NEWS IN BRIEF

GENE DRIVES: THE NEXT FRONTIER

It all started with scientists musing about how to efficiently wipe out an entire mosquito population. The technology that was born is powerful yet terrifying.

Gene drives are the techniques to introduce a gene into an animal population and let it spread through the population very rapidly till it is found in 100% of the organisms. How does it work? A gene drive is introduced into a particular organism, say mosquito. It is inherited by 50% of its offspring. The offspring has the gene drive on one chromosome and a normal gene on the other chromosome from its other parent. The gene drive has an inbuilt CRISPER, which cuts out the normal gene on the opposite chromosome. The cut is repaired using the drive as the template. Now both chromosomes have the gene drive. This way the gene drive rapidly spreads through the population till all have the modified gene.

In September 2018, Andrea Crisanti, a geneticist at the Imperial College London, took a caged population of Anopheles Gambia and introduced a gene drive, which disrupts a fertility gene called *doublesex*. This prevents the female mosquito from biting or laying eggs. Within 8-10 generations, the entire population had crashed. Other scientists are working on gene drives against candida, rodents *etc*. A more ambitious project is a gene drive that gets activated when any virus infects a mosquito, whether it is dengue, chikungunya, Zika or yellow fever.

Because of the inherent potential for misuse – which can have grave and unpredictable outcomes – scientists have simultaneously started building reverse drives that can undo the original drive on command. Can human beings predict the ultimate consequences of tinkering with genetics on a population scale? Ominous questions face us today. It may be best that we tread cautiously. (*Nature 9 July 2019*)

THE PERCH STUDY

The Pnemonia Etiology Research for Child Health (PERCH) study was an ambitious project to identify the causes of severe pneumonia in six resource poor countries: Bangladesh, Thailand, South Africa, The Gambia, Zambia, Mali and Kenya. They tested nasopharyngeal, urine, blood, induced sputum, lung aspirates, gastric aspirates and pleural fluid using cultures and/or polymerase chain reaction (PCR in 1-5 year olds admitted for severe pneumonia. Viruses accounted for 61.4% and bacteria for 27.3%. An interesting finding was that *M. tuberculosis* can present as acute pneumonia in 5.9%. The study showed that finding bacteria on a nasopharyngeal swab was not useful in clinical decision making, but viruses like RSV and parainfluenza found on nasopharyngeal swab were likely to be the etiological agents.

The study also found that in lower income countries, secondary bacterial infection after a viral pneumonia was common. In these settings, overcrowding and possible genetic mechanisms led to dense nasopharyngeal colonization with *S. Pnemoniae* and *H. influenzae*. Drip aspiration of these bacteria resulted in bacterial pneumonias after mucosal breach by viral infections.

The PERCH study has found that 14% of acute pneumonias are vaccine preventable. The next organism to target would be RSV that accounted for 31.1% of all pneumonias. When we go to war against childhood pneumonia, knowing who the enemy is, will make all the difference. (*Lancet 27 June 2019*)

SOCIAL ROBOTS FOR HOSPITALIZED CHILDREN

'Huggable' is a robotic teddy bear that was recently used in Boston Children's Hospital to comfort and entertain hospitalized children. A study recently published in the journal *Pediatrics* compared a tablet-based virtual Huggable and a traditional teddy bear, and found that the robotic teddy bear scored better on many points. Children who used the robotic teddy bear moved around more, interacted more, and were more emotionally connected with it. The robot can change expressions, sing and play games. This makes it a valuable addition to make the intimidating hospital environment more child-friendly.

Human-human interaction is steadily decreasing and people are looking to technology to fill the yawning gap. (*Pediatrics. 2019;144:e20181511*)

MODIFYING THE GUT MICROBIOME FOR FOOD ALLERGIES

A recent study from Boston Children's hospital has found that some bacteria in the gut are associated with food allergies and some help to reverse it. Fecal samples were collected every 4-6 months from babies who developed food allergies, and from controls who did not have food allergies. Using computational methods, researchers analyzed the difference in the gut microbiota of the two groups.

They then made a mouse model for egg allergy. Two separate consortia of five or six species of bacteria derived from the human gut that belonged to species within the *Clostridiales* or the *Bacteroidetes* could suppress food allergies in the mouse model, fully protecting the mice and keeping them resistant to egg allergy. Giving other species of bacteria did not provide protection.

A whole new way to treat food allergies appears to be just around the corner. (*Nature Medicine*. *2019; DOI: 10.1038/s41591-019-0461-z*)

GOURI RAO PASSI
gouripassi@gmail.com