# New Scientist

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Space

# Beware! Planet thieves are operating across the universe

Jonathan O'Callaghan

AROUND one in every 50 planets may have been stolen from other stars in their infancy – perhaps even in our own solar system.

We have thought for some time that worlds in very wide orbits around stars may have been born elsewhere, as it is hard for them to form so far from a star. The hypothesised Planet Nine in the outer reaches of our solar system, for example, may have been snatched from a passing star.

Such events may occur early in the lives of stars when they are born in dense clusters from the same cloud of dust and gas. These clusters can contain thousands of young suns, often packed relatively closely together before later spreading out. If any planets form around these stars, it might be possible for them to jump ship early on as other stars pass nearby.

Emma Daffern-Powell at the University of Sheffield, UK, and her colleagues worked out how often this might occur. They modelled an example cluster of 1000 stars, each separated by a third of a light year. Half of the stars had a single planet with an orbit at least as far out as that of Neptune – a simplistic model designed to represent how often planet transfer could take place in more complex environments.

The results showed that about 2 per cent of planets were "stolen" in the cluster's first 10 million years, meaning they were directly transferred between stars before they spread out. A further 2 per cent were "captured", meaning they became free-floating before being grabbed by another star. The rest stayed in their original system or were disturbed and ended up without a host star at all (*Monthly Notices of the Royal Astronomical Society*, doi.org/hwnb).

Sean Raymond at the University of Bordeaux, France, says the study provides a novel look at the interactions of planets in young star clusters. "I didn't think there would be as many chances for stealing planets," he says.

For a star to grab a planet from another star, it would need to approach at a few hundred astronomical units (AU) – 1 AU is the Earth-sun distance. Captured planets would be in wider orbits than stolen planets because "the encounter is less energetic", says Richard Parker at the University of Sheffield, a co-author of the study. "If you have a very energetic interaction, that planet has to have a fairly small orbit," he says.

Both captured and stolen planets would also have less circular and more inclined orbits – ones that are angled to the flat plane of the system.

By directly imaging star systems, we can look for such planets by mapping their orbits. Matthew Kenworthy at Leiden University in the Netherlands says we have already seen evidence for such worlds. "My group has seen three planets where they're at 100 to 500 AU," he says.

At the moment we have only directly imaged a few dozen exoplanets, but that number should increase as more powerful telescopes like the European Extremely Large Telescope switch on in the coming years. ▮

DARRYL FONSEKA/ALAMY

**Artist's impression of an exoplanet orbiting a red dwarf star**

Biotechnology

## Self-replicating artificial cells move a step nearer

**A SYNTHETIC cell membrane with machinery for cell division is a key step towards building an artificial cell with the ability to replicate itself.**

**Synthetic cell membranes now being created in the lab have many of the properties of real cell membranes, but they have lacked a "divisome", a group of proteins responsible for contorting the cell's membrane into hourglass-like shapes in preparation for division.**

**Now, César Rodriguez-Emmenegger at the Leibniz Institute for Interactive Materials in Germany and his colleagues have incorporated a part of the divisome from the bacterium *E. coli* into a fully synthetic cell membrane, called a dendrimersome.**

**The researchers explored whether the addition would give their artificial membrane the ability to transform into the correct shapes for division. They analysed it using spectroscopy and fluorescence microscopy, and discovered patterns that resembled those found in nature during cell division, as well as some non-natural ones (*Advanced Materials*, doi.org/hwp2).**

**Eventually, Rodriguez-Emmenegger and his team hope to incorporate more parts from living cells into their synthetic membrane.**

**The ultimate goal is a self-dividing artificial cell with synthetic parts, which could have properties not seen in nature, such as stronger and more stable membranes.**

**"It's not the final breakthrough – synthetic cells that self-replicate – but it is getting very close"**

**Self-dividing artificial cells may also help to answer fundamental questions about the origins of life.**

**It is a significant result, says Kate Adamala at the University of Minnesota, and a large number of technical problems had to be solved to achieve it, such as modifying the synthetic membrane to work with the cell division machinery.**

**But the goal of making synthetic cells divide is still elusive, adds Adamala. "It's not the final breakthrough, it's not: 'Yay, [synthetic] cells are self-replicating!' But it is getting very close." ▮**

**Alex Wilkins**