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Biology

Brain cells have a long reach

Mouse neurons can grow out of cages to contact others

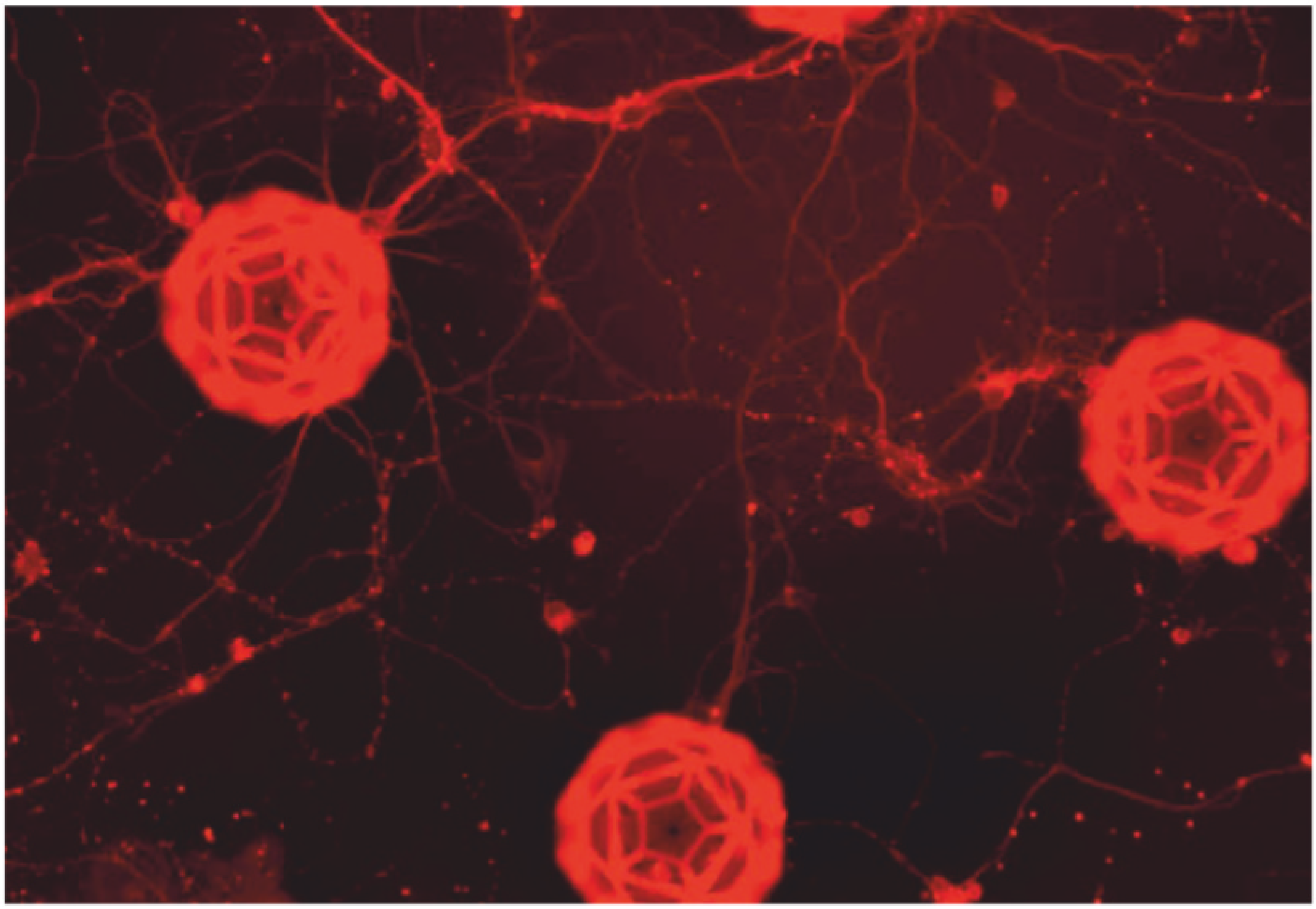
Clare Wilson

THESE microscopic cages, based on the shape of "buckyball" carbon molecules, are trapping neurons taken from the brains of mice. The cells have grown long branch-like appendages through the bars of their cages, allowing them to make connections with each other (*Biofabrication*, doi.org/dt3k).

Trapping brain cells and growing them in this way allows them to be manipulated more precisely, says Aleksandr Ovsianikov at the Vienna University of Technology in Austria.

The buckyball-shaped cages, which are 100 micrometres wide, are made by 3D-printing a plastic-like material.

The immature brain cells, obtained from mouse embryos, are forced into their prisons by placing a suspension of the cells over a layer of cages. Ovsianikov and his colleagues bombarded the suspension with sound waves to jostle the cells into place. ▮



STANFORD UNIVERSITY

Technology

AI can spot objects even if they are hidden

CAMOUFLAGED objects are difficult to detect, for both humans and artificial intelligence. But now an AI has been trained to parse objects from their backgrounds.

This could have a variety of applications, such as being used for search-and-rescue work, detecting agricultural pests, medical imaging or in military settings.

Detecting camouflaged objects requires visual perception and knowledge. Until now, many AIs have struggled with this task because their algorithms rely on visual cues, such as differences in colour or easily recognisable shapes, to identify objects.

To improve on this, Jianbing Shen at the Inception Institute of Artificial Intelligence in Abu Dhabi in the United Arab Emirates and his colleagues collated a data set of 10,000 photographs to train an AI. The data set includes 5066 images of camouflaged objects, which they have divided into 78 categories, such as "amphibian", "aquatic" and "flying".

The photographs included both naturally camouflaged animals such as fish and insects and examples of artificial camouflage, such as soldiers in uniform. Although databases of camouflaged objects already exist, this data set is the largest, says Shen.

The team manually labelled each image of a camouflaged object to highlight characteristics such as its shape or whether it was partially obstructed by its surrounding environment. They then developed an AI called SINet and trained it on images from the data set.

The researchers compared SINet to 12 existing algorithms built to detect generic objects. They tested all 13 algorithms using three existing data sets of camouflaged objects. SINet did better than the other 12 at isolating camouflaged objects and identifying their correct shape and nature in both the existing and the training data sets.

"Many AIs struggle to detect camouflaged objects because their algorithms rely on visual cues"

"Without any bells and whistles, SINet outperforms various state-of-the-art object detection baselines on all datasets tested, making it a robust, general framework that can help facilitate future research," the researchers write. They are due to present the work at the CVPR 2020 conference in Seattle, Washington, in June.

The researchers hope the data set and algorithm can improve AI's ability to recognise camouflaged objects, says Shen. ▮

Donna Lu