Research highlights

PHOTONS STAY OUT OF THE PICTURE TO CAPTURE AN IMAGE

Physicists have recorded images of an object using light that has never interacted with it.

Markus Gräfe at the Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena, Germany, and his collaborators shot a laser beam through a crystal that splits some of the laser's photons into pairs. Every pair contained two photons, each with a different wavelength — for example, one in the infrared and another in the visible light spectrum.

Infrared photons were routed to the object to be imaged, and interacted with it, whereas the visible-light photons travelled a path that did not intersect with the item. The two beams were then directed back to the crystal, where they interacted again and transferred some information from the infrared to the visible light. The visible light then carried that information to a detector that recorded an image, even though those photons had never been near the object.

Gräfe says that researchers could fine-tune the sensor photons' frequency to characteristic frequencies of light absorbed by the molecules of a sample, such as a protein. A detector that picks up visible-light photons could then reveal the molecules, even if the sample is completely transparent to visible light.

Sci. Adv. **8**, eabl4301 (2022)

THE BLOOD MARKERS ASSOCIATED WITH LONG COVID

Scientists have identified an immune-system signature for long COVID, shedding light on the biology of the condition.

As many as 30% of people infected with SARS-CoV-2 go on to be affected by long COVID, which causes debilitating symptoms — including fatigue and shortness of breath — months after an initial infection with the virus. How the pathogen wreaks sustained havoc in the body remains unclear.

Chansavath Phetsouphanh at the University of New South Wales in Sydney, Australia, and his colleagues analysed blood samples from people with long COVID and found that a SARS-CoV-2 infection elicits an immune response distinct from the response to other types of coronavirus. This response persists in people with long COVID.

The analysis pointed to a collection of immune-system molecules that were present at abnormally high levels in people with long COVID eight months after infection. These molecules, such as type 1 and type 3 interferons, are usually made during a viral infection. They activate immune cells called T cells and trigger inflammation.

The findings could help researchers to develop treatments for the disorder.

Nature Immunol. https://doi.org/hdf5 (2022)

ELEPHANTS PACK THEIR TRUNKS — WITH NERVES

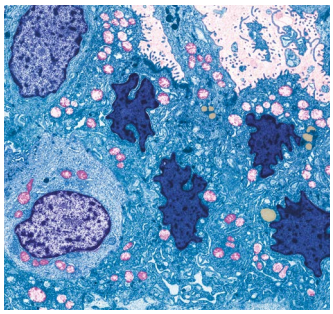
The nerve circuitry of a female elephant's trunk weighs a whopping 1.5 kilograms, thanks in part to a nerve bundle that is one of the largest known structures of its type.

Elephants constantly use their trunks to touch each other or their surroundings. To study the nerves that carry sensory information from an elephant's elongated nose to its brain, Michael Brecht at Humboldt University in Berlin and his colleagues examined the heads of eight Asian and African zoo elephants (*Elephas maximus* and *Loxodonta africana*, pictured) that had either died of natural causes or been euthanized because of health problems.

The researchers found that the elephants' sensory-nerve fibres can be more than 2 metres long, and that the nerve that carries tactile signals from the trunk to the brain is more than three times as thick as the nerve responsible for relaying visual information. The elephant's trigeminal ganglia, the bundle of nerve-cell bodies that sits just below the brain, is one of the largest structures used for carrying sensory information known in any animal.

The findings suggest that elephants have an extraordinary sense of touch, the authors say.

Curr. Biol. https://doi.org/hdb2 (2022)



HOW KERATIN ROBES KEEP CANCER'S ATTACKERS AT BAY

Some cancer cells wrap themselves in a protein mesh that wards off immune cells — which helps to explain why treatments aimed at turning the immune system against tumours can fail.

The protein Keratin 19 helps to give human tissues their structure. But Douglas Fearon at the Cold Spring Harbor Laboratory in New York and his colleagues found that Keratin 19 binds to proteins on the surfaces of some cancer cells (including carcinoma cells, pictured), creating a mesh wrapper. The team found that mouse tumours lacking Keratin 19 contained more T cells, a type of immune cell, than did tumours with the protein.

The researchers suspect that another protein in the mesh binds and inactivates molecules that serve as sensors for T cells — so T cells lose the ability to home in on the tumours. That could jeopardize the success of therapies that rely on T cells to eradicate tumours.

Some such therapies sharpen the killer instincts of T cells — combating the ability of some cancers to pacify these cells. Finding ways to clear the Keratin 19-containing mesh could make such methods more effective.

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