

Editorial*

B Sury, Associate Editor

Indubitably, the most recent scientific news that has created a buzz equally among the scientific community, as well as the common world, is the first ever capture of the images of a super-massive black hole. Made possible through the establishment of the Event Horizon Telescope Consortium, these breathtaking images bear witness to how the wondrous imagination of the human mind is acquitted by empirical observation. Not wishing to take the sheen out of Venkatesh Ramakrishnan's and Rajaram Nithyananda's gripping narratives, we don't say anything more on this other than to note that a number of Indian scientists have also played a part in this massive programme.

The above news item takes centre stage, but this issue also features one of the most prolific modern mathematicians, Jean Bourgain, whose contributions truly spread across a large expanse of mathematical topics. Like a colossus, his work strides across disciplines with ease, solving deep problems and revealing connections hitherto unsuspected. Bourgain was awarded the Fields Medal where his citation points to the wide spectrum of his interests. An article tries to describe a few of these gems in reasonably simple language.

Rukmini Dey reports the news of Karen Uhlenbeck being awarded the Abel Prize – she is the first woman awardee. Uhlenbeck is a pioneer of geometric analysis, a subject that uses differential geometry to study solutions for differential equations, and her techniques are now in common usage. Her Abel Prize citation says that Uhlenbeck's work led to some of the most dramatic advances in mathematics in the last 40 years. She is a role model and an advocate for gender equality in science and mathematics, co-



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founding the Women and Mathematics program (WAM) in 1993 to recruit and empower women to lead in mathematics research at all stages of their academic careers.

The previous few months have witnessed the passing away of five mathematical giants: Elias Stein (1931–2018), Michael Atiyah (1929–2019), Jean Bourgain (1954–2018), Peter Swinnerton-Dyer (1927–2018), and Alan Baker (1939–2018). Some of them are also Fields Medalists. An article reports on the Fields Medals and other awards given during the International Congress of Mathematicians in Brazil last year.

In this issue, a lovely write-up by three Mongolian mathematicians discusses the beauty and power of convex polygons and demonstrates their applications in discrete and computational geometry. This article can be enjoyed by high school students, and some of the problems mentioned in the article come from the mathematical olympiads; the authors are also involved in the mathematical olympiad programme in their country.

Biman Nath has written a captivating article on the possible origin of water on Earth. Some of the traditional theories have been found to have serious loopholes. A different theory envisages the presence of a large reservoir inside the Earth itself! The starting point of this story is the discovery of a certain diamond in Brazil in 2008.

There is a prevalent criticism that in our country's science classrooms, there are not many hands-on experiments. In their article, Priya Gupta and Yukti Sharma addresses this issue and discusses endeavours to fill this void through various programs. The interesting article talks about how to nurture creativity.

A very interesting article by Anindita Bhadra is on a certain 'mutualism' practised in some parts of Africa where some species of honeyguides have developed a mutualistic relationship with honey-hunters.

In other current breakthroughs in science, neurosurgeon Edward Chang, computer scientist Gopala Anumanchipalli and PhD stu-



dent Josh Chartier have developed a way to translate brain signals into simple speech, a scientific leap that may help people who are unable to talk to communicate. They have created a 'neural decoder' that can create speech; their results have been published in the journal *Nature* last week.

With reference to Biman Nath's tantalizing narrative on the source of water on Earth, one may say:

*The presence of water – how on Earth?
Several theories regarding its birth;
Comets/asteroids the cause?
Or a reservoir in Earth's own jaws?
Keep an open mind for what it's worth.*

