



MICROBIOLOGISTS SOCIETY, INDIA



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http://microbiosociety.org

January 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12 National Youth Day	13	14	15
16	17	18	19	20	21	22
23	24	25	26 Republic Day	27	28	29
30 World Leprosy Day	31					



Birth Anniversary of Eminent Microbiologists/Scientists given behind the page

30th January World Leprosy Day

Mycobacterium leprae is a strongly acid-fast, rod-shaped, Gram Positive bacterium. It is acid fast but less than tubercle bacilli.

Leprosy has been around since ancient times and also known as Hanson's disease. Leprosy is an infectious disease caused by bacterium *Mycobacterium leprae*. It leads to severe disfiguring skin sores and nerve damage in the arms, legs & skin areas around the body. Outbreaks have affected people on every continent.

World Leprosy Day was established in 1954 by French philanthropist and writer, Raoul Follereau, as a way to raise public awareness of Leprosy that it can be prevented, treated and cured.

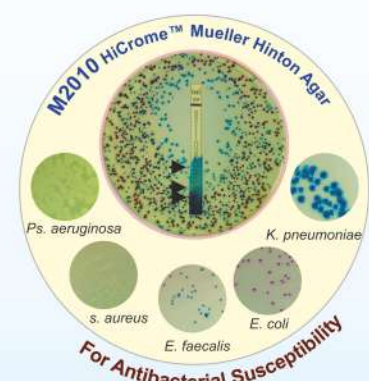
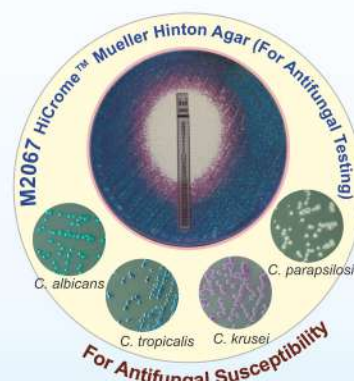
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Birthday	Name of Scientist	Photo	Contribution
<u>1 January</u> 1942	Norman R. Pace		He worked on the synthesis, structure and function of RNA and the application of molecular biology tools to detect microbes in various environments.
<u>5 January</u> 1895	Rebecca Lancefield		Lancefield is best known for her serological classification of β -hemolytic streptococci.
<u>9 January</u> 1922	Har Gobind Khorana		His work on discovering that the order of nucleotides in our DNA determine which amino acids are built. Deciphering the genetic code.
<u>21 January</u> 1868	Felix Hoffmann		He was a German chemist notable for resynthesizing diamorphine.
<u>24 January</u> 1828	Ferdinand Cohn		Cohn was the first to classify algae as plants and to define what distinguishes them from green plants.

Vaccine Maitri

Vaccine Maitri (*English: Vaccine Friendship*) is a humanitarian and commercial initiative undertaken by the Indian government to provide COVID-19 vaccines to countries around the world. The government started providing vaccines from 20 January 2021. As of 9th May 2021, India had delivered around 66.3 million doses of vaccines to 95 countries. Of these, 10.7 million doses were gifted to 47 countries by the Government of India. The remaining 54 million were supplied by the Serum Institute of India under its commercial obligations.

ORGANIZATIONS PROMOTING SCIENTIFIC RESEARCH IN INDIA

1. Indian Institute of Education and Research-IISERs:

The Government of India, through the Ministry of Education, has established seven Indian Institutes of Science Education and Research (IISER). These institutes are located in Bhopal, Berhampur, Mohali, Pune, Kolkata, Thiruvananthapuram and Tirupati. The IISERs represent a unique initiative in India where teaching and education are totally integrated with state-of-the-art research nurturing both curiosity and creativity in an intellectually vibrant atmosphere of research. Each IISER is an autonomous institution awarding its own Masters and Doctoral degrees.



2. Department of Biotechnology- DBT:

Biotechnology is a front line area of science with immense potential for the benefit of the human kind. The Department was developed to achieve excellence in the promotion of biotechnology in the country within the ambit of the Allocation of Business Rules, 1961 as enumerated through the Government of India. The Department shall provide services in the areas of research, infrastructure, generation of human resource, popularization of biotechnology, promotion of industries, creation of centers of excellence, implementation of bio-safety guidelines for genetically modified organisms and recombinant DNA products and biotechnology-based programs for societal benefits.

3. Jawaharlal Nehru Centre for Advanced Scientific Research- JNCASR:

The Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) is a multidisciplinary research institute located at Jakkur, Bangalore, India. It was established by the Department of Science and Technology of the Government of India, to mark the birth centenary of Pandit Jawaharlal Nehru, the first Prime Minister of independent India.





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February 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 <small>1-7 Tetanus Awareness Week</small>	2	3 	4 <small>World Cancer Day</small>	5
6	7	8	9	10 	11	12
13	14	15	16 	17 	18 	19
20 	21 	22	23	24	25	26
27 <small>National Protein Day</small>	28 <small>National Science Day</small>					

Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Tetanus

C. tetani is a Gram Positive bacterium, drumstick appearance, obligate anaerobe, its spores are extremely hardy and are resistant to heat, various antiseptics and boiling for several minutes. Tetanospasmin ("tetanus toxin") is one of the most potent toxins known, with an estimated lethal dose of less than 2.5 nanograms per kilogram of body weight.

1st to 7th February Tetanus Awareness Week

Tetanus is an infection caused by bacterium called *Clostridium tetani*, when the bacteria invade the body, another name for tetanus is "lockjaw" Tetanus can be prevented through immunization with tetanus-toxoid-containing vaccines (TTCV). However, people who recover from tetanus do not have natural immunity and can be infected again. The majority of reported tetanus cases are birth-associated among newborn babies and mothers who have not been sufficiently vaccinated with TTCV. In 2015, about much lesser newborns died from neonatal tetanus, a 96% reduction since 1988, largely due to scaled-up immunization with TTCV.



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2. Determination of biomass in soil through PLFA (Phospholipid Fatty Acid) analysis
3. Determination of abundance of AMF (arbuscular mycorrhizal fungi) through NLFA (Neutral Lipid Fatty Acids) analysis.
4. Polyphasic report, (FAME combined with sequencing) (Confirmatory)

Other services include

- Soil analysis (Microbial and Micro-Nutrient)
- Oil Analysis
- 16Sr DNA /18Sr DNA
- 16Sr RNA/18Sr RNA Sequencing Analysis

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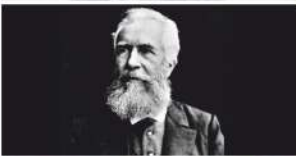




Prepared by : Department of Microbiology, HVHP Institute of Post Graduate Studies and Research, Kadi, Gujarat, | www.hvpgkadi.ac.in
Concept by : Dr. Sanjeev Patankar (Maharashtra), Dr. A. Archana (New Delhi), Dr. Shanmugam (Tamilnadu)



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Birthday	Name of Scientist	Photo	Contribution
3 February 1923	Hans Cohen		He worked on the development of the Salk polio vaccine.
10 February 1897	Johan Franklin Enders		The Father of Modern Vaccines, a leader in modern virology, Enders is credited for cultivating the polio virus in tissue cultures of human cells which led to the development of an attenuated live vaccine for polio.
12 February 1809	Charles Darwin		Contributions to the science of Evolution.
16 February 1834	Ernst Haeckel		He proposed the term Kingdom Protista and coined the term Ecology.
17 February 1949	Peter Piot		His research on Ebola and AIDS virus.
18 February 1626	Francesco Redi		He was the first person to challenge the theory of Spontaneous generation by demonstrating that maggots come from eggs of flies.
20 February 1901	Rene Dubos		French-American Microbiologist, Isolation and testing of first natural antibiotic.
21 February 1866	August Von Wassermann		Wassermann developed a complement Fixation test for the diagnosis of syphilis in 1906, just one year after the causative organism, <i>Treponema pallidum</i> .

ORGANIZATIONS PROMOTING SCIENTIFIC RESEARCH IN INDIA

4. Indian Space Research Organization (ISRO) :

ISRO is one of the top research and development organizations in India involved in the research activities relating to space, remote sensing, vehicle launch facilities, and satellites. It has a number of centers all around the country, which includes the Vikram Sarabhai Space Centre (VSSC) at Thiruvananthapuram, laboratory of electro optic system (LEOS) at Bangalore and many more.



5. Council of Scientific and Industrial Research (CSIR) :

CSIR, founded in 1942, is currently the largest industrial R&D organization in the country. The organization is involved in R&D for number of scientific fields including environment, aerospace, life science, petroleum, metallurgy, food as well as chemicals. CSIR currently has 39 laboratories all around the country with over 17000 employees working in different client-oriented projects throughout the year.

6. Defense Research and Development Organization (DRDO) :

DRDO is the premier organization in India concerned with research and development in defense systems and military technology. Headquartered in New Delhi, it works in a variety of areas related to defense in its 52 laboratories across the country. These areas include aeronautics and avionics, electronic warfare, combat vehicle engineering, naval development, missile systems.





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March 2022

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 World Water Day	23	24 World Tuberculosis Day	25	26
27 National Triglycerides Day	28	29	30	31		

Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Tuberculosis

Mycobacteria are immobile, slow-growing, rod shaped, Gram-positive bacteria with high genomic G+C content. Due to high mycolic acid in the cell wall, they are not decolorized by acid alcohol and hence are called acid-fast.

24th March World Tuberculosis day

Tuberculosis (TB) is a contagious infection that is caused by a bacterium called *Mycobacterium tuberculosis*. Usually, TB bacteria attack the lungs, but they can attack any part of the body such as the kidney, spine, and brain.

World Tuberculosis Day was first celebrated on 24th March, 1982, on the 100th anniversary of Dr Robert Koch, who discovered the Tuberculosis. TB was a leading cause of death in preantibiotic era. Later on, most cases are cured with antibiotics. However emergence of extreme drug resistant TB bacteria are major cause of concern globally.



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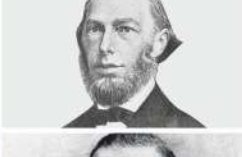

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14 March 1854	Paul Ehrlich		Father of Chemotherapy, he also contributed in development of staining tissue which made it possible to distinguish between different types of blood cells, which led to the ability to diagnose numerous blood diseases.
15 March 1854	Emil Von Behring		Discovery of a diphtheria antitoxin.
16 March 1851	Martinus Beijerinck		He isolated free-living nitrogen fixing bacteria known as <i>Beijerinckia</i> spp.
25 March 1825	Max Schultze		He worked on Cell Theory of Biogenesis.
28 March 1837	Wilhelm Kuhne		He is best known today for coining the word "Enzyme".

RNTCP - Revised National TB Control Program

The large scale implementation of the Indian government's Revised National TB Control Program (RNTCP) (sometimes known as RNTCP 1) was started in 1997. The RNTCP was then expanded across India until the entire nation was covered by the RNTCP in March 2006. RNTCP uses the World Health Organization (WHO) recommended Directly Observed Treatment Short Course (DOTS) strategy and reaches over a billion people in 632 districts/reporting units.

Objectives:

- To achieve and maintain a TB treatment success rate of at least 85% among new sputum positive (NSP) patients.
- To achieve and maintain detection of at least 70% of the estimated new sputum positive people in the community.

ORGANIZATIONS PROMOTING SCIENTIFIC RESEARCH IN INDIA

7. Indian Council of Medical Research (ICMR):

ICMR is one of the best research and development organizations in India for promoting research in the field of medicine. Based in New Delhi, the organization is responsible for the funding and over-seeing of the scientific and medical research being undertaken in various medical institutions in the country. The fields that are encouraged by ICMR include reproductive and child health, non-communicable diseases, epidemiology, stem cell re-search, and human genetics.



8. Bhabha Atomic Research Centre (BARC):

BARC is the premier research and development organization in India concerned with research in various fields including nuclear science, chemical technology, environment, biotechnology, electronics and instrumentation, health, physical sciences and material sciences. The organization works under the Department of Atomic Energy and its primary focus is on nuclear research and development.

9. Indian Council of Agricultural Research (ICAR):

The ICAR is a major body that coordinates, guides, and manages research and education in the field of agriculture (also including the fields of Horticulture, Fisheries and Animal Sciences) in the nation. There are 100+ ICAR institutes and 70+ Universities focused on agriculture in the country, making it one of the largest agriculture systems in the world. The ICAR has played a pioneering role in ushering Green Revolution and prolific development of agriculture in India through research and technology development. It has enabled the country to increase the production of food grains, crops, and milk to name a few by double digits in the last 4 decades.





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April 2022

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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30



Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Malaria

Causative agents of Malaria
Plasmodium falciparum
Plasmodium vivax
Plasmodium ovale
Plasmodium malariae
Plasmodium knowlesi



25th April World Malaria Day

Malaria is a life-threatening disease. It's typically transmitted through the bite of an infected *Anopheles* mosquito. Infected mosquitoes carry various *Plasmodium* parasite species.

World Malaria Day was established on 25th April 2007 by the 60th session of the world health assembly, WHO's decision making body. The day was established to provide "Education and Understanding of Malaria" and spread information on year long intensified implementation of national malaria-control strategies, including community-based activities for malaria prevention and treatment in endemic areas.



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Birthday	Name of Scientist	Photo	Contribution
4 April 1938	Ananda Mohan Chakrabarty		Father of "Organic Superbug". Developed genetically engineered <i>Pseudomonas</i> spp. for bio-degradation of pollutants.
5 April 1827	Joseph Lister		Father of Antiseptic surgery, developed Serial Dilution Technique.
6 April 1928	James Watson		Played a crucial role in the discovery of the molecular structure of Deoxyribonucleic acid (DNA).
8 April 1911	Melvin Calvin		Discovery of the chemical pathways of photosynthesis and gave Calvin cycle.
10 April 1927	Marshall Warren Nirenberg		Breaking the genetic code and describing how it operates in protein synthesis.
25 April 1873	Felix d'Herelle		Discovery of Bacteriophage, a bacterial virus.
26 April 1932	Michael Smith		Developed Site Directed Mutagenesis.

ORGANIZATIONS PROMOTING SCIENTIFIC RESEARCH IN INDIA

10. Tata Institute of Fundamental Research (TIFR):

Mumbai headquartered Tata Institute of Fundamental Research (TIFR) was founded in 1945 by Homi J. Bhabha with the support from J.R.D. Tata. It works under the Department of Atomic Energy and conducts research in the areas of physics, chemistry, biology, mathematics, computer science and science education. As a university, it has its different fields of research spread out between different institutes. Its multiple facilities are supported by many advanced equipments including a particle accelerator.



11. National Institute of Biomedical Genomics (NIBMG):

Based in Kalyani, near Kolkata, West Bengal, National Institute of Biomedical Genomics (NIBMG) is India's first research institute dedicated to research in genomic medicine. It was founded in 2009 under the Department of Biotechnology. The institute has done some cutting edge work in the field of Biomedical Genomics in the last decade. This includes the global record breaking sequencing data generation in a single experiment in a short period of time.

12. National Research Development Corporation (NRDC):

The National Research Development Corporation (NRDC), New Delhi, comes under the purview of the Department of Scientific and Industrial Research (DSIR). It was established in 1953 by the Government of India to promote, develop and commercialize the technologies, know how, inventions, patents and so on, being developed in different institutions in the country. It undertakes projects at national and international levels to promote scientific and technological innovations.





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May 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8 Intl. Thalassemia Day	9	10 World Asthma Day	11	12	13	14
15	16	17 World AIDS Vaccine Day	18	19	20	21
22 Intl. Biodiversity Day	23	24	25	26	27	28
29	30	31 World Anti Tobacco day				

Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Bio-Diversity hotspots

India is one of the recognized mega-diverse countries of the world, harbouring nearly 7-8% of the recorded species of the world, and representing 4 of the 34 globally identified biodiversity hotspots. India has four biodiversity hotspots, i.e., Eastern Himalayas, Western Himalayas, Western Ghats & Andaman and Nicobar Islands.

8th May International Thalassemia Day

The Thalassemia's are a group of inherited hematologic disorders caused by defects in the synthesis of one or more of the hemoglobin chains. Alpha thalassemia is caused by reduced or absent synthesis of alpha globin chains, and beta thalassemia is caused by reduced or absent synthesis of beta globin chains.

World Thalassemia Day is celebrated on 8th May every year to commemorate Thalassemia victims and to encourage those who struggle to live with the disease. The theme for 2021 World Thalassemia Day was "Addressing Health Inequalities Across the Global Thalassemia Community".

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Birthday	Name of Scientist	Photo	Contribution
8 May 1902	Andre Lwoff		His contributions in the discoveries regarding genetic control of Enzyme and Synthesis of virus.
15 May 1845	Elie Metchnikoff		Nobel Laureate, known for Phagocytosis mechanism.
17 May 1749	Edward Jenner		Pioneered the concept of vaccines including creating the Small Pox vaccine, the world's first vaccine.
23 May 1707	Carl Linnaeus		He is known as the "Father of Modern Taxonomy" and proposed Binomial nomenclature system.
23 May 1925	Joshua Lederberg		Discovering that bacteria can mate and exchange genes (Bacterial Conjugation)
28 May 1942	Stanley B. Prusiner		Discovery of disease-causing proteins called Prions.
31 May 1852	Julius Richard Petri		Invented "petri dish" in which microorganisms are cultured.

ORGANIZATIONS PROMOTING SCIENTIFIC RESEARCH IN INDIA

13. Indian Institute of Science - IISc :

IISc is one of the India's premier institutes for advanced scientific and technological research and education. Its mandate is to conduct original investigations in all branches of knowledge as these are likely to promote the material and industrial welfare of India. Keeping with this guiding principle, the Institute has strived to foster a balance between the pursuit of basic knowledge and applying its research for industrial and social benefits.



14. National Institute of Science Education and Research-

NISER : (NISER) is an autonomous premier public research institute in Jatani (Khordha), Odisha, India under the umbrella of Department of Atomic Energy, Govt. of India. The institute is a constituent institution of Homi Bhabha National Institute (HBNI). The then Prime Minister, Manmohan Singh (2004-2014), laid the foundation stone on 28th August , 2006, establishing the institute along the lines of the IISc in Bengaluru & its seven sister institutions, the IISERs, established at Pune, Mohali, Bhopal, Berhampur, Tirupati and Thiruvananthapuram in India.

15. Gujarat Biotechnology Research Centre GBRC :

Government of Gujarat has recognized the importance and potential of biotechnology. With the vision to develop biotechnology sector and to provide global level opportunities, research and development in the state, the government in the year 2004, established Gujarat State Biotechnology Mission (GSBTM) as a state nodal agency dedicated to biotechnology. It has taken another important leap with a vision to build biotechnology based research and development activities by establishing an independent organization namely, Gujarat Biotechnology Research Centre (GBRC) under the Department of Science and Technology.





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June 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5 World Environment Day	6 World Ocean Day	7	8	9	10	11
12	13	14 World Blood Donation Day	15	16	17	18
19 World Sickle Cell Awareness Week	20	21	22	23	24	25
26	27 World Microbiome Day	28	29	30		



Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

19th June World Sickle Cell Awareness Week

Sickle cell anemia is an inherited red blood cell disorder in which there aren't enough healthy red blood cells to carry oxygen throughout body. In sickle cell anemia, the red blood cells are shaped like sickles or crescent moons. These rigid, sticky cells can get stuck in small blood vessels, which can slow down or block blood flow and oxygen to various parts of the body.

27th June World Microbiome Day

A Microbiome is the community of microorganisms living together in a particular habitat. Humans, animals and plants have their own unique microbiomes. Even soils, oceans and environment have their own microbiomes.

During World Microbiome Day, all of these microbiomes are celebrated, as a vibrant and complex area of study that deserves recognition and attention. This year, the theme of the event is "Sustainability", focusing the debate on how microbes can contribute to a sustainable future.



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Birthday	Name of Scientist	Photo	Contribution
<u>3 June</u> 1929	Werner Arber		Discovery of the process by which enzymes could be used to break down the DNA molecules into smaller fragments without losing their inherent characteristics and could then be studied easily.
<u>8 June</u> 1916	Francis Crick		Co-Discoverer of the structure of the DNA molecule, Nobel Prize Winner.
<u>13 June</u> 1870	Jules Bordet		Discovery of complement and development of complement fixation test, identification of the bacterium <i>Bordetella pertussis</i> which causes whooping cough.
<u>14 June</u> 1868	Karl Landsteiner		Received Nobel Prize for discovery of ABO blood grouping.
<u>19 June</u> 1906	Ernst Chain		Received Nobel Prize for Industrial production and purification of Penicillin.
<u>22 June</u> 1850	Fanny Hesse		Pioneered use of Agar-Agar as a solidifying agent in solid culture media.
<u>24 June</u> 1852	Friedrich Loeffler		He was first to cultivate <i>Corynebacterium diphtheriae</i> , causative agent of Diphtheria. He discovered that Foot and Mouth disease is caused by a virus.
<u>30 June</u> 1926	Paul Berg		First to create Hybrid DNA or Recombinant-DNA.

BEST BIOTECHNOLOGY START-UPS IN INDIA

In India, the biotechnology sector is fast growing. The companies under these biotech start-ups are known for providing better diagnosis, high quality drugs and making medicines and MedTech products available at a reasonable price. They aim at getting the best outcome for developing health awareness and upgrading diagnosis facilities. With the developing technologies the health care sector is also increasing.

BIOCON : Founded in 1978 and top biotech start-up. As a company that used to produce the enzyme papain. Annual sums up to INR 4,709 CRORES in 2018. Now their pharmaceutical ingredients are being sold in more than 120 countries throughout the world.

Med Genome : Sam Santosh founded the start-up in 2013. Providing personalized genetic tests and medicines. It has working genres scattered for a range of ailments such as cancer, neurological ailments and diabetes. And it awarded for biomedical research. They provide unique genomic solutions.

Bharat Biotech : It was founded in the year 1996. The Hyderabad based company was founded by an well known Indian scientist Krishna Ella. Very first pharmaceutical start-up that has successfully developed generic drug. They also received the patent the vaccine Zikavac, also producing Covaxin, a vaccine against Corona virus.

GANIT Labs : The Bengaluru based start-up found in 2010 by Dr. Binay Panda and Dr. Vijay Chandru. They studied and mapped genomes related to oral cancer.

Sea6 Energy : They solve the problem of over consumption of energy in India. Primary aim to convert photosynthetic biomass for instance plant and algae to fuels something that will definitely come in handy in the new future.

Zumutor Biologics : Founded by Kavitha Iyer Rodrigues in 2013, Zumutor Biologics is one of the leading immune-oncology start-ups that help in treating cancer by targeting the body's immune system. To date, it has raised \$41.6 million (₹306.4 crore) from Accel, Chiratae Ventures & Bharat Innovation Fund.

Vyome Therapeutics : Founded by Shiladitya Sengupta & Venkateswarlu Nelabhotla in 2010, Vyome Therapeutics is focused on treating inflammatory diseases like acne using its innovative next generation therapeutic solutions. It has raised \$48.3 million (₹355.7 crore) from Iron Pillar, Sabre Partners and Aarin Capital.



Prepared by : Department of Microbiology, HVVP Institute of Post Graduate Studies and Research, Kadi, Gujarat, | www.hvpgrkadi.ac.in
Concept by : Dr. Sanjeev Patankar (Maharashtra), Dr. A. Archana (New Delhi), Dr. Shanmugam (Tamilnadu)



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July 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6 World Zoonoses Day	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28 World Hepatitis Day Nature Conservation Day	29	30
31						



Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Viral Hepatitis Types

Viral infections of the liver that are classified as hepatitis include hepatitis A, B, C, D, and E. A different virus is responsible for each type of virally transmitted hepatitis.



28th July

World Hepatitis Day

Hepatitis is inflammation of the liver. Hepatitis can be an acute (short-term) infection or a chronic (long-term) infection. Hepatitis affects hundreds of millions of people worldwide causing acute and chronic disease and killing close to 10.34 million people every year.

The date of 28th July was chosen because it is the birthday of Nobel-prize winning scientist Dr Baruch Blumberg, who discovered hepatitis B virus (HBV) and developed a diagnostic test and vaccine for the virus.



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Birthday	Name of Scientist	Photo	Contribution
15 July 1928	Carl Woese		Famous for defining the Archaea.
20 July 1822	Gregor Mendel		Mendel's pea plant experiments. Gave Mendelian Laws.
22 July 1888	Selman Waksman		Discoverer of Streptomycin.
25 July 1920	Rosalind Franklin		Contributed in understanding of the molecular structures of DNA (Deoxyribonucleic acid). Determined structure of RNA in TMV.
28 July 1635	Robert Hooke		Using a microscope, was the first to visualize microorganisms and named as "Animalcules".

Importance of Hepatitis B Vaccination

The hepatitis B vaccine is also known as the first "anti-cancer" vaccine because it prevents hepatitis B, the leading cause of liver cancer. More than 1 billion doses of the hepatitis B vaccine have been given worldwide and it is considered one of the safest and most effective vaccines ever made. The vaccine can provide a lifetime of protection for ones who do not have hepatitis B.

The hepatitis B vaccine is a safe and effective vaccine that is recommended for all infants at birth and for children up to 18 years. The hepatitis B vaccine is also recommended for adults living with diabetes and those at high risk for infection due to their jobs, lifestyle, living situations, or country of birth. Since everyone is at some risk, all adults should seriously consider getting the hepatitis B vaccine for a lifetime protection against a preventable chronic liver disease.

BEST BIOTECHNOLOGY START-UPS IN INDIA

Forus Health : K. Chandrasekhar, the founder of this created in 2010, the basic mantras of the company as Innovate, Implement and Impact. They work to eliminate preventable blindness through an ophthalmology device, which include intelligent pre screening techniques.

XCode Life Sciences : Founded by Mohammed Saleem, Abdur Rab Abdur Rahman & Ramabadran Narayanan in 2010. It focuses on preventive healthcare by enabling individuals to understand their genetic makeup and helping them to improve their lives by creating personalized health, nutrition and fitness plan based on their genetic markers and disease risk.

Map My Genome : Founded by Anu Acharya in 2013. It is a personal genomics start-up that offers their customers DNA-based immunity report which offer insights about your risk towards certain immune system diseases as well as life style diseases they might be susceptible to. These reports also tell which drugs will be most effective for them based on their DNA. Make My Genome has raised \$1 million (₹7 crore) from investors Singapore angel network & sequoia capitals MD Rajan Anandan.

Oncostem Diagnostics : Founded by Manjiri Bakre in 2011. Oncostem is a cancer treatment start-up that offers innovative prognostic & preventive solutions. Its flagship product "Can Assist Breast" is a prognostic test for early stage breast cancer patients which provide vital insights about breast tumors as well as benefits & risks of chemotherapy and hormonal therapy. It is working on developing tests for other type of cancer like oral & ovarian cancer. Oncostem diagnostics has raised \$7 million (₹51.5 crore) from Artiman Ventures.

Pandorum Technologies : Founded by Arun Chandru and Dr. Tuhin Bhowmick in 2011, Pandorum Technologies is a biotech company that focuses on tissue engineering & regenerative medicine. It is the 1st Indian company to design & 3D print human liver tissue for medical research. Till date, the start-up has raised \$9.2 million (₹67.75 crore) from investors like 500 start-ups, 021 Capital, Indian Angel Network and Binny Bansal.

Bugworks Research : Founded by Anand Anand kumar in 2014, Bugworks Research is a drug discovery start-up that is designing antibiotics that can fight the super bugs which are immune to our traditional drugs. To date, this biopharma start-up has raised \$16.5 million (₹121.5 crore) from University of Tokyo Edge Capital, Global Brain Corporation and Aquipharma Holdings.

Farcast Biosciences : Founded by Pradip K. Majumder & Mallikarjun Sundaram in 2010, Farcast Biosciences was formerly known as Mitra Biotech. The start-up has developed its flagship platform called CAN Script which helps oncologists to identify which drug will be most effective for their patients. They have raised \$76 million (₹560 crore) from North pond Ventures, Tata Capital & Accel.



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August 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10 World Biofuel Day	11	12	13 National Organ Donation
14	15 Independence Day	16	17	18	19	20 World Mosquito Day
21	22	23	24	25	26	27
28	29	30	31			

Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

20th August World Mosquito Day

Diseases transmitted by mosquitoes include Malaria, Dengue, West Nile virus, Chikungunya, Yellow fever, Filariasis, Tularemia, Dirofilariasis, Zikaviral disease, Viral Encephalitis, Rift Valley fever.

10th August World Biofuel Day

Biofuel, any fuel that is derived from biomass-the plant or algae material or animal waste. World Biofuel Day is observed on August 10 to raise awareness of the importance of non-fossil fuels as a substitute for conventional fossil fuels. This initiative will enable non-fossil fuel cleaner consumption patterns. The role of biofuel is not to replace fossil fuel but to help in forming a balanced policy. Biofuel is created to serve as an ideal alternative with a mindset to make a positive impact on the environment and also an improved economy.



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2. Determination of biomass in soil through PLFA (Phospholipid Fatty Acid) analysis
3. Determination of abundance of AMF (arbuscular mycorrhizal fungi) through NLFA (Neutral Lipid Fatty Acids) analysis.
4. Polyphasic report, (FAME combined with sequencing) (Confirmatory)

Other services include

- Soil analysis (Microbial and Micro-Nutrient)
- Oil Analysis
- 16Sr DNA /18Sr DNA
- 16Sr RNA/18Sr RNA Sequencing Analysis

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Prepared by : Department of Microbiology, HVVP Institute of Post Graduate Studies and Research, Kadi, Gujarat, | www.hvpgkadi.ac.in
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Birthday	Name of Scientist	Photo	Contribution
<u>2 August</u> 1820	John Tyndall		Fractional sterilization known as Tyndallization.
<u>6 August</u> 1881	Alexander Fleming		Discovered Penicillin.
<u>11 August</u> 1905	Erwin Chargaff		Chargaff's Rule for DNA.
<u>12 August</u> 1919	Vikram Sarabhai		He is internationally regarded as the Father of the Indian Space Program.
<u>13 August</u> 1912	Salvador Luria		Work on Bacteriophages or viruses that infect bacteria.
<u>23 August</u> 1931	Hamilton O. Smith		Discovery of 'Restriction Enzymes' that could cut the DNA in a cell into smaller pieces.
<u>25 August</u> 1900	Hans Krebs		He was a pioneer scientist in the study of cellular respiration and TCA Cycle.
<u>30 August</u> 1919	Maurice Hilleman		Discovery of Antigenic shift and drift the cold causing Adeno viruses, the Hepatitis viruses and the potentially cancer causing virus SV 40.

BEST BIOTECHNOLOGY START-UPS IN INDIA

Currently, India is the largest provider of generic medicines, holding a market share of 20% to worldwide supply by volume and meets virtually 60% of the vaccine requirement around the world. Indian pharmaceutical companies also supply 80% of antiretro-viral medications (utilized in fighting AIDS) in the international markets.

1. Sun Pharmaceutical Industries Ltd : Sun Pharmaceutical Industries Ltd is an Indian multinational pharmaceutical company ranked among the top 10 pharma companies, which produces and sells pharmaceutical formulations as well as active pharmaceutical ingredients (APIs) in India as well as the U.S. The overall sales of the firm are Rs 29066 Crores. The company is one of the most trusted and reputable pharma firms in India. Sun Pharma provides formulations in numerous therapeutic fields, such as cardiology, diabetology, neurology, gastroenterology and psychiatry. It also provides anti-cancer drugs, peptides, steroids, sex hormones, etc. The firm supplies more than 2000 formulations as well as exports in various other nations too.

2. Dr. Reddy's Laboratories Ltd : Dr. Reddy's Laboratories is an Indian multinational pharma firm. The company produces as well as markets a wide variety of pharmaceuticals in India and abroad. The firm has more than 190 drugs, 60 APIs for drug manufacture, biotechnology products, critical care, and diagnostic kits. The firm has seven active manufacturing plants across India. The company made its first move and expanded its operations to Russia in 1992. To fight this battle of COVID-19 pandemic, Dr. Reddy's Laboratories agreed to perform final-stage clinical trials of Russia's Sputnik V COVID-19 vaccine in India.

3. Divi's Laboratories : Divis Laboratories manufactures APIs, Intermediates, and Nutraceutical ingredients with predominance in exportation. Divi Laboratories has two manufacturing systems and is amongst the leading pharma companies in the country. Due to its market value, it has entered into the top list of Pharma Companies in India. Divi's Labs is among the youngest firm, which leads to being in the list of leading Pharma Companies. The Company exports the products to nations like the USA, Europe, Japan, South Africa, Australia, and the Philippines.

4. Cipla : Cipla is a leading worldwide pharmaceutical firm, committed to generic medicines of top quality. The firm is relied on by healthcare professionals as well as patients throughout the world. The company supplies a wide range of medicines. The company has got a prominent position in the Indian market as well as global market. The company is spread in more than 150 countries. For adhering to the highest quality standards, the company has earned worldwide recognition as well as received approvals from major global regulatory agencies.



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September 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 National Nutrition Week	2	3
4 National Wildlife Day	5	6	7	8	9	10
11	12	13 	14	15	16 World Ozone Day	17 Intl. Microorganism
18	19	20	21	22	23	24
25	26	27	28 World Rabies Day	29 World Heart Day	30	



Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Rabies Virus

Rabies virus is also known as street virus or lyssa Virus. It is Rhabdo virus which is large rod or bullet shaped. These viruses are enveloped and have a single stranded RNA Genome.



28th September World Rabies Day

Rabies is usually transmitted through a bite of infected animal, for example, from the saliva of stray dogs, rabid bats, coyotes, foxes, raccoons and skunks most often transmits rabies.

World Rabies Day takes place each year on 28th September, the anniversary of the death of Louis Pasteur who, with the collaboration of his colleagues, developed the first efficacious rabies vaccine. World Rabies Day aims to raise awareness about the impact of rabies on humans and animals, provide information and advice on how to prevent the disease in at risk communities and support advocacy for increased efforts in rabies control.

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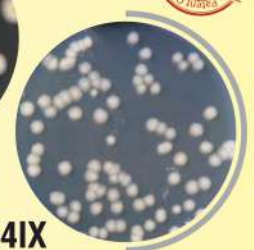
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Birthday	Name of Scientist	Photo	Contribution
<u>1 September</u> 1856	Sergei Winogradsky		Proposed Winogradsky column, identification of Biological Nitrogen fixation bacteria.
<u>3 September</u> 1899	Frank Macfarlane Burnet		Virologist & Nobel Prize Laureate for Clonal Selection Theory.
<u>10 September</u> 1926	Thomas D. Brock		Founder of Thermophilic bacteria <i>Thermus aquaticus</i> and <i>Sulfolobus</i> Spp.
<u>13 September</u> 1853	Hans Christian Gram		Development of the Gram Staining.

BEST PHARMACEUTICAL INDUSTRIES IN INDIA

5. Aurobindo Pharma : Aurobindo Pharma started operations in 1988-89 with a single unit manufacturing Semi-Synthetic Penicillin at Pondicherry. The company became a public company in 1992. Along with Semi-Synthetic Penicillin's, the company has a presence in key therapeutic segments such as cardiovascular, anti-retrovirals, neurosciences, anti-biotics, gastroenterology, anti-diabetics, anti-Allergics etc. The company exports its products to more than 150 nations across the globe. Aurobindo pharma has production and research and development units. The products given by this company are effective as well as budget-friendly, and these products are of high quality and have a massive demand in the market.

6. Torrent Pharmaceuticals : Torrent Pharma was a leader in initiating the principle of niche marketing in India. Today, it is ranked amongst the leaders in the therapeutic sector of the women's health care, cardiovascular, central nervous system, and gas-trointestinal. Additionally, the firm has a considerable existence in diabetology, oncology, gynecology, pain management, and anti-infective sectors. They have first class manufacturing centers, advanced R & D facilities, an extensive domestic network, and a prevalent international presence in more than 40 nations. The firm deals with a wide product segment including CNS, cardiovascular, diabetology, gastrointestinal, pain management, and anti-infective sector. The company has its own manufacturing system in several parts of the nation. The firm has its subsidiaries around the globe.

7. Lupin Ltd : Lupin is a worldwide pharmaceutical company supplying a large range of products like Branded & Generic For-mulations, Biotechnology Products, APIs, etc. The company's manufacturing centers are spread across India, Japan, Brazil, Mexico, and the UNITED STATES. The company is a substantial player in the treatment areas of Non-Steroidal Anti-Inflammatory Drugs, Cardiovascular, CNS, Gynaecology, Asthma, Paediatric, Diabetology, Gastro-Intestinal, and Anti-Infective drugs. Additionally, the company holds an international leadership position in the Anti-TB and Cephalosporins sectors. The company is spread around more than 100 countries. It supplies top quality yet budget-friendly medications for some of the most persistent diseases addressing unmet demands in several parts of the globe.

8. Zydus Cadila Healthcare : Zydus Cadila is a pioneer Pharmaceutical company, it is one of the oldest players in the Indian formulations market and has gone onto becoming India's prominent pharmaceutical manufacturer. The company's Innovation program is led by 1300 researchers across 19 sites, working on distinguished medicines. The team is exploring various ideas and also principles from NCEs to vaccines, biosimilars, and specific niche technologies. In India, the company's research facilities are in Gujarat, Maharashtra, Goa, Himachal Pradesh and Sikkim. They also have research units in the US and Brazil.





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October 2022

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

Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Polio Viruses

Polio viruses are prototypic members of the genus Enterovirus. Polio virus is a small and simple virus. It is composed of a shell, or capsid, made of protein and RNA as genome.

24th October World Polio Day

Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted from person-to-person mainly through the faecal oral route or less frequently by contaminated water or food and multiplies in the intestine from where it can enter the nervous system and can cause paralysis.

The World Polio Day was established by Rotary International over a decade ago to commemorate the birth of Jonas Salk, who led the first team to develop a vaccine against poliomyelitis. India received polio free certification along with the entire South-East Asia Region on 27th March 2014 by WHO.



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2. Determination of biomass in soil through PLFA (Phospholipid Fatty Acid) analysis
3. Determination of abundance of AMF (arbuscular mycorrhizal fungi) through NLFA (Neutral Lipid Fatty Acids) analysis.
4. Polyphasic report, (FAME combined with sequencing) (Confirmatory)

Other services include

- Soil analysis (Microbial and Micro-Nutrient)
- Oil Analysis
- 16Sr DNA /18Sr DNA
- 16Sr RNA/18Sr RNA Sequencing Analysis

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Birth Date	Name of Scientist	Photo	Contribution
<u>3 October</u> 1877	Frederick Griffith		Discovery of Pneumococcal Transformation.
<u>15 October</u> 1931	A. P. J. Abdul Kalam		Known as the 'Missile Man of India'.
<u>24 October</u> 1632	Antonie Van Leeuwenhoek		Known as the Father of Microbiology and he is remembered for developing Microscope.
<u>28 October</u> 1911	Ephraim Anderson		Best known for his work highlighting the human health dangers of drug resistant bacteria created by use of antibiotics.
<u>28 October</u> 1864	Dmitri Ivanovsky		Discovery of viruses, TMV (Tobacco Mosaic Virus).
<u>30 October</u> 1909	Homi J. Bhabha		Father of the Indian Nuclear Programme.

BEST PHARMACEUTICAL INDUSTRIES IN INDIA

9. Abbott India : Abbott India Limited is a public listed company and a subsidiary of Abbott Laboratories United States. The firm manufactures pharmaceutical drugs and provides therapeutics including Women's Health, Neurology, Thyroid, Gastroenterology, Anti-Infectives, Diabetes, Urology, Pain management, Vitamins, etc. To produce high quality and high volume formulations, they have a plant at Verna, Goa. Abbott Laboratories has brought breakthrough products in branded generic pharmaceuticals, diagnostics, medical devices and nutrition.

10. Alkem Laboratories : Alkem Laboratories markets top-quality branded generics, generic medications, APIs, as well as nutraceuticals in India and more than 50 countries around the world. The company is rated among the top 10 pharma firms in India in terms of domestic sales for the past 15 years, with a detailed portfolio of over 750 brands covering all the major therapeutic sectors as well as a durable pan-India sales and distribution network. For more than ten years, Alkem Laboratories has been ranked as the No. 1 Anti-infective company in India. They attribute among the leading pharma companies in the therapeutic segments of Gastro-intestinal, Vitamins/Minerals/Nutrients and pain management.

11. Glenmark Pharmaceuticals Ltd : Glenmark Pharmaceuticals is a global pharmaceutical company. The Company is engaged in the development of new chemical entities (NCEs) and new biological entities (NBEs). The company has several molecules in various stages of preclinical and clinical development and is primarily focused in the areas of Oncology, Respiratory and Dermatology.

12. Intas Pharmaceuticals Ltd. : This pharma company in India has its R&D department in the field of chronic disease of oncology (cancer), rheumatology, auto-immune, nephrology, ophthalmology and plasma-derived product-based therapies. This pharmaceutical company has its headquarters in Ahmedabad and is one of the leading biosimilar product manufacturers in Asia. Intas has 14 formulation manufacturing facilities, of which seven are located in India and the rest in the UK. and Mexico. It is the seventh largest company in India and the company saw an increase in revenue by 29.84% in 2017.

13. Piramal Enterprises Ltd. : It is one of the popular companies for Pharmaceuticals in India. It was founded in 1984 and was ac-quired by Ajay Piramal in the early 1980s. The global business conglomerate deals with healthcare, life sciences, drug discovery, healthcare etc. The company deals with pharma, critical care, consumer products, phytomedicine, and imaging. Piramal Enterprises Limited is the 12th largest company in India.



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November 2022

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 🎂			



Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

Pneumonia

Diplococcus pneumoniae, or pneumococcus, is a spherical bacteria lancet-shaped, Gram-positive, facultative anaerobic bacteria, having hemolytic ability and belongs to genus diplococcus. It has 100 known serotypes.

12th November World Pneumonia Day

Pneumococcal disease is caused by a common type of bacteria, *Diplococcus pneumoniae* (*S. pneumoniae*) or pneumococcus, which can attack different parts of the body. The bacteria can spread through droplets in the air when a person with the infection coughs or sneezes. Pneumonia is an infectious respiratory disease that affects the lungs and is associated with high mortality, especially among children under five and the elderly.

World Pneumonia Day (12th November) provides an annual forum for the world to stand together and demand action in the fight against pneumonia. More than 100 organizations representing the interests of children joined forces as the Global Coalition against Child Pneumonia to hold the first World Pneumonia Day on 2nd Nov. 2009.

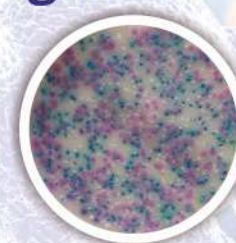
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Birthday	Name of Scientist	Photo	Contribution
<u>24 November</u> 1864	Raymond Sabouraud		Development of sabouraud agar with low pH and high concentration of sugar for isolation of fungi and introduced radiological treatment against ringworm of scalp.
<u>30 November</u> 1858	Jagadish Chandra Bose		Pioneer of Radio & Microwave optics, made significant contributions to plant science and laid the foundations of experimental science in the India.

Microbial Culture Collection Centres

IMTECH-MTCC	Institute of Microbial Technology	Chandigarh
NCIM	National Collection of Industrial Microorganism	Pune
ABRC	Anaerobic Bacterial Resource Centre	Hyderabad
CCDMBI	Culture Collection, Department of Microbiology	Kolkata
GCC	Global Collection of Cyanobacteria	Varanasi
GFCC	Goa University Fungus Culture Collection and Research Unit	Goa
ITCC	Indian Type Culture Collection IARI	New Delhi
NCDC	National Collection of Dairy Cultures	Karnal
NFCCI	National Fungal Culture Collection of India	Pune
BAB	Bank A Bug	Gandhinagar
VBCCA	Vishva-Bharati Culture Collection of Algae	Shantiniketan, W.B.

CAREER PROSPECTS OF MICROBIOLOGIST

Microbiologists are required for diverse jobs. The following are some of the job profiles that Microbiologists can take up after obtaining the necessary skills.

Professor/Lecturer : In Microbiology/Biochemistry/Biotechnology/Clinical Microbiology/Fermentation Microbiology/Industrial Biotechnology etc.

Research and Development : These microbiologists engage in research activities associated with microorganisms, causes for the diseases, figuring out solutions or treatment for diseases etc. They assist higher-level researchers in varied activities in the field of science.

Biomedical Scientist : Biomedical Scientists carry out a wide range of scientific and laboratory tests to support the diagnosis and treatment of diseases.

Food Technologist : The major responsibility of the food technologist is to ensure safe and efficient development, manufacture and modification of food products and processes.

Pharmacologist : Usually, pharmacologists specialise in a specific field of research such as pharmacokinetics, toxicology etc. Micro-biologists can choose pharmacology as one of the subjects at the Ph.D. level.

Clinical & Veterinary Microbiologist : Veterinary microbiologists are veterinarians who specialize in the study of microorganisms that cause infectious diseases to animals.

Industrial Microbiologist : These microbiologists apply engineering and scientific principles to the processing of materials by microorganisms, plant and animal cells to create useful products or processes.

Environmental Microbiologist : The major responsibility of the environmental microbiologist is to study the microorganisms that exist in artificial environments such as bioreactors.

Virologist : These infectious disease specialists are highly skilled medical experts who manage the diagnosis, treatment, and prevention of infectious diseases such as hepatitis C, HIV and Ebola.

Mycologist : Study the properties of fungi such as yeast and mold. They also study the ways fungi can be used to benefit society.



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December 2022

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	24
25	26	27 	28 	29	30	31

Birth Anniversary of Eminent Microbiologist/Scientist given behind the page

HIV

The human immunodeficiency viruses (HIV) are the species of Lentivirus (a sub group of retro virus) that infect humans. HIV (Human Immunodeficiency Virus) is composed of two strands of RNA, 15 types of viral proteins and a few proteins from the last host cell it infected, all surrounded by a lipid bilayer membrane.

1st December World AIDS Day

Acquired immunodeficiency syndrome (AIDS) is a chronic, potentially life-threatening condition caused by the human immunodeficiency virus (HIV). HIV can be transmitted via the exchange of a variety of body fluids from infected people, such as blood, breast milk, semen and vaginal secretions. HIV can be also transmitted from a mother to her child during pregnancy and delivery.

World AIDS vaccine day is observed each year on 18th May across the globe. The day is commemorated to recognize the efforts of thousands of scientists and health professionals who are tirelessly working to find a vaccine against the Human immunodeficiency virus (HIV). It is aimed at increasing awareness regarding the need for HIV vaccines to prevent the spread of HIV infection and AIDS.



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- Soil analysis (Microbial and Micro-Nutrient)
- Oil Analysis
- 16Sr DNA /18Sr DNA
- 16Sr RNA/18Sr RNA Sequencing Analysis

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Email : info@royalgroupinfo.com | Mob: +91-9246810242 | Web : www.royalgroupinfo.com







Prepared by : Department of Microbiology, HVHP Institute of Post Graduate Studies and Research, Kadi, Gujarat, | www.hvpgkradi.ac.in
Concept by : Dr. Sanjeev Patankar (Maharashtra), Dr. A. Archana (New Delhi), Dr. Shanmugam (Tamilnadu)



MICROBIOLOGISTS SOCIETY, INDIA



+91 9822079782 | mbiosociety@gmail.com
http://microbiosociety.org

Birthday	Name of Scientist	Photo	Contribution
<u>11 December</u> 1843	Robert Koch		Founder of modern bacteriology and proposed Koch's Postulates, Discover of Anthrax disease.
<u>16 December</u> 1928	Bruce Ames		Ames test for testing mutagenesis of compound.
<u>27 December</u> 1822	Louis Pasteur		Known as the "Father of Modern Microbiology", "Father of Fermentation" developed vaccine for chicken cholera, anthrax and rabies, developed the process of Pasteurization.
<u>27 December</u> 1920	Robert Harding Whittaker		He was the first to propose the five kingdom taxonomic classification of the world's biota into the animalia, Plantae, Fungi, Protista and Monera in 1969.
<u>27 December</u> 1860	David Hendricks Bergey		American bacteriologist, primary author of Bergey's manual of determinative bacteriology, an invaluable taxonomic reference work.
<u>28 December</u> 1944	Kary Mullis		Invention of polymerase chain reaction.

CAREER PROSPECTS OF MICROBIOLOGISTS

Water Quality Laboratory Technician : Water quality technicians test for microbes and chemical contaminants in recreational, potable and waste water to determine if the water meets EPA.

Clinical Research Scientist : Clinical trials are experiments conducted in clinical research involving studies on human participants. Clinical researchers conduct these trials, which are designed to answer specific questions about medicine and behaviors.

Food Technologist/Scientist : Food scientists study food, using their scientific knowledge to improve safety, production, and nutrition. A food technologist is a very specific kind of food scientist. These technologists tend to work with a company in order to produce new flavors, foods and products.

Medical Technologist : Medical technologists (also known as clinical laboratory scientists) are professionals who work in the hospital laboratory, performing a wide range of tests.

Cosmetic Microbiologist : They develop skin friendly cosmetic formulations and also prevent skin infections.

Diagnostic Microbiologist : They concentrate on the laboratory analysis of clinical specimens in cases when an infectious disease is suspected.

Agricultural Microbiologist : For the development and testing of Biofertilizers, Biopesticides, PGPR and study of Plant Pathogens.

In Water Purification and Treatment Plants : For the microbiological and chemical analysis of water as well as purification of domestic waste water and industrial effluents.

In Bioremediation and Bioleaching : Bioremediation uses microorganisms to reduce pollution through the biological degradation of pollutants into non-toxic substances, hence reducing pollution. Microorganisms also help in leaching for the extraction of metals from their ores. Therefore Microbiologists are required in chemical industry to reduce the pollution. Similarly in mining industry for extraction of metals.