

In this issue

Replacing Plastics

In dairy industry

Plastic is a wonderful packaging material. But, within almost no time after the development of the material from petrochemicals, plastic waste accumulated in soil and water and in the guts of land and marine animals. Though we realised the problem, it took some time to set laws into motion, regulating the production, sale and use of different types of plastic materials from petrochemicals.

But there is one industry where plastic of different kinds is in use in great quantities: dairy. From milk in plastic pouches to cups and tubs of ice cream, Indian homes still throw out quantities of plastic.

In a General Article in this issue, scientists from the ICAR-National Dairy Research Institute, Karnal describe many alternatives, including bioplastics based on whey and casein, produced by the dairy industry itself. The researchers argue that, with so many viable alternatives, it is possible to reduce the use of plastic in the dairy industry by half in one year – if the right vision and orientation is provided. Read on from **page 1411**.

Land Tenure System

Tigers in semi-arid habitats

In 2005, there were just 19 tigers in the Ranthambhore Tiger Reserve, situated at the junction of the Aravalli and Vindhya hill ranges. Along with the setting up of protective measures, the density of motion sensitive cameras to study the tiger population in the area also went up – to almost one camera trap per square kilometre in the area. Today, there are nearly 50 tigers. While the population is steadily growing, there are also deaths, translocations and emigrations.

What happens when a territory is thus vacated by tigers, highly territorial carnivores? Armed with the database of photographs from the camera traps, fortified by photographs from the

authorities and tourist guides, researchers confronted the problem.

How do tigers resolve their territorial problems without written laws and regulations, when humans find it difficult even with the land registration system? Read more in the Research Article on **page 1549** in this issue for insights into the land tenure system among tigers.

Optimising Neutron Production

The linear accelerator at the Variable Energy Cyclotron Centre, Kolkata is capable of producing electron beams of 50 million electron volts. When an electron beam hits a thick target, it can produce a cascade of photons which, in turn, can lead to the emission of neutrons. And these neutrons can be used for producing radionuclides for medical and industrial applications.

But what should be the target material? What is the optimum shape and size for the best output of neutrons?

Nisith Kumar Das from the Variable Energy Cyclotron Centre and S. Chatterjee from BARC tussle with the questions in a Research Article in this issue – an article that balances theory and experiments, logic and evidence, strategies and techniques. Enjoy from **page 1499**.

DNA Aptamers

For cornering COVID

Lack of rapid and dependable testing devices for SARS-CoV-2 remains the Achilles' heel in our response to the COVID-19 pandemic. Since the production of antibodies to the virus takes a few days, testing for antibodies delays diagnosis, increasing the risk of spreading the virus. Moreover, the results are not very dependable because of cross reactions and false positives. Testing for the viral RNA or the reverse transcribed DNA is time consuming and complicated. This is where DNA aptamers can come to our rescue.

The recognition, about two decades ago, that oligonucleotides can specifically bind to proteins and even to smaller molecules, has led to the development of protocols for screening and selecting DNA sequences that can bind to molecules of interest. Such a DNA aptamer to sense HIV and an RNA aptamer to sense the Hepatitis C virus have been developed. A Review Article in this issue invites researchers' attention to this exciting possibility.

Oligonucleotide aptamers are useful not only for diagnosis, but also as therapeutic agents. The review by researchers at IIT Gandhinagar identifies potential targets for developing DNA aptamers against SARS-CoV-2. Read the challenges posed to researchers on **page 1489**.

A Leader in Science

Manager, administrator, humanist

A hundred years ago, a boy from a middle class family in Kashmir grows up to finish his Bachelor's degree in Physics and Maths and then continues his Masters degree in English Literature. And then goes on to become an engineer, a scientist, a manager and administrator of large scientific teams in such institutions as IISc, HAL and ISRO, in spite of his clearly expressed socialist ideals and actions.

The Special Section in this issue focuses on Satish Dhawan who provided vision and leadership to Indian science after C. V. Raman and Homi Bhabha. Leaders in Indian science who followed pay homage to the memory of their interactions with this legendary figure, bringing out the intricate influence of an individual on the cultural history of science in India.

You cannot afford to miss the Special Section starting on **page 1417** in this issue.

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