

Health

Trio takes chemistry Nobel for new, 'cool' method to study molecules

Method uses electron beams to examine tiniest cell structures

STOCKHOLM: A revolutionary technique dubbed cryo-electron microscopy, which has shed light on the Zika virus and an Alzheimer's enzyme, earned scientists Jacques Dubochet, Joachim Frank and Richard Henderson the Nobel Chemistry Prize yesterday. Thanks to the international team's "cool method", which uses electron beams to examine the tiniest structures of cells, "researchers can now freeze biomolecules mid-movement and visualize processes they have never previously seen," the Nobel chemistry committee said.

This has been "decisive for both the basic understanding of life's chemistry and for the development of pharmaceuticals," it added. The ultra-sensitive imaging method allows molecules to be flash-frozen and studied in their natural form, without the need for dyes. It has laid bare never-before-seen details of the tiny protein machines that run all cells. "When researchers began to suspect that the Zika virus was causing the epidemic of brain-damaged newborns in Brazil, they turned to cryo-EM (electron microscopy) to visualize the virus," the committee said. Frank, a 77-year-old, German-born biochemistry professor at Columbia University in New York, was woken from his sleep when the committee announced the prize in Stockholm, six hours ahead.

"There are so many other discoveries every day, I was in a way speechless," he said. "It's wonderful news." In the first half of the 20th century, biomolecules—proteins, DNA and RNA—were terra incognita on the map of biochemistry. Because the powerful electron beam destroys biological material, electron microscopes were long thought to be useful only to study dead matter.

But 72-year-old Henderson, from the MRC Laboratory of Molecular Biology in Cambridge, used an electron

microscope in 1990 to generate a three-dimensional image of a protein at atomic resolution, a groundbreaking discovery which proved the technology's potential. Frank made it widely usable between 1975 and 1986, developing a method to transform the electron microscope's fuzzy two-dimensional images into sharp, 3-D composites.

Dubochet, today an honorary professor of biophysics at the University of Lausanne, added water. Now 75, he discovered in the 1980s how to cool water so quickly that it solidifies in liquid form around a biological sample, allowing the molecules to retain their natural shape even in a vacuum. The electron microscope's every nut and bolt have been optimized since these discoveries.

The required atomic resolution was reached in 2013, and researchers "can now routinely produce three-dimensional structures of biomolecules," according to the Nobel committee. The trio will share the prize money of nine million Swedish kronor (around \$1.1 million or 943,100 euros). "Normally what I'd do if I was in Cambridge, we will have a party around tea-time in the lab but I expect we'll have it tomorrow instead," said Henderson.

'Beautiful pictures'

The prize announcement was praised by the scientific community and observers around the world. "By solving more and more structures at the atomic level we can answer biological questions, such as how drugs get into cells, that were simply unanswerable a few years ago," Jim Smith, science director at the London-based biomedical research charity Wellcome, said in a statement.

Daniel Davis, immunology professor at the University of Manchester, said details of crucial molecules and proteins



STOCKHOLM: Members of the Nobel Committee, sit during a press conference as they announce - Jacques Dubochet - from the University of Lausanne, Switzerland, Joachim Frank from Columbia University, USA and Richard Henderson, from the MRC Laboratory of Molecular Biology, Cambridge, in England as the winners of the 2017 Nobel Prize in Chemistry, at the Royal Academy of Sciences. — AP

that make the human immune system function, can now be seen like never before. "It has been used in visualising the way in which antibodies can work to stop viruses being dangerous, leading to new ideas for medicines—as just one example," he said. John Hardy, neuroscience professor at University College London, said Dubochet, Frank and

Henderson's technique has transformed the field of structural biology. It has been used, for example, to compile a detailed identikit of an enzyme implicated in Alzheimer's. "Knowing this structure opens up the possibility of rational drug design in this area," Hardy said. "And as a biologist, I can say that the pictures are beautiful." — AFP

Panic in Madagascar as plague spreads

ANTANANARIVO: Crowds of fearful residents flock to their local pharmacies before dawn, desperate to buy masks and antibiotics to stave off a plague outbreak sweeping Madagascar. In just the past few days, the highly infectious disease has wreaked havoc in the poor Indian Ocean island nation, claiming six lives in the capital city Antananarivo and causing widespread panic.

Like many of his neighbors, 50-year-old Johannes Herinjatovo quickly became overwhelmed by fear as news of the outbreak spread. He too joined the long lines forming outside the capital's chemists. "I'd already visited six this morning and at each one they told me that they didn't have any more masks," he said as he left a pharmacy empty-handed. His wife Miora Herinjatovo, 55, had better luck, success-



ANTANANARIVO: Rat-traps are pictured in a primary school at Andraisoro, a district of the Antananarivo on October 2, 2017. Rats disseminate fleas which are carrier of the plague bacterium. — AFP

fully locating a mask in a hospital. "Everyone is looking for one," she said. "Some pharmacies are saying that there won't be any more in the city. Others are telling us to wait. We just don't know." Having failed to get hold of a mask, her husband instead collected a handful of generic antibiotics. The health ministry has advised against using the treatment preventively against

the plague, but that has done little to deter worried members of the public. "We are scared—all of these deaths show that the situation is serious," said Herinjatovo. Prime Minister Olivier Mahafaly Solonandrasana dropped a bombshell on national TV on Saturday when he announced that 24 people have so far died from the plague since the end of August. — AFP

Cats kill one million birds a day in Australia

SYDNEY: Feral and pet cats kill more than one million birds in Australia every day, new research showed yesterday, with the staggering slaughter driving the decline of many species. The study, published in the journal Biological Conservation, estimated that wild cats wiped out 316 million every year, while pets killed 61 million annually.

"Everyone knows that cats kill birds, but this study shows that, at a national level, the amount of predation is staggering," said lead researcher John Woinarski from Charles Darwin University. "It is likely to be driving the ongoing decline of many species." The numbers are based on results from nearly 100 studies across the country by environmental scientists, each sampling cat population density. Another

set of almost 100 studies assessed feline diet. Woinarski said that while previous research had looked at the impact cats had on Australia's mammals, this was the first nationwide assessment on birds.

It found the highest rates of predation were on Australia's islands and in remote arid areas, where the number of birds killed each year could reach 330 per square kilometer.

Feral cats, which number in their millions across the country, are also considered the main culprit behind Australia's high rate of mammal extinction.

They have wiped out entire populations since being introduced by Europeans who settled in the country two centuries ago, with efforts to cull or sterilise them so far failing to slow their march. The researchers found evidence of cats killing 338 bird types—almost half of Australia's native species, including 71 threatened species such as the spotted quail thrush, the squatter pigeon, and the night parrot.

"We found that the birds most likely to be killed by cats are medium sized birds, birds that nest and feed on the ground, and birds that occur on islands or in woodlands, grasslands and shrublands," said Woinarski. — AFP

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PAGE

248 33 199

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