

Felix

HOPEWORK

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STUDENT NEWSLETTER OF FILIX SCHOOL OF EDUCATION



Felix Hosts the Samar Bagchi Mathematics Camp: Where Mathematics Met Humanity



The Samar Bagchi Mathematics Camp at Filix School of Education honours the luminous legacy of Dr. Samar Bagchi, eminent science educator, environmentalist, and people's rights activist, who believed that science must travel beyond privileged classrooms into every waiting corner of India. Former Director of the Birla Industrial and Technological Museum, Kolkata, he reshaped experimental science education and devoted his life to People's Science and environmental awareness. Organised by Filix in collaboration with Cheenta Academy, Nandritam, and the Purulia Police, the camp brought together students selected through the Samar Bagchi Mathematics Olympiad from both rural and urban India alike.



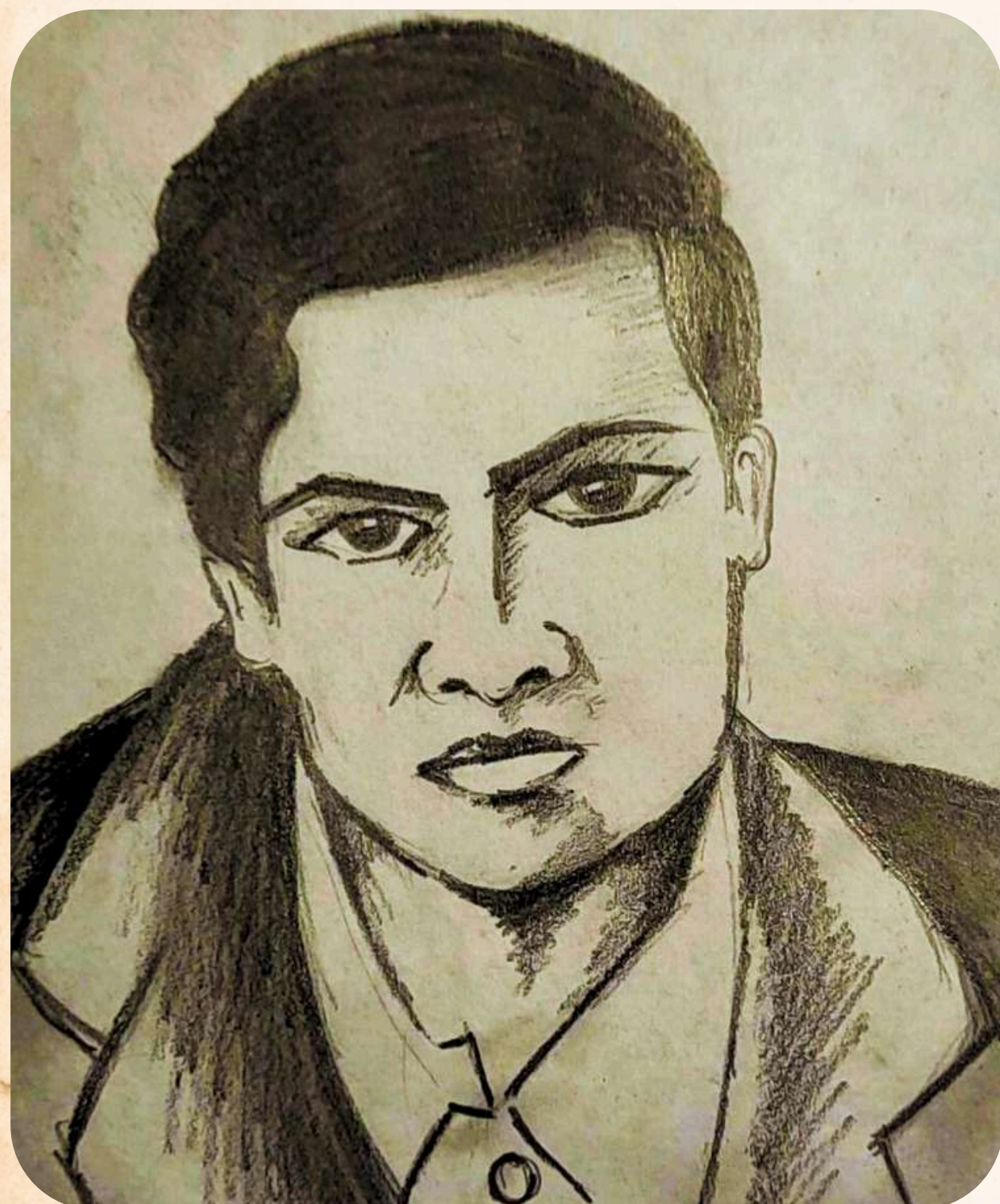
The first two days led students to an eye hospital and Supur village in Bokaro, where they collected cataract data and discovered how mathematics quietly serves human lives through observation, organisation, and analysis. A gentle visit to Mukutmanipur refreshed their spirits before the third and fourth days unfolded into deeper explorations of Number Theory, Combinatorics, the Pigeonhole Principle, and higher Geometry.

The final day concluded with an examination, certificates, and books by Dr. Ashani Dasgupta, yet the truest rewards were confidence, curiosity, and connection. At Filix, the camp was more than an event; it was a reminder that mathematics is not merely a subject, but a gentle bridge between minds and hearts.

Soumili Sengulpa, IX



Maestro of the Month



Srinivasa Ramanujan

Srinivasa Ramanujan was not merely a mathematician. He was a walking miracle with a notebook. Born into a modest family in a small town in Tamil Nadu, he treated numbers the way poets treat words, with instinct, courage and a touch of divine mischief. While most people used mathematics to solve problems, Ramanujan used it to create them, then solved them anyway.

With little formal training but extraordinary imagination, he sent his original equations to Cambridge, where they astonished G. H. Hardy and subtly altered the direction of modern mathematics. Ramanujan proved that genius requires neither privilege nor permission, only an unshakeable devotion to thought.

Illustrated by Ayushi Banerjee, VI

Did You Know?



AN INTELLECTUAL DETOUR

He was a self taught prodigy who failed most non maths subjects, yet built revolutionary theories from a borrowed book and a stubborn love for numbers.

The taxi number 1729 became immortal through him, the smallest number expressible as the sum of two cubes in two different ways, now known as the Hardy Ramanujan number.

He believed many of his ideas were revealed to him by the goddess Namagiri, a form of Goddess Mahalakshmi, and insisted that an equation mattered only if it expressed a thought of God.

His first letter to Cambridge was so advanced that Hardy briefly suspected a prank, before recognising genius written in remarkably economical handwriting.

His life inspired the film *The Man Who Knew Infinity*, directed by Matthew Brown, portraying his journey from Madras to Cambridge and his partnership with G. H. Hardy, which reshaped modern mathematics.

1. I am infinite, irrational and quietly present in circles, waves and galaxies .

You can never finish writing me, yet you use me every time you draw a curve. Who am I?

2. Ramanujan meets Schrödinger's cat and says, "Your existence depends on observation." The cat replies, "So does your proof." What shared idea are they hinting at?

Creative Corner



THE LIFE OF A BANYAN TREE



*Bronze Award-winning entry from
the Queen's Commonwealth Essay
Competition 2025,
authored by
Umesh Chandra Kumbhakar,
Grade IX*



The sun rising in the east and a new life emerges out of the hilly soil, at the center of our environment. The breeze is cool and moisty around, welcoming the life with its warm and calm gesture. It is the heart of Purulia, the Great Banyan Tree. The Banyans being the National tree of India, makes us fill our hearts with pride. Since my childhood, I have been seeing hundreds of Banyans surrounding our colony with aerial roots hanging, all huge and old. This one is also going to be like all.

The Monsoon enters Purulia.

As the moisty wind blows through Purulia, it brings rain with it. All the trees shaking and dancing with the cool wind and all tiny-insignificant creatures ran to escape. The first rain of the year starts and it is a heavy downfall. The small tree discovers a new world experiencing many new things. It enjoys its first monsoon and it spreads its first green leaves. The monsoon nurtures the tiny emerging lives and gives a new life to the thirsty grown trees.

The environment becomes beautiful, fresh and green. The Ayodhya Hills attracts every person with its natural springs and dense forests around it, making it a tourist spot for various activities like hiking and camping.

All the farmers are seen dancing in the paddy fields as the lands are filled with rainwater and the seedlings of paddy comes out on the ploughed soil. Under the hills, the fishers are seen fishing in the rivers along with their beautifully designed boats.

What a nice experience the newly born plant gets!

The last day of Monsoon.

As the monsoon comes to its end, it rained cats and dogs. The little Banyan has grown up and has learnt to face challenges in life. The monsoon has been a life lesson for it and it embraces the rain. The smell of Bhadu festival is in the air and the women are seen worshipping Bhadu Devi. It is often associated with singing Bhadu songs and cultural practices.

Autumn enters Purulia.

All the trees are dry and the leaves have become yellow and crinkled, excluding the newly grown-up tree at the center of our environment. The other trees have become quite aged, but the newly grown tree is now full of lush-green leaves, nurturing itself and providing fresh air to us. And, there the hot wind blows out, taking all the weak leaves of the old trees, including the Great Banyans and Sal who continue to inspire the young life.

The freezing winter arrives Purulia.

As the autumn moves away, winter enters Purulia from the other side. The first day of winter is little colder, but as days pass away it becomes severely cold. The Banyan Tree has become an adult and matured. It has risen up and it has spread its bushes and branches all over the area. Now, it is standing face to face of the deadly winter, where all the creatures have become silent and all the human beings are in their homes.

Previously, he had learnt many things, but now he tries to be resilient. Many.

Last of the winter.

After striving a lot in the winter, now it is the end of the winter. The paddy is now being harvested and this year the production has significantly risen. The smell of Makar Sankranti is spread all around. On this day, the farmers are celebrating their production and are very glad to see them. At the dawn of the day, many people are seen dipping in the holy water of Damodar as an age-old ritual. The fried smell of different types of pulses delights every heart, which are offered to goddess Tusu. There it does not stop. After some days, The Saraswati Puja comes, the festival of knowledge, particularly for the students. The students are seen worshipping Maa Saraswati for seeking blessing from the goddess of knowledge, so that they become good learners and human beings in their life. After the puja ends, the idols of Maa Saraswati are immersed in river. From there, a new life starts.

Spring arrives Purulia.

The weather is very pleasant and all the creature enjoys it. The Ayodhya Hills is full of red blooming Palash flowers, making the place a vibrant landscape of red mixed with yellow. The Palash is the natural beauty of Purulia, due to which Purulia is also known as the "Land of Palash". The bright Palash flowers enhance the natural beauty of Purulia and attracts every nature lover and tourists towards this place. Really, the place seems heaven. The Banyan also feels proud, taking birth on such a beautiful land full of Palash flowers. The Banyan also blooms its flowers which will later turn into fruits. Really, the Palash flowers has inspired it. The air is filled with the fragrance of Palash and the bees are sucking the sweet nectar of the Palash flowers. Also, Palash is seen being celebrated by people with great enthusiasm and joy.

They sing many folk songs and dance to celebrate this beautiful time of the year. Palash is not just a flower blooming in Purulia, it is the emotion of Purulia. It makes the community dance in the village courtyards under the Mahua trees, traditionally known as The Chhau dance. The people become intoxicated with the fresh smell of the season. The Banyan also enjoys the season as the human beings do. Hence, the Banyan tree has grown up in a really beautiful hill.

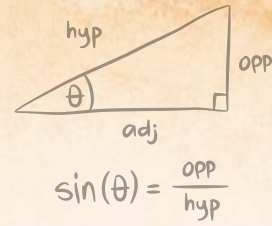
The intense summer arrives Purulia.

Spring moves away making the land colorful. From there, the Kal Baishaki blows making the pleasant environment into a ball of fire. The sun burns with its extreme power delivering immense sunlight and heat in Purulia. The air is very dry like sand. The Banyan has started bearing reddish fruits at the beginning of the summer. In this extreme heat of summer, going outdoors becomes very difficult and a risk of tanning. Most of the day, people are seen staying indoors. While the Banyan continues to bear the deadly heat all the days with bravery and courage. Not only it lives, but also it provides relief, shelter, shed and cool air to many creatures like birds, squirrels and many more.

The birds are seen eating the tasty fruits of the Banyan joyfully. Not only them, but also humans seek the dense Banyan for shed during the daytime and for timepass during the night. This tree stands as strong as a brick and not like a tangle glass which seems to break easily. Really, how resilient and selfless the tree has been! Nowadays, it becomes an inspiration for the human beings to strengthen themselves and face any challenges with courage and determination.

And there comes the Charak Puja of Purulia, as a village healer. All the people are seen celebrating the start of Bengali New Year and praying God for bringing prosperity in the coming year. Also known as Gajan, this festival includes piercing of body with metal rods and walking on red-hot coals not with any fear but with dedication towards Lord Shiva. The chanting of mantras can be heard around the temples. Finally, after the worshipping, hook swinging is performed in which devotees swing in Charak hanging with metal hooks. The people believe that God will surely provide relief to them by doing the traditional ritual. The Banyan enjoys listening to folk songs and watching Chhau dancers spinning tales barefooted with traditional masks, under it. The Chhau is not just martial arts; it is a storytelling of ancient Purulia with swords and feathers. Rather, it is also a way of calling the rains to cool down the area. The rituals held in Purulia are related to some significant topic in some way or the other. Finally, life in Purulia continues in this way and the Banyan tree gets an immersive and vibrant experience living over here.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



MATH AROUND ME

$$\lim_{x \rightarrow 0} f(x)$$

$$\frac{dy}{dx}$$

Math lives quietly in my day,
In clocks that tick and bills I pay.
I count my steps, I check the time,
I measure words, I space each line.

$$\sqrt{x}$$

Numbers add, subtract and grow,
Helping me learn what I should know.

$$\int_b^a f(x) dx$$

Fractions teach me how to share,
Decimals show how much is there.

$$\int (x \pm a^2)^c$$

Lines and angles shape the land,
Drawn by a careful, thinking hand.

$$y - f(a) = m(x - a)$$

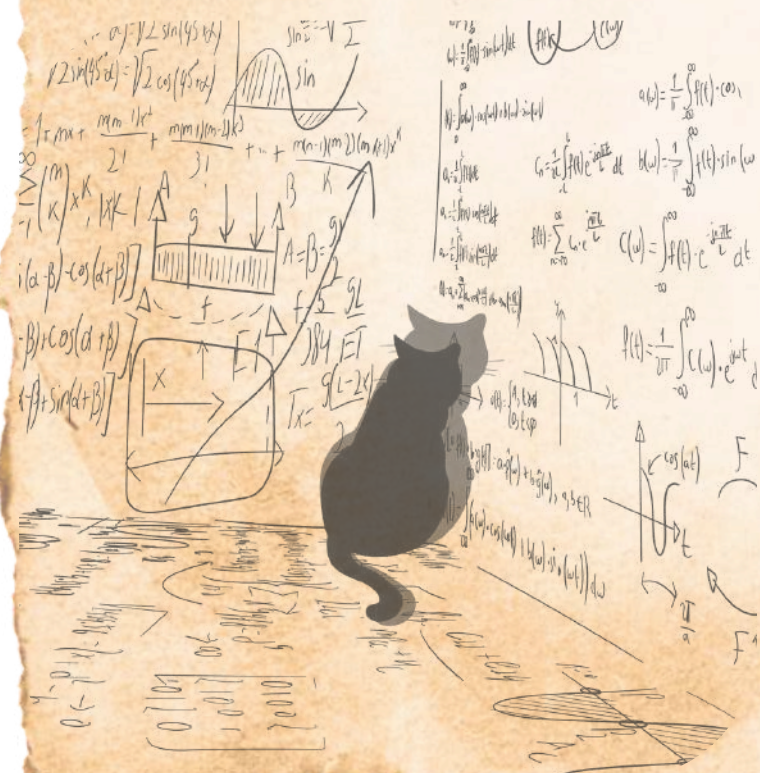
Circles roll and never end,
Pi's a number I can't comprehend.

Math is logic, clear and true,
It trains my mind in all I do.



Not just sums on paper spun,

But sense in life and space between.



$$\sin^2 A + \cos^2 A = 1$$

Nisha Mandal
Grade VII

Of Microbes and Minds : In Conversation with Prof. Forest Rohwer



Professor Forest Rohwer is a microbial ecologist and Professor of Biology at San Diego State University, whose work has reshaped how we perceive the smallest architects of life. A pioneer of environmental shotgun metagenomics, he has helped the scientific world recognise that life's most decisive conversations often occur far below the reach of ordinary sight. In his research, viruses, microbes, and coral reefs are not footnotes to biology, but its true protagonists. Raised in Idaho, Dr. Rohwer developed an early fascination with aquatic worlds and has spent decades exploring microbial life in tropical seas, where his studies on coral holobionts and microbialisation have transformed our understanding of reef health. Yet, for all his scientific distinction, he speaks not like a distant authority, but like a delighted explorer who has never lost the pleasure of asking, "And what happens if we look a little closer?" What makes Prof. Rohwer especially compelling is not only what he knows, but how graciously he shares it. He treats science not as a guarded territory for experts, but as an open landscape for anyone willing to wander curiously. In his intellectual universe, biology does not compete with history, chemistry, or philosophy; it converses with them.

Listening to Prof. Rohwer leaves one with the quiet certainty that brilliance need not be solemn. It can dwell deeply on a single idea, and then break into laughter the very next moment.

1. How did your association with Filix begin, and what interested you most about working with a school community in this field?

Prof. Rohwer : People from Filix visited my university and gave a talk. They were looking for ideas for curriculum, and that is really how our association began. What interested me most was that, for a long time, phage research has been taught mainly at higher levels, mostly in colleges and universities. Very little of it had reached schools in a structured way.

So the idea of developing this understanding all the way through the curriculum is what truly began our journey together.

2. As this is your first visit to Filix, what caught your eye at once? Did anything gently hint that our students might be your sort of inquisitive minds?

Prof. Rohwer : The first thing that caught my eye was the Design Thinking projects. That was honestly the very first thing I noticed. You were practising how to come up with a problem, which is exactly what an inquisitive design process should look like. That became my first real introduction to Filix, the very first classroom I walked into.

3. Our biology team spent almost a month in your lab at SDSU while developing India's first school-level microbiology course. From your perspective, what was the most exciting part of that collaboration?

Prof. Rohwer : It made us think seriously about what the curriculum might really look like, because you can carry an idea in your head, but it does not always turn out the same way when you begin to build it.

It also showed a great deal of commitment to the project, because it is a big thing to get on an airplane and come all the way to California just to learn and work. That effort truly mattered to me.

Ankita worked very hard and tried to learn everything we were talking about. She worked constantly while she was there.

4. Your work often carries you from coral reefs to classrooms. What keeps you so charmed by the microscopic world when most of it refuses to stay still long enough to pose for photographs?

Prof. Rohwer : Yes, that is pretty true, it kind of moves all the time. (laughs) The thing I like most about the microscopic world is that, in many ways, almost everything

is happening there. Yet it is a little like gravity, you cannot really see it, so you are always trying to measure it. And if you think about it, even most biologists do not really consider microbiology very much, even though most of what is happening is microbiology.

5. You pioneered the first shotgun metagenome, a moment that transformed how we study life we cannot even see. Looking back, did you realise at the time that you were rewriting the rulebook, or did it feel like a quiet idea that simply refused to stay small?

Prof. Rohwer : Yeah, more than the latter. At the time, I was mostly learning; it all seemed logical. We were working on one phage, and it was really hard to get it sequenced. I invented a technique to handle that phage, and then realised, “Oh, I could apply this to an entire environment.” It was one day after another; the real revelation came when we started seeing just how much diversity there was. I honestly didn’t expect it to be that vast, now estimated at around 100 billion phages on the planet. That sheer scale was the truly shocking moment for me.

6. What new frontiers in microbiology excite you most at the moment, especially those that school-level learners may soon have the chance to explore?

Prof. Rohwer : Right now in biology, what excites me most is genetic engineering, how it applies to disease and environmental health, and the fact that high school students are beginning to explore it. Beyond that, astrophysics is really exciting, as our understanding of the universe is changing so rapidly.

7. Many students here dream of studying science abroad. What simple habits can they begin now that will prepare them well for university laboratories later?

Prof. Rohwer : That’s a very good question. To prepare for university, students should engage in extracurriculars related to their interests. If it’s music, play in a band; if science, get research experience; if medicine, help out at a clinic. These experiences are becoming increasingly important as admissions have gotten very competitive

8. Many of us look up to scientists as role models. Who were your own early inspirations ?

Prof. Rohwer : I was exposed to science early, as both my parents were scientists. Beyond that, I had some truly remarkable teachers. I think it’s the same everywhere. Good teachers are the ones who ignite your excitement. I had a great PhD advisor, she was a wonderful teacher of immunology, who guided me. The biggest influence, though, was the evolutionary biologist Thomas Gould. His writing, like Feynman’s, made complex ideas entirely understandable. That kind of clarity and depth is incredibly powerful.

9. You studied biology, chemistry, and history, a rather unexpected trio, especially today when students often feel the need to choose a single specialised path. How has this broader foundation shaped your approach as a researcher?

Prof. Rohwer : I think it is important not to specialise too early, even though people often encourage it. The world now values flexibility, and being too specialised can sometimes leave you stuck when fields change or disappear.

One skill I always encourage is writing. It is probably one of the best skills you can develop. If you can communicate well, it helps in every field.

History matters because it reminds you that change has always been part of the world. That perspective is both comforting and grounding.

As for science, chemistry and physics give you strong foundations, while biology is complex in a different way. Biology requires much more memorisation and has softer rules, more like psychology or sociology. You simply have to know a great deal of it.

10. What are your favourite books that you think everyone should read at least once, science or otherwise?

Prof. Rohwer : I read a great deal. Among the classics, *Moby-Dick* has stayed with me more than any other book.

I also loved *Ivanhoe* and *The Swiss Family Robinson*.

As I grew older, *1984* by Orwell really settled into my mind.

After that, science fiction became more important to me.

The Forever War is probably my favourite science fiction novel. It is simply a wonderful book.

In more modern writing, *Accelerando* and Margaret Atwood’s *The Handmaid’s Tale* stand out. Her writing is extraordinary.

For historical fiction, I love Colleen McCullough’s

First Man in Rome series. There is even a line, “even Caesar had to go home to his wife” (laughs).

11. In your experience, what strengths do you feel Indian learners bring to science that the world should notice a little more?

Prof. Rohwer : Indian scientists are already well known, of course, but what perhaps deserves even more attention is the depth of India’s mathematical tradition. From ancient times to the present day, India has produced remarkable mathematicians, and that is truly impressive.

In science, we rely on experiments, but we also need models, and to understand those models, we need mathematics. A great deal of the mathematics we use today, in some way, comes from India. That intellectual contribution is enormous.

12. If you could leave one thought on our lab wall for every future Filix microbiologist, what would it be?

Prof. Rohwer : That the future is deeply biological. After the age of computers and robotics, we are moving into a time when we will use those tools to shape biology itself. Instead of building things, we will grow them. That future will be driven by our understanding of biology, especially microbiology, because it offers the greatest control and diversity. And within that, phages will matter more than we yet imagine. We are moving towards a biophilic future.

Interviewed by Ankita Mukhopadhyay, XI

