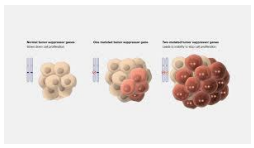		1	2	3	4	5
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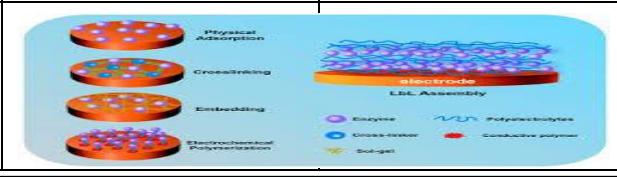
27	28	29	30			

April 25 2016

Du Point announced development of new solution for biofuel production.

April 12 2021

Industrial biotech company, Ginkgo Bioworks, announced the development of new microbial-based platform for industrial chemical

April 10 2022

Novozymes launched a new enzyme-based solution for biofuel production

Ananda Mohan 'Al' Chakrabarty

Born: April 4, 1938, Sainthia, India

Died: July 10, 2020, Chicago, U.S.

Education: University of Calcutta

Chakrabarty was born in the small town of Sainthia in the Indian state of West Bengal on 4 April 1938. After his early education at Sainthia High School and Ramkrishna Belur Vidyamandir, he majored in chemistry as an undergraduate at St. Xavier's College (now University) in Kolkata and later received his MSc and PhD in the emerging discipline of biochemistry from Calcutta University under the tutelage of Sailesh Chandra Roy.

Chakrabarty's laboratory developed new plasmid-based technology for the biodegradation of toxic chemicals, such as Agent Orange, and investigated how pseudomonads contribute to diseases, such as cystic fibrosis. He and his colleagues discovered that the azurin toxin from these bacteria could effectively kill cancer cells via apoptosis by binding and stabilizing the tumor suppressor protein p53; subsequent clinical trials have demonstrated that a derivative of azurin called p28 shows favourable safety and anticancer activity

FERMENTATION TECHNOLOGY

Fermentation technology is the process of using microorganisms to convert organic substrates into desired products through biochemical reactions. This technology has been utilized for thousands of years in food and beverage production, but modern advancements have expanded its applications to medicine, biofuels, agriculture, and environmental industries.

The most important ingredient used in traditional fermented foods and beverages prepared in most world regions is cereals (such as wheat, rice, wheat, sorghum, or corn). Some of these are used as significant foods in the human diet, whereas others are utilized as spices, colorants, breakfast, and beverages. In maximum cereal-based fermented products, fermentation is done with natural or mixed cultures such as bacteria, fungi and yeasts.

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05 **MAY** 2025

SUN	MON	TUE	WED	THU	FRI	SAT
				1 MAHARASHTRA DAY	2	3
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Edward Jenner

Born: May 17, 1749, Berkeley, United Kingdom

Died: January 26, 1823, Berkeley, United Kingdom

Education: Katharine lady Berleley's School, Cirencister Grammer School, University of St. Andrews, university of London

Edward Jenner 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.

Jenner's work represented the first scientific attempt to control an infectious disease by the deliberate use of vaccination Edward Jenner performed his first vaccination on James Phipps have proved him to be more right than wrong. The germ theory of disease, the discovery and study of viruses, and the understanding of modern immunology tended to support his main conclusions. The discovery and promotion of vaccination enabled the eradication of smallpox: this is Edward Jenner's ultimate vindication and memorial.

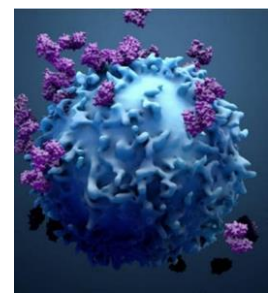
May 1,2023

Biotech company, Genomatica announced development of new solution for producing sustainable chemicals.

May 5, 2022

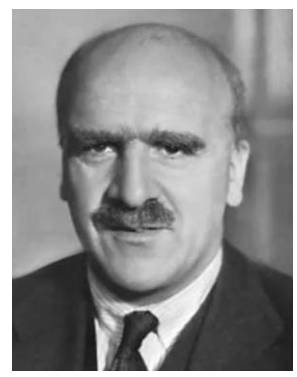
Industrial biotech company, DSM, launched a new microbial-based solution for bio-based material production.

INDUSTRIAL ENZYMES AND BIOCATALYSTS



Industrial enzymes are proteins that act as catalysts in biochemical reactions, speeding up processes in various industrial applications such as food production, textiles, detergents, pharmaceuticals, and biofuels. These enzymes are used to improve efficiency, reduce energy consumption, and make processes more environmentally friendly.

Eduard Buchner, a German chemist, is credited with discovering that enzymes could work outside of living cells. In December 1897, Buchner published his findings on zymase, an enzyme complex responsible for alcoholic fermentation, which earned him the Nobel Prize in Chemistry in 1907.



J.B.S. Haldane, a British biochemist, introduced the modern concept of biocatalysis in his 1930 book "Enzymes", where he suggested that enzymes could be used to accelerate industrial chemical reactions.

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06 **JUNE** 2025

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29	30					

June 10 2021

Researchers from the University of California, Berkeley, developed a new microbial-based method for producing biodegradable plastics.

June 5 2022

Industrial biotech company, DSM, announced the development of a new microbial-based solution for bio-based material production.

June 1 2023

Biotech company, Genomatica, launched a new microbial-based process for producing

Paul Berg

Born: June 30, 1926, New York City, U.S.

Died: February 15, 2023, Stanford, California, U.S.

Education: Pennsylvania state university, Abraham Lincon High School, Clare Hall Cambridge

Paul Berg was the first researcher to incorporate DNA from one species into the genetic material of another. In so doing, he invented one of the most powerful tools in modern biology and the basis for a biotechnology industry that is worth hundreds of billions of dollars and has designed therapies for many human diseases. This alone would have been enough to establish Berg's pre-eminent status — he received the Nobel Prize in Chemistry in 1980 — but he is also remembered for addressing anxieties about the possible risks of 'recombinant' research, and leading the development of a consensus on responsible use of the technology.

BIOENERGY AND BIOFUELS

Bioenergy refers to energy derived from biological materials, also known as biomass, which are renewable sources of organic materials from plants, animals, and microorganisms. It is considered a form of renewable energy because the biomass used for bioenergy production can be replenished on a relatively short time scale, unlike fossil fuels, which take millions of years to form.

Bioenergy plays a critical role in reducing greenhouse gas emissions by offering an alternative to fossil fuels, promoting sustainability, and contributing to a circular economy. It is used in various applications, from heating homes to powering vehicles, and supports rural economies by creating new markets for agricultural waste.

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07 **JULY** 2025

SUN	MON	TUE	WED	THU	FRI	SAT
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27	28	29	30	31		

Gerald Edelman

Born: July 1, 1929, New York City, U.S.

Died: May 17, 2014, La Jolla, California, United States

Education: Rockefeller University, Perelman School of Medicine at the University of Pennsylvania, Ursinus College

As a graduate student, Edelman began to study antibodies, and by 1969 he and his colleagues had constructed a precise model of an antibody molecule. Edelman's group narrowly beat a rival group of British investigators led by Porter to this goal. Both researchers were awarded the Nobel Prize for the enormous contributions they made to the field of immunology.

In 1975 he discovered substances called cell adhesion molecules (CAMs), which "glue" cells together to form tissues. Edelman found that, as the brain develops, CAMs bind neurons together to form the brain's basic circuitry. His work led to the construction of a general theory of brain development and function called neuronal group selection.

July 10, 2021

Researchers from the University of California, Los Angeles, developed a new microbial-based method for producing biodegradable plastics.

July 25, 2015

Researchers from the University of Wisconsin-Madison developed a new microbial-based method for producing biofuels from agricultural waste.

July 18, 2018:

Researchers from the National University of Singapore developed a new microbial fuel cell for industrial wastewater treatment.

ENVIRONMENTAL MICROBIOLOGY

Environmental microbiology is the study of microorganism in their natural environments, including soil, water, and air. It explores how these microbes interact with each other and with their environment, their roles in nutrient cycling, and their impacts on ecosystems and human health.

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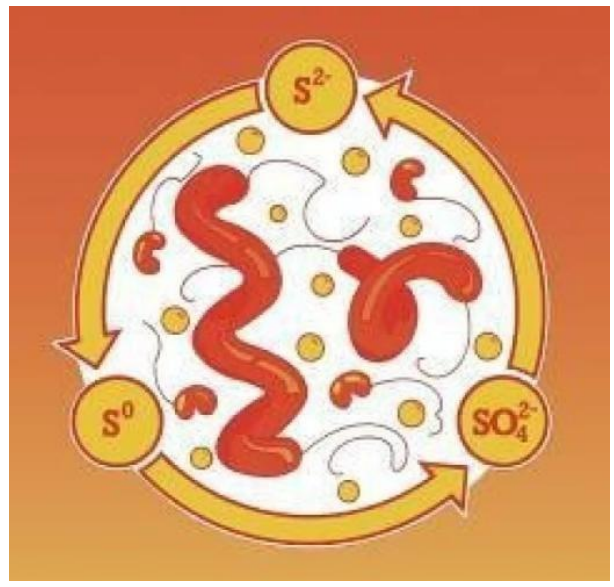

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Sergei Winogradsky was one of the first researchers to attempt to understand microorganisms outside of the medical context—making him among the first students of microbial ecology and environmental microbiology—discovering chemosynthesis, and developing the Winogradsky column in the process

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08 AUGUST 2025

SUN	MON	TUE	WED	THU	FRI	SAT
31					1	2
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10	11	12	13	14	INDEPENDENCE DAY 15	16
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12 August 2020

Biotech company, Novozymes, launched a new enzyme-based solution for biofuel production.

20 August 2022

The first-ever microbial-based biorefinery was opened in the United States.

August 25, 2015

Researchers from the University of Wisconsin-Madison developed a new microbial-based method for producing biofuels from agricultural waste.

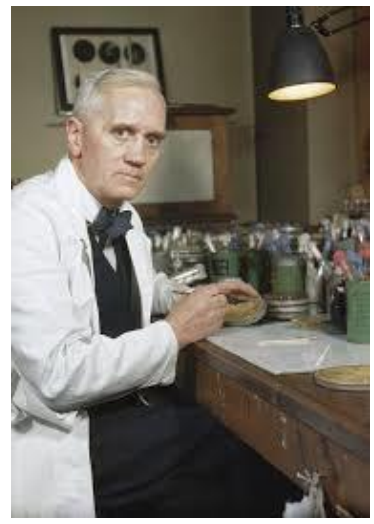
Alexander Fleming

Born: August 6, 1881, Darvel, United Kingdom

Died: March 11, 1955, London, England

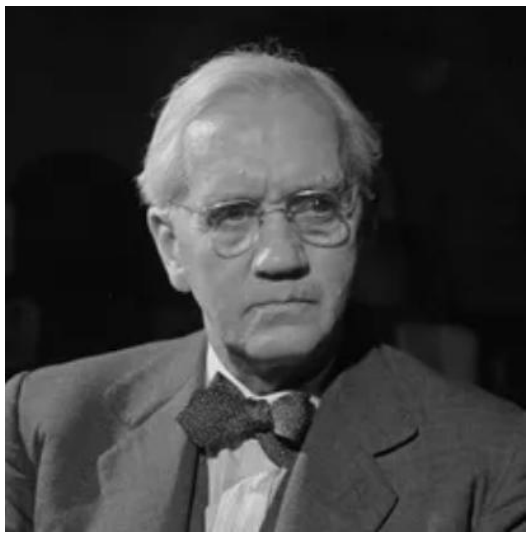
Education: Imperial College London, Kilmarnock Academy, Imperial College School of Medicine, University of Westminster

Alexander Fleming was a Scottish physician-scientist who was recognised for discovering penicillin. The simple discovery and use of the antibiotic agent has saved millions of lives, and earned Fleming – together with Howard Florey and Ernst Chain, who devised methods for the large-scale isolation and production of penicillin – the 1945 Nobel Prize in Physiology/Medicine.



Pharmaceutical biotechnology is a branch of biomedical sciences that uses novel technologies for production, formulation, and synthesis of biological substances from the living organisms, which act as drug molecules for the treatment and/or prevention of various diseases and/or syndromes.

The areas of science in which pharmaceutical biotechnology interfere are synthetic biotechnology, drug delivery and targeting, analytical biotechnology, pharmacokinetics and pharmacodynamics, regenerative medicine, bioinformatics, environmental biotechnology, therapeutic biotechnology, biotech ethics, and translational immunology.



Alexander Fleming played a groundbreaking role in the pharmaceutical industry through his discovery of penicillin in 1928, a finding that revolutionized modern medicine.

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09 **SEPTEMBER** **2025**

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28	29	LAXMINARAYAN DAY 30				

September 1, 2023

Biotech company, Genomatica, announced the development of a new microbial-based process for producing sustainable chemicals.

September 5, 2022

Industrial biotech company, DSM, launched a new microbial-based solution for bio-based material production.

September 12, 2020

Biotech company, Novozymes, announced the development of a new enzyme-based solution for

RICHARD ROBERT

Born- 6 September 1943

During 1969–1972, he did postdoctoral research at Harvard University. Before moving to Cold Spring Harbor Laboratory, where he was hired by James Dewey Watson, a co-discoverer of the structure of DNA and a fellow Nobel laureate. In this period he also visited the MRC Laboratory of Molecular Biology for the first time, working alongside Fred Sanger. In 1977, he published his discovery of RNA splicing. In 1992, he moved to New England Biolabs. The following year, he shared a Nobel Prize with his former colleague at Cold Spring Harbor Phillip Allen Sharp.

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Future trends in Industrial Microbiology and Biotechnology are poised to revolutionize various sectors, driven by advancements in technology and greater understanding of microbial processes.

Synthetic Biology: This field combines biology with engineering principles to design and construct new biological parts, devices, and systems.

Metagenomics and Microbiome Research: Advances in metagenomics—the study of genetic material recovered directly from environmental samples—will enable a deeper understanding of microbial communities.

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10 **OCTOBER** 2025

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Antonie van Leeuwenhoek

Born: 24 Oct 1632

Died: 26 August 1723

Raised in Delft, Dutch Republic, Van Leeuwenhoek worked as a draper in his youth and founded his own shop in 1654. He became well-recognized in municipal politics and developed an interest in lens-making. In the 1670s, he started to explore microbial life with his microscope.

Using single-lensed microscopes of his own design and make, Van Leeuwenhoek was the first to observe and to experiment with microbes, which he originally referred to as dierkens, diertgens or diertjes. He was the first to relatively determine their size. Most of the "animalcules" are now referred to as unicellular organisms, although he observed multicellular organisms in pond water.

He was the first to relatively determine their size. Most of the "animalcules" are now referred to as unicellular organisms, although he observed multicellular organisms in pond water.

October 12, 2020

Biotech company, Novozymes, launched a new enzyme-based solution for biofuel production.

October 5, 2022

Industrial biotech company, DSM, announced the development of a new microbial-based solution for bio-based material production.

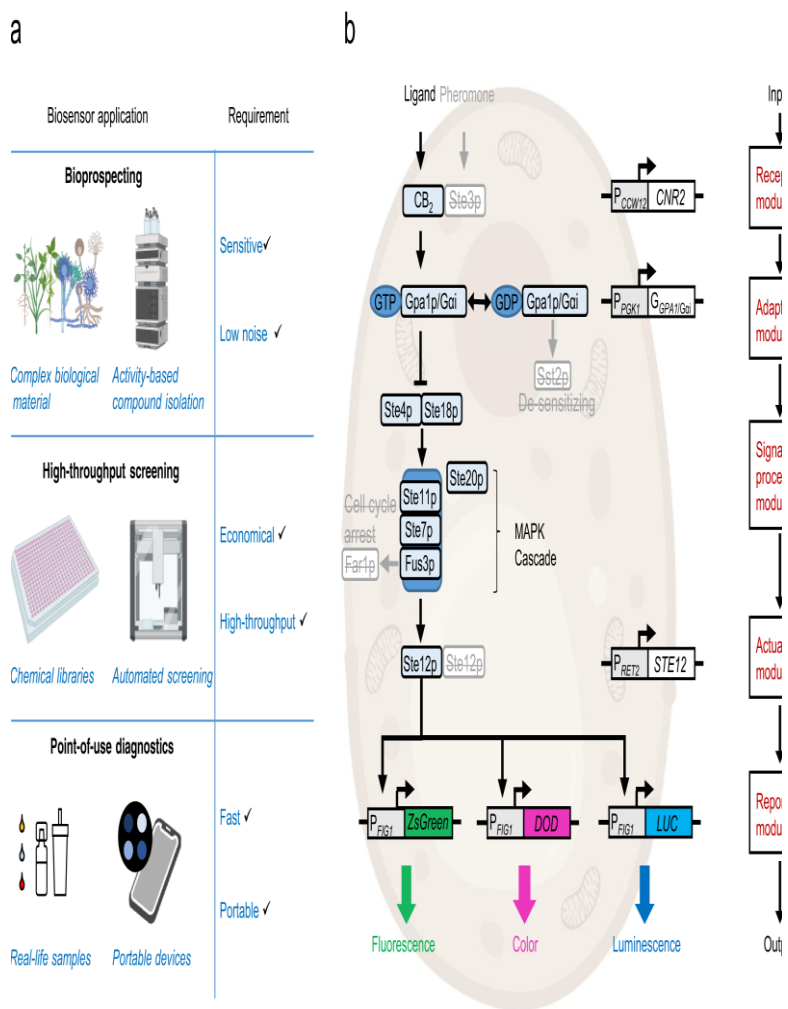
October 1, 2023

Biotech company, Genomatica, launched a new microbial-based process for producing sustainable textiles.

Engineering a GPCR-based yeast biosensor

The study of melatonin production by yeast poses a great challenge that resides on the generally low amount of this metabolite naturally produced by them. This fact shows that extremely sensitive and reliable analytical techniques are required for its study, which allow melatonin to be detected and quantified with confidence and robustness. Currently, the most powerful technique in terms of low limit of detection (LOD) and limit of quantitation (LOQ) is the ultrahigh performance liquid chromatography coupled with high-resolution tandem mass spectrometry (UHPLC-HRMS/MS). Nonetheless, this technique often requires an extraction step before chromatography such as solid-phase extraction (SPE) or liquid–liquid extraction. In addition to sample preparation, this technique requires costly infrastructure and equipment, as well as highly skilled operators. In a context of determining potential melatonin producer strains from a large pool of natural or industrial strains, having a quick, reliable and inexpensive method for detecting and quantifying melatonin directly from supernatant of yeast cultures is of great interest. Likewise, melatonin detection in different fermented beverages can provide an extra added-value to the final product.

As an alternative rapid detection method for melatonin, important milestones have been achieved in recent years, such as the voltammetry of immobilised particles (VIMP) method, which can be applied directly to yeast cells. This method has been successfully applied to monitor melatonin content in different yeast strains but its discriminating power is not comparable to chromatographic techniques. Other more specific methods rely on the specificity of monoclonal antibodies, such as radioimmunoassay (RIA) and enzyme linked immunosorbent assay (ELISA). RIA method is reported to overestimate melatonin concentration when compared to gas chromatography mass spectrometry tandem (GC–MS) and to yield false positive results. And for ELISA methods, there are available kits for biological samples like urine and cell cultures, but their use in other matrices like fermented food, drinks or yeast growth media still needs to be optimized as similarly reported previously for other analytes. The development of new monoclonal antibodies suitable for these complex matrices is critical for a correct detection and quantitation. A more recent study uses the mammalian melatonin receptor MTNR1B expressed in mammalian cells in a whole-cell bioassay where melatonin is detected by receptor MTNR1B, and it activates β-lactamase enzyme (BLA) that cleaves a FRET (Förster resonance energy transfer)-based substrate (CCF2/4) that presents green fluorescence when intact but blue fluorescein activity when cleaved This method showed high sensitivity, even comparable to HPLC–MS/MS , but the whole-cell bioassay requires a daily good maintenance of the cell lines before the assay and it comprises long periods of exposure to ligand, making the whole process not ideal when aiming for a quick, inexpensive and practical method.



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11 NOVEMBER 2025

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November 20, 2017

Biotech company, Amyris, launched a new microbial-based platform for industrial chemical production.

November 5, 2022

Industrial biotech company, DSM, launched a new microbial-based solution for bio-based material production.

November 1, 2023

Biotech company, Genomatica, announced the development of a new microbial-based process for producing sustainable chemicals.

STANLEY COHEN

Born:17 November 1955

Died: 5 February 2000

Education: University of Michigan Oberlin College
Brooklyn College

Cohen was born in Brooklyn, New York, on November 17, 1922. He was the son of Fannie and Louis Cohen, a tailor. His parents were Jewish immigrants. Cohen received his bachelor's degree in 1943 from Brooklyn College, where he had double-majored in chemistry and biology. money, he received his Master of Arts in zoology from Oberlin College in 1945.

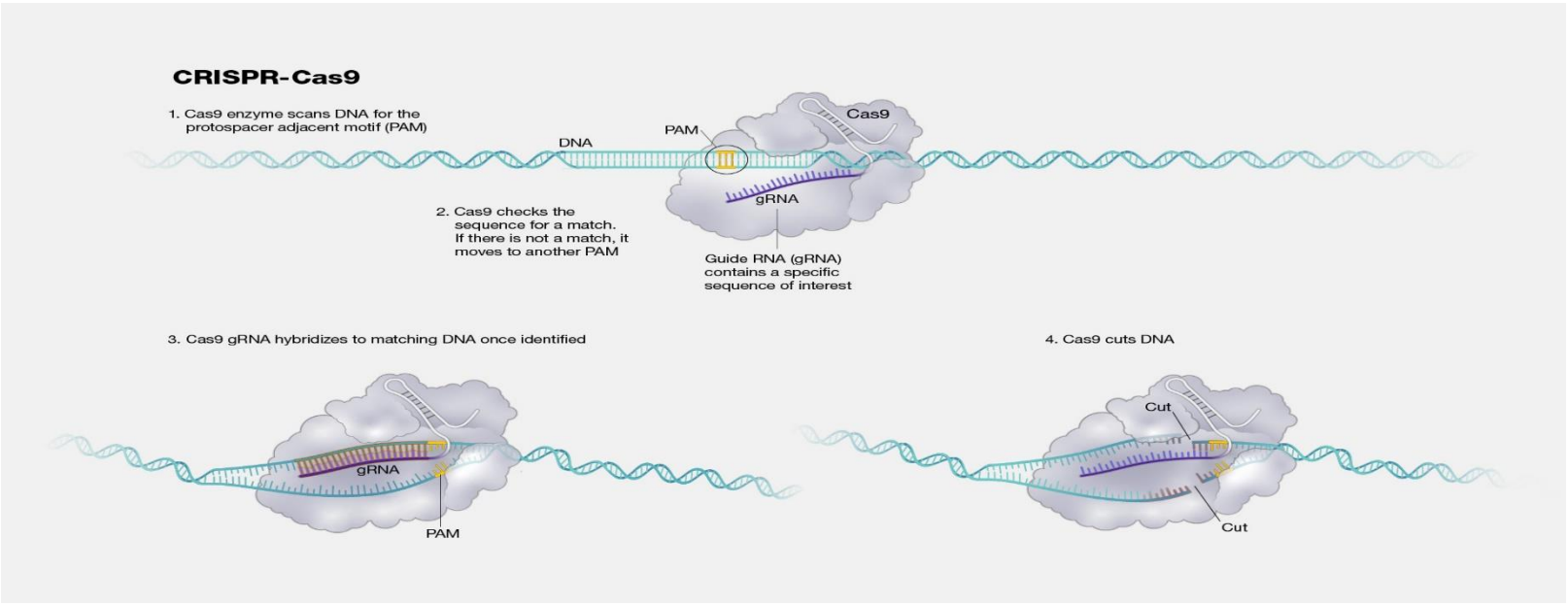
After working as a bacteriologist at a milk processing plant to earn, he received his Master of Arts in zoology from Oberlin College in 1945. His first academic employment was at the University of Colorado studying the metabolism of premature babies. In 1952 he moved to Washington University in St. Louis, working first in the department of radiology, learning isotope methodology, and then in the department of zoology. Working with Rita Levi-Montalcini, he isolated nerve growth factor. He later isolated a protein that could accelerate incisor eruption and eyelid opening in new born mice, which was renamed epidermal growth factor.

CRISPR technology: A decade of genome editing is only the beginning

CRISPR (short for “clustered regularly interspaced short palindromic repeats”) is a technology that research scientists use to selectively modify the DNA of living organisms. CRISPR was adapted for use in the laboratory from naturally occurring genome editing systems found in bacteria.

The advent of clustered regularly interspaced short palindromic repeat (CRISPR) genome editing, coupled with advances in computing and imaging capabilities, has initiated a new era in which genetic diseases and individual disease susceptibilities are both predictable and actionable. Likewise, genes responsible for plant traits can be identified and altered quickly, transforming the pace of agricultural research and plant breeding. In this Review, we discuss the current state of CRISPR-mediated genetic manipulation in human cells, animals, and plants along with relevant successes and challenges and present a roadmap for the future of this technology.

n the decade since the publication of CRISPR-Cas9 as a genome-editing technology, the CRISPR toolbox and its applications have profoundly changed basic and applied biological research. Wang and Doudna now review the origins and utility of CRISPR-based genome editing, the successes and current limitations of the technology, and where innovation and engineering are needed. The authors describe important advances in the development of CRISPR genome-editing technology and make predictions about where the field is headed. They also highlight specific examples in medicine and agriculture that show how CRISPR is already affecting society, with exciting opportunities for the future.



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12 **DECEMBER** **2025**

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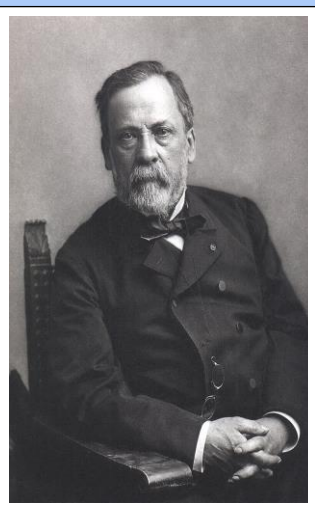
21	22	23	24	25	26	BIRTH ANNIVERSARY OF DR. PUNJABRAO DESHMUKH. 27
28	29	30	31			



Louis Pasteur

Born: 27 December 1822

Died: 28 September 1895

Education: École normale supérieure University of Paris

Pasteur was responsible for disproving the doctrine of spontaneous generation. Under the auspices of the French Academy of Sciences, his experiment demonstrated that in sterilized and sealed flasks, nothing ever developed; conversely, in sterilized but open flasks, microorganisms could grow. For this experiment, the academy awarded him the Alhumbert Prize carrying 2,500 francs in 1862.

Pasteur is also regarded as one of the fathers of germ theory of diseases, which was a minor medical concept at the time.[13] His many experiments showed that diseases could be prevented by killing or stopping germs, thereby directly supporting the germ theory and its application in clinical medicine. He is best known to the general public for his invention of the technique of treating milk and wine to stop bacterial contamination, a process now called pasteurization.

December 18, 2018

Researchers from the National University of Singapore developed a new microbial fuel cell for industrial wastewater treatment.

December 12, 2020

Biotech company, Novozymes, launched a new enzyme-based solution for biofuel production.

December 1, 2023

Biotech company, Genomatica, launched a new microbial-based process for producing sustainable textiles.

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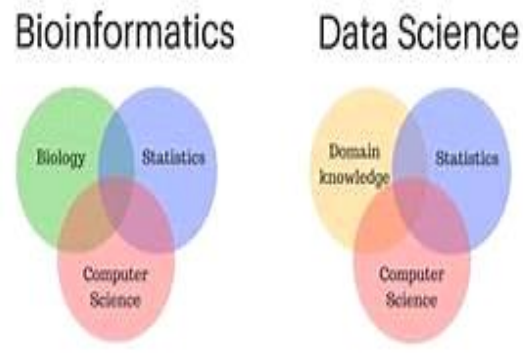
Bioinformatics and Data Science in Industrial Microbiome Applications



Advances in sequencing and computational biology have drastically increased our capability to explore the taxonomic and functional compositions of microbial communities that play crucial roles in industrial processes. Correspondingly, commercial interest has risen for applications where microbial communities make important contributions. These include food production, probiotics, cosmetics, and enzyme discovery. Other commercial applications include software that takes the user's gut microbiome data as one of its inputs and outputs evidence-based, automated, and personalized diet recommendations for balanced blood sugar levels. These applications pose several bioinformatic and data science challenges that range from requiring strain-level resolution in community profiles to the integration of large datasets for predictive machine learning purposes. In this perspective, we provide our insights on such challenges by touching upon several industrial areas, and briefly discuss advances and future directions of bioinformatics and data science in microbiome research.