

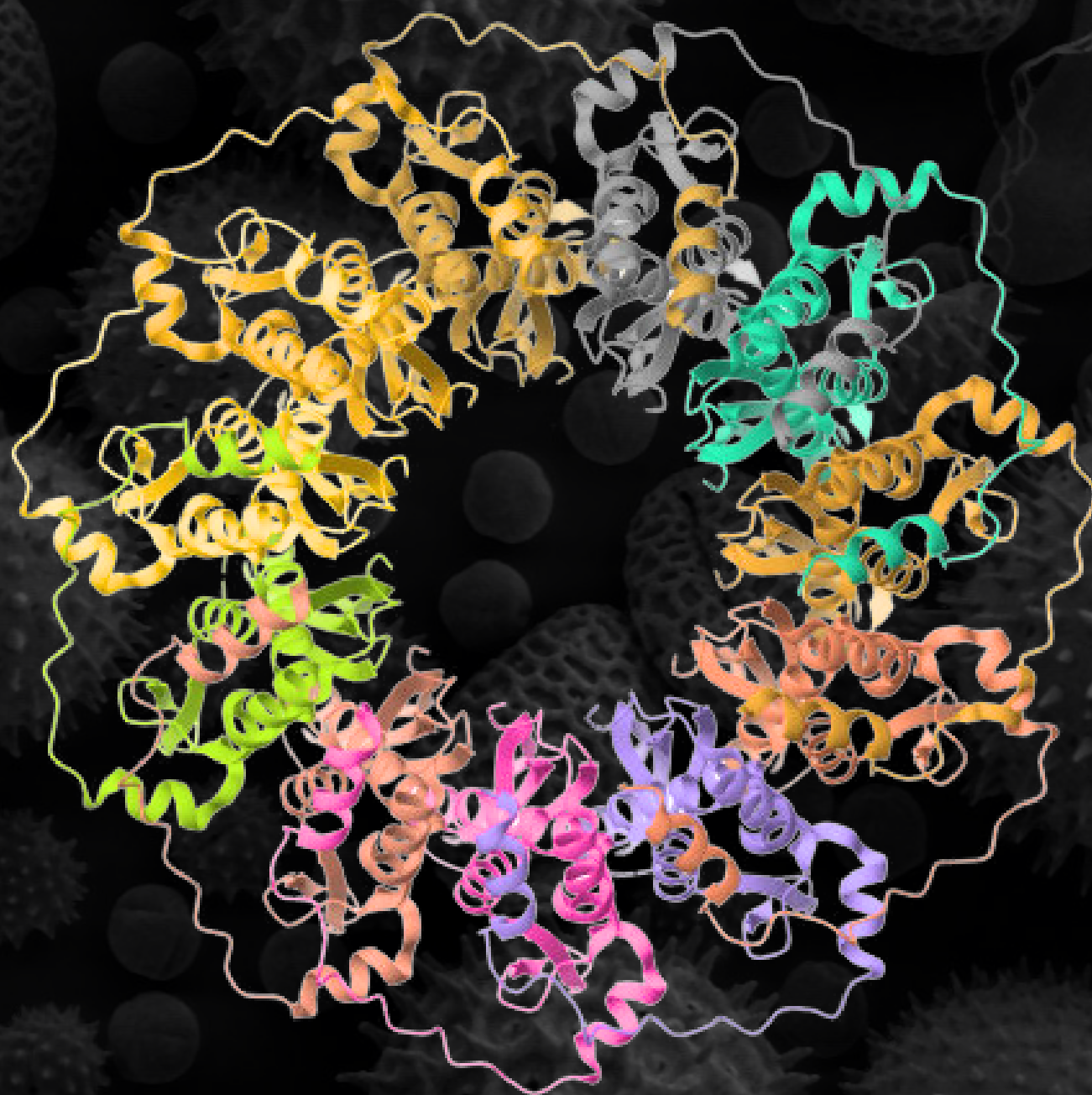


DECCAN EDUCATION SOCIETY'S
FERGUSSON COLLEGE (AUTONOMOUS), PUNE - 04

CHIASMA

THE CROSSING OVER OF BIOLOGY AND CHEMISTRY

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OUR FOUNDERS



Dr. Shobhana Bhide

She was one of the founders of the Biochemistry Division and a former HOD of Department of Chemistry at SPPU. Now superannuated, she had an illustrious career with numerous publications ranging from enzymology to isolation techniques. She played a pivotal role in the conception of the Biochemistry Division. She has guided multiple PhD students throughout her career. She has immense experience in teaching and research and continues to be a significant figure in the division.

She has been associated with Fergusson College since 2005. She was awarded the Global Best Teacher award in 2022. She completed her PhD in Biochemistry from Savitribai Phule Pune University in 2011. She is a committed practitioner and an enthusiastic facilitator of yoga and meditation and a coordinator of health and nutrition courses in the college.



Dr. Meenakshi Suresh

OUR FACULTY



Dr. Kiran Fulzele

She has been associated with Fergusson College since 2009. She did her PhD in Biochemistry from Nagpur University in 2009. She has been looking after the Biochemistry Division as a coordinator since 2010.

She has been guiding and inspiring fergussonians for the last ten years. She completed her PhD in Biochemistry from SPPU in 2015. She has been awarded meritorious fellowships like JRF and SRF. With her passion and commitment she makes every lesson an adventure.



Dr. Kirti Limgaokar

OUR FACULTY



The newest addition to our department. She has completed her PhD in basic medical science from SPPU in 2012. She also has teaching experience of over 8 years.

We extend our heartfelt gratitude to Dr. Poonam Deshpande, a dedicated and inspiring member of our biochemistry department. She has been teaching biochemistry in our college since January 2014. Currently, she is working as a coordinator for the bioinformatics course at DESPU. She completed her PhD in Biochemistry from Nagpur University in 2007.



KNOW THE SCIENTIST

-Rucha Thigale

For this inaugural article of our magazine, we thought it would be apt to tell you all about the first Indian woman to get her Ph.D. in Biochemistry – Dr. Kamala Sohonie

Kamala was born in June 1911 in the city of Indore. She was born into a highly educated family with her father Naraynrao Bhagvat and her uncle Madhavrao Bhagvat, both being chemists. They were graduates of the prestigious 'Tata Institute of Sciences' which later became the Indian Institute of Sciences in Bengaluru.

She followed the family tradition by pursuing a Bachelor of Chemistry degree from Bombay University and topped the class. She thought it would be easy to continue her further studies at IISc and applied for a research fellowship. However, her application was rejected by the then-director of the institute Prof. C.V. Raman.



Taken from Civildaily

Prof Raman who was a Nobel laureate, thought that women were not competent enough to pursue research. Kamala was not deterred so easily. She posed a 'satyagraha' outside his office which compelled Prof. Raman to grant her admission, but, with a few stipulations. She was on probation for the first year and had to get her work approved by Prof. Raman himself among other rules.

Kamala's mentor at the IISc was Sri Srinivasayya. Her work included characterization of proteins present in milk, legumes and pulses. In 1935 she published her work for the first time that involved the characterization of non-protein nitrogen of nine pulses.

It was shown that these contain simpler, easily digestible, and assimilable components, important for boosting nutrition in children. In further publications she characterized the nutrients of milk. These works paved the way for her MS thesis in 1936.

She was then invited to Cambridge University for her doctoral studies. She worked on potatoes and her findings showed that the enzyme Cytochrome C was present in all biochemical reactions within plants. She sent a short thesis describing this finding for her Ph.D. degree. Her thesis was completed in just 14 months and was just 40 pages long which was a departure from the usually long and arduous theses. Finally, she became the first Indian woman to hold a Ph.D. in a scientific discipline.



Google doodle created on her 112th birthday

Following the completion of her doctorate, she returned to India and joined the Lady Hardinge College, New Delhi as the Head of the department of Biochemistry. She married M.V. Sohoni in 1947 and moved to Mumbai. There she joined the Royal Institute of Science as a Professor in the Department of Biochemistry and worked on the nutritional aspects of legumes.

Dr. Sohoni worked on 'Neera', a drink made from palm extract suggested by the First Indian President, Dr. Rajendra Prasad. Her studies established that Neera was a cheap and reliable source of Vitamin C for poor tribals. The tribal women and malnourished children benefitted greatly from the introduction of Neera in their diet. She received the President's award for her work and later became Director of the Institute of Science, Mumbai, an honour which was delayed for several years due to the gender bias prevalent in the scientific community.

RECENT ADVANCES IN BIOCHEMISTRY

-Mrugakshi Kulkarni

Regulators place a high priority on chemical safety, and companies must adhere to strict standards in order to receive approval for new compounds. However, in addition to being costly and time-consuming, the present licensing process—which entails testing drugs on rats—also raises ethical questions.



Taken from Google Images

Grouping and read-across is an EU-approved method that permits new chemicals that share structural similarities with other substances that have already received clearance to be allowed for sale by copying the same toxicological data to them. However, the European Chemicals Agency (ECHA) rejects the majority of submissions using this flawed method. However, a new approach based on metabolomics that was published in the Archives of Toxicology may hold the secret to improving the efficacy of the read-across technique.

Six international labs used metabolomics to test chemicals on rats and determine whether it was a more effective method. The labs all arrived at the same conclusion, proving the method's high effectiveness. The use of metabolomics could dramatically reduce the number of rats required for testing and make the process more efficient and ethical.

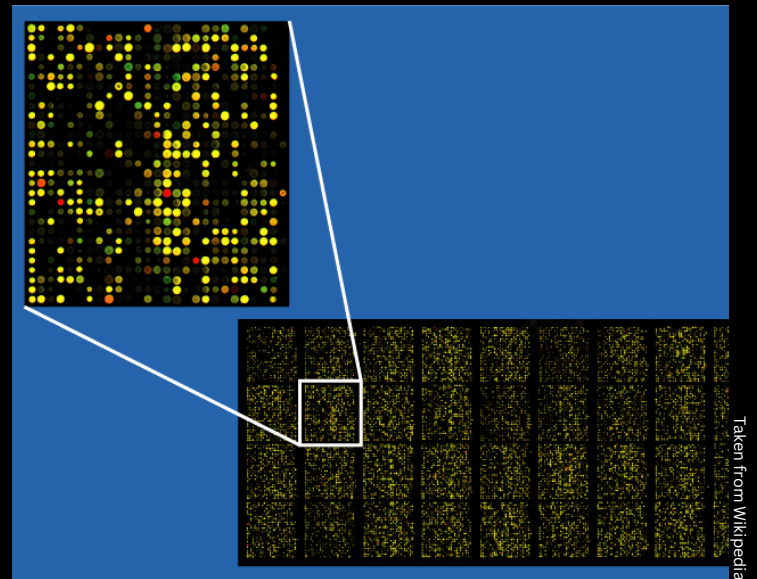
CURRENT STATE OF THE BIOCHEM INDUSTRY

-Gaurav Mhapralkar

The current focus in the industry is on being fast, having high throughput, and deeper coverage. Processing a large number of samples in the shortest time possible is the goal every company is working towards. This is evident in the high number of startups that have flared up in response to this challenge. It was found that most of the variability in experiments came from variable sample preparation. To solve this, everyone wants to become the one-stop solution to the wide range of steps involved in research.

Protifi, for example, has developed 'S-Trap' where they offer automatable well-plates or spin columns for use in SDS sample preparation. Their goal is streamlining & automating the sample prep (using SDS) process, with special care taken on minimal loss of sample.

MicroArrays are being developed to multiply the number of sample preparations & analyses that can be done simultaneously. These are well plates or chips able to process thousands of samples at the same time. And, the process is automated!



Cellenion has partnered with Thermo Fisher Scientific to provide complete solutions from single-cell isolations & automated sample prep to mass spectrometry-based proteomics analysis. They'll be combining technologies like proteoChip (for miniaturized sample preparation) and Orbitrap (a mass analyzer able to analyze 8,000 proteins per sample).

BIOCHEMISTRY OF TUBERCULOSIS

-Durva Khedkar

Tuberculosis (TB) affects 2 billion people, but a staggering 90-95% of individuals are unaware of their infection, largely due to the protective action of their immune system.

Mycobacterium tuberculosis, the causative agent, is a rod-shaped bacterium and is a strict aerobe, meaning it cannot survive without oxygen. The production of mycolic acid contributes to its distinctive waxy cell wall, earning them the name mycobacteria. The lipid-rich cell wall is hardy and allows them to resist weak disinfectants and survive on dry surfaces for months. TB transmission occurs through inhalation. The bacteria can bypass mucus traps, entering deep airways and alveoli, where macrophages typically digest and destroy foreign cells.

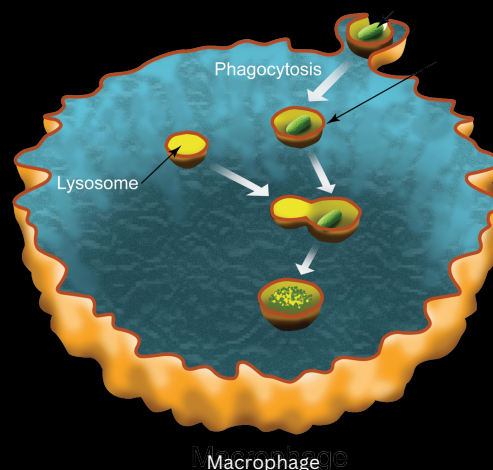


Image by Flavio Robles, Berkeley Lab Public Affairs-CSO

TB transmission occurs through inhalation. The bacteria can bypass mucus traps, entering deep airways and alveoli, where macrophages typically digest and destroy foreign cells. Macrophages recognize bacterial surface proteins on TB and attempt to phagocytize them or package them into a space called the phagosome. In most cases, the macrophage fuses the phagosome with the lysosome. Lysosomes contain hydrolytic enzymes that can break down any biochemical molecule. However, TB has a unique ability to produce a protein inhibiting the fusion of phagosome and lysosome in the macrophage, allowing the mycobacterium to not only survive but to proliferate and create a localised infection.

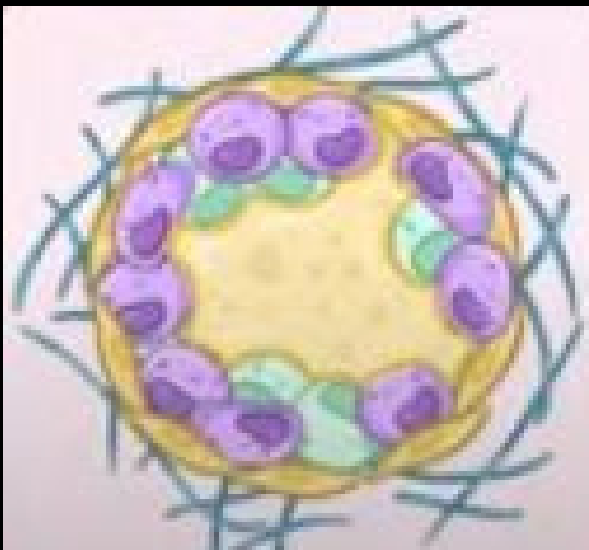


Mycobacterium tuberculosis

Image credit: U.S. Centers for Disease Control and Prevention - Medical Illustrator (CCO)

Upon initial exposure, most individuals are asymptomatic, while some experience flu-like symptoms. Three weeks post-infection, cell-mediated immunity activates, leading immune cells to surround the site of infection and form a granuloma. This containment results in caseous necrosis, causing the tissue in the middle to die.

Caseous necrosis means “cheese-like necrosis” because the dead tissue is soft, white and looks like cheese.



Taken from Google Images

In certain instances, the immune system successfully eliminates the mycobacteria. However, in others, the bacteria remain dormant or inactive within the walled-off area. If the immune system weakens due to conditions such as AIDS or ageing, TB can become active, spreading to other lung regions. Memory T-cells, having encountered the infection before, promptly release cytokines to control the new outbreak, leading to additional areas of caseous necrosis.

This time, however, cavities may form, allowing the bacteria to spread through airways or lymphatic channels to other parts of the lungs which can cause bronchopneumonia or it can spread through the vascular system to other parts of the body.

Tuberculosis poses a formidable challenge globally. Addressing this health threat demands unified efforts in research, awareness, and accessible healthcare for effective prevention and treatment.

OUR ALUMNI



Dr. Akash Saggam

He is currently a lead engineer at Persistent Systems, where he is working on integrating AI into health sciences. He has completed his PhD in Health Science, from SPPU, where he studied the Ayurveda-based botanicals as potential adjuvants. He is an epitome of warmth, enthusiasm, and possesses a heart full of kindness.

He is working as a Formulation and Analytical scientist at Sanofi mRNA center of Excellence.

He has a double masters in Biochemistry (Fergusson college) and in Biomedical nanotechnology (Bouve's college of Health sciences). He is a shining star of Fergusson with a warm personality and helping attitude.



Mr. Dipen Parande

OUR GOLD MEDALISTS

Siona Daniel (2009)



Madhurima Das (2010)



Madhuri Kshirsagar (2011)



Vandana Pawar (2012)



Neha Pai (2013)



Almas Khan (2014)



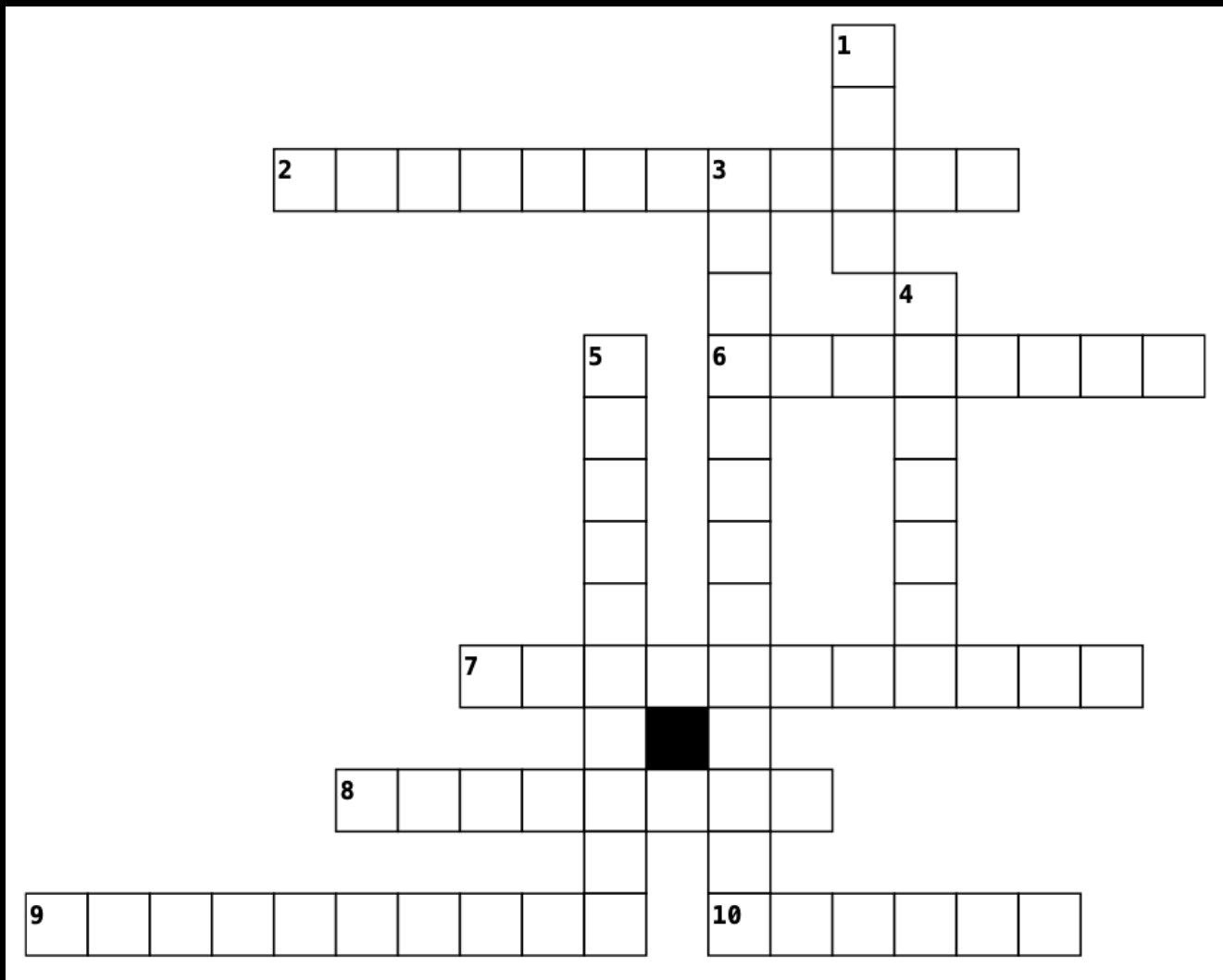
Rutuja Mardi (2015)



Prachi Erram (2017)



CROSSWORD



Across

2. Genetic disorder of chromosome 21
6. Three carbon end product of glycolysis
7. A steroid that gives rigidity to the cell membrane
8. HPV causes _____ cancer
9. A type of WBC
10. Biocatalyst

Down

1. An ion present in haemoglobin
3. Enzyme that catalyses synthesis of DNA molecules from nucleotides
4. A heterodisaccharide; Table sugar
5. Vitamin B6

“Life is truly a mystery, and it is our duty as scientists to unravel its secrets.”

-Har Gobind Khorana,
Physiology Nobel Laureate (1968)

**This is an initiative by
FC BioChem Club**

(M.Sc. Biochemistry)

Our core members are-

Durva Khedkar

Gaurav Mhapralkar

Mrugakshi Kulkarni

Rucha Thigale

Sakshi Pant