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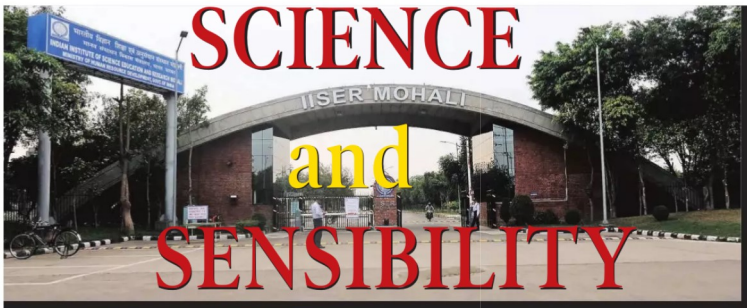
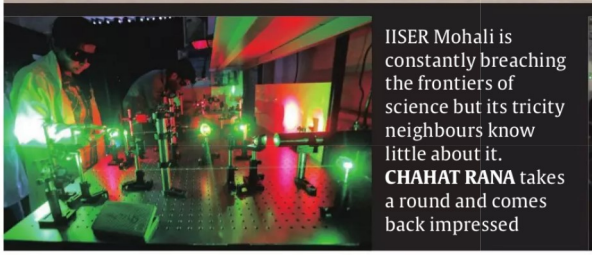
# SCIENCE and SENSIBILITY




## PROF GETS S.T.A.R.S

GROWING up, Dr. Kaushik Chattopadhyay was sure he would become a scientist, but didn't really know how. "As a child I was inspired by the character of the inventor Professor Shonku, a character from a Satyajit Ray novel. I just knew I wanted to be like him," says Chattopadhyay. Now, as a successful scientist, Chattopadhyay has been awarded a S.T.A.R.S. grant for his work in studying pathogenesis mechanisms of bacterial cells and our immune response to such bacterial invasions. "Bacteria in our body release pore forming toxins which attack our cells by puncturing their membrane. However, at the same time our own body produces pore forming proteins which attack bacteria cells, viral infected cells and even tumor cells through the same puncturing process. Our study examines the pathways used to create this balance in our body," explains Chattopadhyay. The scientist believes his work will allow for greater understanding of immune response in our body, leading to further study in enhanced fortification of our immune system.

*Express photos by Jasbir Malhi*



IISER Mohali is constantly breaching the frontiers of science but its tricity neighbours know little about it. **CHAHAT RANA** takes a round and comes back impressed

SEATED at a pristine edge of the otherwise rapidly developing city of Mohali, the Indian Institute of Science Education and Research (IISER) has made its mark as a source of globally recognised scientific research and a hub of knowledge production. Most recently, on October 28, the institute secured its place as the institute with the second most number of S.T.A.R.S awardees after IISC Bangalore. S.T.A.R.S or the Scheme for Transformation and Advanced Research in Sciences, is a flagship project of the Ministry of Human Resources and Development to identify and provide grants to researchers excelling in various fields of science. Twelve such researchers have been handpicked from the IISER faculty and each one of them will receive funds worth Rs. 50 lakh to sustain their research.

In spite of its much-feted track record of producing such breakthroughs in research, the University remains somewhat obscure to the population residing in its tricity neighbourhood. "In the early days, when faculty members or students would ask cab drivers or autos to take them to IISER, the drivers would think we were referring to the EICHER factory manufacturing tractors!" jokes Dr. N.G. Prasad, Dean of International Affairs and Outreach at IISER.

The University, which was established in 2007, first operated from a building in Sector 26, Chandigarh. In a few years, the campus was shifted to the 125 acres of land in knowledge city, Sector 81, Mohali where it is now located. "In its early years, the campus didn't even have roads inside. It was just a vast empty plot with a few buildings," recounts Dr. Arvind, a professor of Physical sciences and the officiating director of the institute until the new director Dr. Siva Umapathy arrives on campus.

The university, with its modern brick-lined walls and vast green spaces is now fully developed, but its infrastructure is far from becoming modish or congested. Students can be seen taking walks under the foliage of trees, eating food in the outdoor cafeteria space and running, perhaps in an attempt to correct their tardiness, towards their lecture halls on broad footpaths besides empty roads. "They don't allow student to use privately owned vehicles on campus. Sometimes it can be a little inconvenient, but it is to make sure that the campus remains eco-friendly," says Reema Kothari, a PhD student from the Bio-Chemistry Department. Kothari, in the fifth year of her PhD degree, is doing her thesis on protein-lipid interactions and recently went to present her work at Washington D.C. "The institute provided half the funding so that I could attend the conference. They are quite supportive of our work," adds Kothari.

Sipping coffee in the shade of a red garden umbrella at the outdoor cafeteria, Sanad, a third-year undergraduate student of Biology tells Newsline about his experience with the teaching staff at the University. "Most of them are quite approachable. You can go to any professor from any department to consult them. If you want to do research, you can go to any lab and ask to join them. As long as the student is willing to do extra work, no one will deny them the opportunity to be a part of any research," says Sanad. Many students at the University spend their summer or winter breaks on campus, participating in research. The students are also able to make their mark in the world of science by publishing a handful of articles in international science journals before they graduate.

### AN INTERDISCIPLINARY APPROACH TO SCIENCE EDUCATION

Sanad says what truly sets the university apart from other traditional science institutes is its multi-disciplinary approach towards education. "For the first two years of our degree, we have to take subjects from all the streams, i.e. Physics, Chemistry, Math and Biology, and only at the end of the two years do we get to decide our major," he said. Dr. N.G. Prasad, Dean of International Relations and Outreach, says a multidisciplinary approach to science education allows for students to not only have a strong base in their field of choice, but also inculcate the skill to interact with and hold meaningful conversations with members of other disciplines. "This give and take between disciplines is essential for those who wish to become scientists. One cannot do science without understanding a larger context. Research is productive only when it is borne out of these multidisciplinary interactions," adds Prasad.

> "IISER ENCOURAGES ITS STUDENTS TO CONSTANTLY DO SCIENCE, RATHER THAN LEARNING SCIENCE FROM TEXTBOOKS AS THEY HAVE DONE THROUGHOUT THEIR SCHOOL EDUCATION. AS THE FACULTY AT THE INSTITUTE ARE THEMSELVES PRACTICING SCIENTISTS AND ACTIVE RESEARCHERS, THE STUDENTS HAVE EASY ACCESS TO THE WORLD OF KNOWLEDGE CREATION."
> N.G. PRASAD, Dean, IISER

Beyond its multidisciplinary approach towards science education, the institute offers interdisciplinary electives in subjects such as computer science, and also mandates that students take up a few humanities electives. "Here, students get something very close to a liberal arts education, which is not one something one can say about other science colleges in India," says Dr Anu Sabhlok, who heads the Department of Humanities and Social Sciences at the University. The Humanities department is small and relatively new, but its PhD students and staff have already garnered various achievements, fellowships and awards. Six PhD students from the Department were granted Fulbright scholarships. From the staff, Dr. Path R Chauhan, a Paleolithic archeologist specialising in Human Evolutionary studies in the Indian subcontinent, is one of the 12 S.T.A.R.S awardee at the institute. Besides its achievements, Dr Sabhlok believes that the Humanities department serves the institute by providing a more holistic education to future scientists. "We want these students to be aware of their social context. We make sure that they are sensitised about social structures of power such as caste, class and gender. In this way, their work can impact the context they reside in more fruitfully," said Dr. Sabhlok.

IISER Mohali's interdisciplinary approach is so embedded in its planning, that even the infrastructure of the University reflects it. The University does not have different buildings for different departments; instead its founders have very consciously decided to keep laboratories and classrooms of different disciplines in close proximity with each other. "In every building, there will be labs where biology experiments are conducted next to chemistry labs or physics labs or even an astronomy observatory," says Dr. Kaushik Chattopadhyay, an associate professor at the Biology Department and the Dean of Research and Development at the University. Chattopadhyay also received a S.T.A.R.S grant for his work in studying mechanisms of cell death and immuno modulatory responses.

### NURTURING FUTURE SCIENTISTS

"When I first joined the University, a colleague of mine said something quite revealing. He said if you ask all musicians how they become good musicians, they say through riyaaz, but when you ask science students what it takes to be a good scientist, they say they need to study hard. All other crafts are honed by practice; why do we believe that science is honed by a theoretical education rather than through practicing science," says N.G. Prasad. According to Prasad, IISER Mohali promotes its students to constantly do science, rather than learning science from textbooks as they have done throughout their school education. As the faculty at the institute are themselves practicing scientists and active researchers, the students have easy access to the world of knowledge creation. "Many students are already publishing articles in scientific journals. They condense very technical knowledge for the layman. They also use digital mediums such as podcasts and short films to talk about their work." Claims Prasad.

> "IN ITS EARLY YEARS, THE CAMPUS DIDN'T EVEN HAVE ROADS INSIDE. IT WAS JUST A VAST EMPTY PLOT WITH A FEW BUILDINGS"
> DR. ARVIND, Officiating Director

"One way in which I like to inculcate scientific thinking in my students from the onset, is by throwing a very challenging question at them in their first year, and not giving them the answer directly. I am there to guide them, but not solve the question for them. Slowly, they learn to work through problems themselves," says Dr. Jasjeet Singh Bagla, a professor from the department of Physical Sciences at IISER. Bagla's recent study on Atomic Mass in Star-Forming Galaxies, in partnership with scientists from the National Centre for Radio Astrophysics at Tata Institute of Fundamental Research in Pune, has been internationally acclaimed for its path-breaking results in understanding the rate of star formation using atomic mass. According the Bagla, what make IISER such a fertile ground for knowledge creation is its pool of young and bright talent and a faculty full of dedicated and active scientists.

However Bagla believes that there is more to be done in terms of funding research projects on campus. "Until about 2015, we had internal funding of about 20-25 crores annually, and now it has come down to about 5-6 crore. A good model to support research projects is to ensure internal funding when the research idea is just a seed, and then appeal to external agencies when we have a solid proposal to make. We can also liaison with local industrialists to support our work," adds Bagla. In terms of improving the quality of education at IISER, Bagla believes that the student to teacher ratio needs to be brought down to 10:1 from the current 17:1. "Only if we devote complete attention to these students will we able to make them excellent scientists."

### OUTREACH AND COMMUNITY INTERACTION

IISER Mohali has made many efforts since its establishment to work with students and teachers from across the country through summer schools, educational schemes and regular workshops. "We have students and teachers from all parts of the country almost every week," says Dr Arvind. The institute also works closely with the students and teachers of the government-run Meritorious School in Mohali. Besides this, the University orgnaises summer research programmes for Undergraduate and Masters students from all across the country. "The summer school students are invited to utilise our labs and our facilities and work on whatever they wish to. Some are so impressed by IISER that they come back here to pursue their PhDs," says a beaming Prasad.

"I think there is more that can be done in terms of reaching out to a wider demographic of students who belong to varied socio-economic backgrounds," says Dr Bagla from the Physical Sciences Department. Bagla believes that since the government has limited the number of INSPIRE fellowships awardees, a fellowship that provides funding to students from a weaker economic background to pursue higher education in the sciences, the opportunities for such students to study in these prestigious government institutes have reduced. Dr Arvind too believes that they need to take steps to mitigate the distance between institutions like IISER and talented students from underprivileged background. "We need to find a way to identify potential outside of the conventional forms of identifying bright students, which is through competitive exams and scholastic excellence," says Arvind.

The University is working towards developing a system to identify bright students from across varied socio-economic backgrounds. "Most of our current students come from English speaking, urban, middle to upper class backgrounds. We wish to identify scientific talent outside of this strata; in small vernacular schools from small villages or towns; students who have potential but lack adequate opportunities," Says Prasad. IISER is in the midst of formulating a "nurture" program to identify and tutor bright students from underprivileged backgrounds in order to make them qualified enough to pursue higher education at good science institutions. "They can apply to whatever university they wish to, and if they come back to us, all the better," says Prasad.

In terms of reaching out locally, to the population of the tricity, Prasad states that the campus is open to all. "We already have a few regulars who attend workshops and lectures at the University. Whenever there is some event on campus that we know will interest them, we inform them about it. And every year, we have an open day where anyone and everyone can come and take a tour of the campus, including the laboratories and the classroom," says Prasad. He believes that they can put more concerted effort into making the campus visible to its neighbors. But Dr. Arvind feels that efforts have to be made from outside the campus as well to breach this supposed distance. "One just has to make the effort to reach us. We have always been right here," he sums up.