

## Invasive species and economy

- Two invasive species, the American bullfrog and the brown tree snake, cost the world an estimated \$16 billion between 1986 and 2020, by causing problems ranging from crop damage to power outages,
- The brown-and-green frog, known as *Lithobates catesbeianus* and weighs over two pounds (0.9 kg), had the greatest impact in Europe,
- The brown tree snake, known as *Bungarus irregularis*, has multiplied uncontrollably on Pacific islands including Guam and the Mariana Islands, where the species was introduced by the U.S. troops in World War II,
- The snakes have, at times, been so abundant that they caused power outages by crawling on electrical equipment.
- This signals the need for investment in controlling global transport of invasive species to avoid paying for mitigation after the invasions occur.

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#### BA.5 Variant

- Compared with the earlier Omicron BA.2 subvariant, currently dominant Omicron BA.5 is linked with higher

odds of causing a second SARS-CoV-2 infection regardless of vaccination status,

- The antibodies, called P2G3 and P5C3, recognise regions of the spike protein the SARS-CoV-2 virus uses to enter cells.
- “P5C3 alone can block all SARS-CoV-2 variants that had dominated the pandemic up to Omicron BA.2.

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#### DNA Nanometer

- Topoisomerase 1-targeted chemotherapy is one of the mainstays of treating cancer cells.
- Currently-used anticancer drugs (Camptothecin, Topotecan and Irinotecan) target a molecule (the enzyme Topoisomerase 1 or Top1) involved in DNA replication.
- While DNA replication is essential to cell division replication characterises cancer.
- However, we found that cancer cells sometimes develop resistance to Topoisomerase 1-targeted chemotherapy through their intrinsic DNA repair toolbox.
- Based on these insights, a combination of molecules (the protein PRMT5, and the enzyme TDP1) can be used as potential

targets for developing novel anti-cancer therapeutics, thus taking us a step closer to developing precision medicine approaches for cancer patients.

- Top1, an enzyme in all higher eukaryotes, is essentially responsible for relaxing DNA as it coils during replication (and transcription).
- The drugs directed at this pathway disrupt the activity of Top1 by changing its shape and rendering it ineffective.
- The enzyme PRMT5 is broadly overexpressed in many cancer cells.
- Therefore, targeting the PRMT5 enzyme with drugs in combination with low dosage camptothecin will help in killing cancer cells more effectively.
- The PRMT5 enzyme, which is found in abundance in cancer cells, directly regulates the natural cellular repair mechanisms through chemical finetuning.
- This results in the repairing of DNA breaks generated by camptothecin and thus, resistance to chemotherapy.

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### **Molecular Motor**

- Physicists have built a molecular-scale motor entirely from DNA

strands, and used it to store energy by winding up a DNA ‘spring’.

- It is not the first DNA nanomotor, but the first to actually perform measurable mechanical work.
- DNA nanomotors are synthetic biochemical devices whose motion can be controlled at the molecular scale.

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### **Focus on OIL**

- Areas of one of the largest old-growth rainforests on Earth and the Virunga National Park could be auctioned off for oil drilling.
- The Democratic Republic of Congo says the about-face is necessary to support its financial stability

### **Virunga National Park**

- Virunga National Park is a national park in the Albertine Rift Valley in the eastern part of the Democratic Republic of the Congo.
- It was created in 1925. In elevation, it ranges from 680 m (2,230 ft) in the Semliki River valley to 5,109 m (16,762 ft) in the Rwenzori Mountains.

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## Monarch butterfly

- The monarch butterfly is now listed as endangered.
- The International Union for the Conservation of Nature has added it to its 'red list' for the first time; estimates suggest that its population in North America has declined by up to 72% in the past ten years.
- Multiple threats are contributing to their decline. These include loss of habitat, climate change and pesticide use.

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