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# BIOLUMIERE

Newsletter by the Department of Biotechnology


## Association Board



## Editorial Board



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## Cancer Cell Nanotubes Hijack Mitochondria from Immune Sentinels

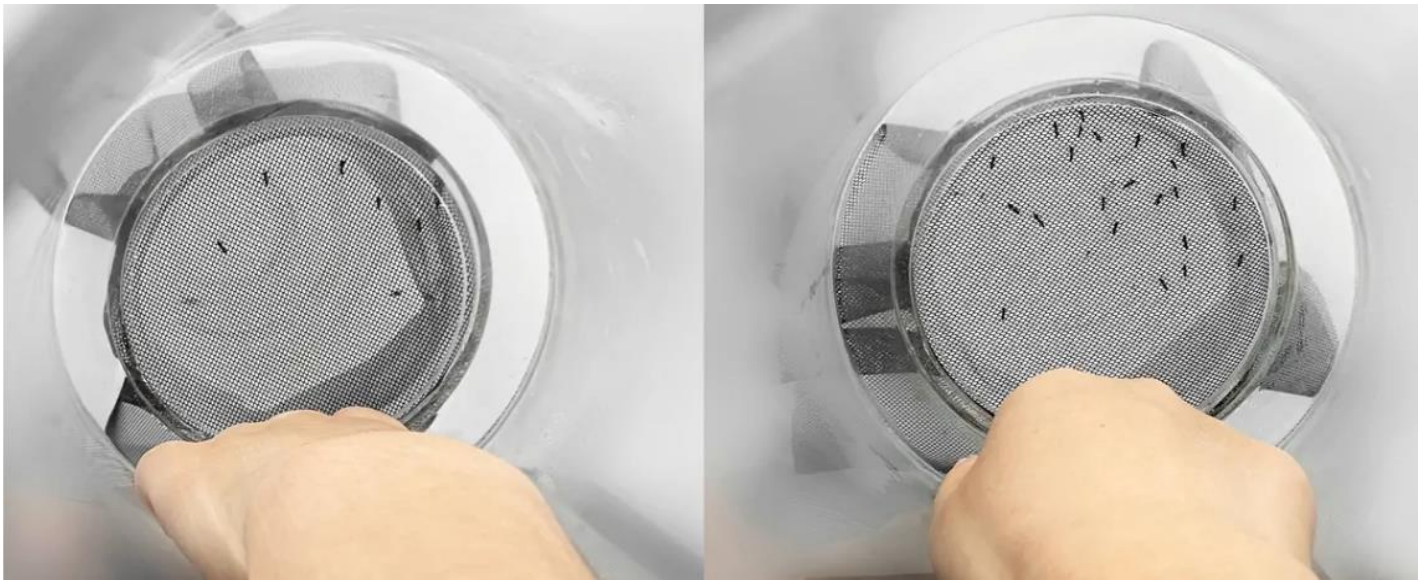
Tunneling nanotubes (TNTs) are delicate, hairlike structures that sprout from the cell body and pierce through neighboring cell membranes when cells are stressed, including when they're low on oxygen or during infection. Through the tubes, which are made of the protein actin, cells can send and receive RNA, nutrients, even entire organelles—and, unfortunately, viruses. From previous work, Pasteur Institute cell biologist Chiara Zurzolo knew that some viruses use nanotubes to spread from cell to cell. And given the fact that SARS-CoV-2 was infecting such a broad array of cell types, she thought maybe the coronavirus could similarly exploit TNTs. To test this line of thinking, the researchers cultured Vero E6 cells, which model the cells that line our skin, organs, and blood vessels—and express angiotensin-2 converting enzyme (ACE2). Separately, the team also cultured SH-SY5Y, which model human neuronal cells and lack the ACE2 receptor. When ACE2 receptors were blocked, the virus was still able to find its way from infected epithelial cells to noninfected ones.

## Missing Y Chromosome in Mouse Blood Causes Heart Dysfunction

Mosaic loss of Y chromosome (mLOY), a condition where some of a male's somatic cells, particularly white blood cells, lose the Y chromosome. This condition, which is heavily associated with tobacco smoking, affects more than 40% of 70-year-old men in the UK Biobank cohort and is associated with a long list of illnesses. Researchers looked at the hearts of mLOY mice using ultrasound, they noticed the development of cardiomyopathy—a chronic disease of the heart muscle—that worsened with age. Only 40 percent of the mLOY mice survived to 19 months of age, compared to more than 50 percent of the controls. There's a causal effect from the loss of Y on the risk for cardiovascular disease.

## Mosquitoes Drawn To Hosts Infected By Dengue, Zika

Some of the most notorious human viruses, including dengue and Zika, belong to a group of viruses called flaviviruses. They need mosquitoes to ferry them from host to host, and research now suggests they play an active role in ensuring that transfer occurs. The viruses are able to manipulate their hosts' skin microbes so that they produce an increased amount of a chemical that attracts mosquitoes to the host. The researchers had a hunch that the insects might be attracted to scents emitted by infected hosts based on previous studies on other insects. So, for a period of six days, they placed 60 hungry *Aedes aegypti* mosquitoes in a chamber system where they could smell either mice infected with dengue and Zika viruses or healthy mice and move towards their preferred scent. By the last day, 70 percent of the mosquitoes opted to be in the chamber containing the infected mice's odor. Acetophenone—a sweet-smelling chemical produced by bacteria—emerged as the most potent stimulator and in chamber tests, it was the only one that attracted more mosquitoes than a control scent.



## The Naked Eye Can Spy This Enormous Bacterium

A bacterium that doesn't require such a device to be seen: Thiomargarita magnifica, or "magnificent sulfur pearl," which was first sampled in the swampy, sulfurous waters surrounding a mangrove forest in the Caribbean archipelago of Guadeloupe. It's the largest bacterium found to date. It is orders of magnitude bigger than what we thought was the maximum possible size for a single bacterium. *T. magnifica* has average filament lengths of 9,000 microns, with the largest spindles measuring 20,000 microns (about the diameter of a US penny). That's in stark contrast to typical bacteria such as *E. coli*, which measures about 2 microns long. Scientists have assumed that the simplicity of bacterial structures kept them small, but the new research reveals that *T. magnifica*'s cell membranes have complex compartments that may help them to grow to larger sizes. "It's an amazing discovery," Petra Levin, a microbiologist at Washington University in St. Louis who was not involved in the study, tells the Associated Press. "It opens up the question of how many of these giant bacteria are out there—and reminds us we should never, ever underestimate bacteria."

## This Octopus-inspired Glove Helps Humans Grip Slippery Objects

A new high-tech glove totally sucks. Each fingertip is outfitted with a sucker inspired by those on octopus arms. These suckers allow people to grab slippery, underwater objects without squeezing too tightly. Each sucker on the glove is a raspberry-sized rubber cone capped with a thin, stretchy rubber sheet. Vacuuming the air out of a sucker pulls its cap into a concave shape that sticks to surfaces like a suction cup. Pumping air back into the sucker inflates its cap, causing it to pop off surfaces. Each finger is also equipped with a Tic Tac–sized sensor that detects nearby surfaces. When the sensor comes within some preset distance of any object, it switches the sucker on that finger to sticky mode. The octopus-inspired glove barely brushes the surface of what octopuses and other cephalopods can do. Octopuses can individually control thousands of suckers across their eight arms to feel around the seafloor and snatch prey. The suckers do this using not only tactile sensors, but also chemical-detecting cells that "taste" their surroundings.

## This Soft, Electronic 'Nerve Cooler' Could Be A New Way To Relieve Pain

A flexible electronic implant could one day make pain management a lot more chill. Created from materials that dissolve in the body, the device encircles nerves with an evaporative cooler. Implanted in rats, the cooler blocked pain signals from zipping up to the brain fungal infections developed, gut bacteria were also able to escape, leading to the additional risk of bacterial infection. Scientists already knew that low temperatures can numb nerves in the body. Think of frozen fingers in the winter, Rogers says. But mimicking this phenomenon with an electronic implant isn't easy. Nerves are fragile, so scientists need something that gently hugs the tissues. And an ideal implant would be absorbed by the body, so doctors wouldn't have to remove it. Made from water-soluble materials, the team's device features a soft cuff that wraps around a nerve like toilet paper on a roll. Tiny channels snake down its rubbery length. When liquid coolant that's pumped through the channels evaporates, the process draws heat from the underlying nerve. A temperature sensor helps scientists hit the sweet spot — cold enough to block pain but not too cold to damage the nerve.

# HALL OF FAME

# Congratulations

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URK18BT064
Intellipat, Bengaluru

**Sharon Mary Eappen**
URK18BT057
Zifo RnD Solutions, Chennai

# PUBLICATIONS

***Students' corner:***

- **Asma Musfira Shabbirahmed** published an article on Sugarcane bagasse into value-added products: a review in ***Environmental Science and Pollution Research*** of **Springer** with an impact factor of **5.190**.

***Faculties' corner:***

- **Prof. Jibu Thomas** published an article on Advanced technologies on the sustainable approaches for conversion of organic waste to valuable bioproducts: Emerging circular bioeconomy perspective in ***Fuel*** of ***Elsevier*** with an impact factor of **8.035**.