

## Missing galaxies found hiding in plain sight

YOU look everywhere for something and it was in your pocket all along. Millions of ancient galaxies thought to have been destroyed in collisions seem to be hiding in discs of stars in other galaxies. Even our own Milky Way may be hiding another galaxy at its centre.

In 2005, astronomers found that there were a lot of compact spherical galaxies in the early, distant universe. These galaxies, which appeared to be about a third of the size of ones in our own backyard with a comparable mass and shape, were abundant about 11 billion years ago

**“There are 1000 times as many compact galaxies in the local universe than previously thought”**

but seemed scarce nowadays. The local universe is dominated by large “elliptical” galaxies – giant clouds of stars with little structure – and disc galaxies like the Milky Way.

“Pretty much all of the compact massive galaxies were thought to be missing from the nearby universe,” says Alister Graham of Swinburne University of Technology in Melbourne, Australia. “Very few compact massive galaxies had been found locally, just a handful.”

Computer simulations showed that these galaxies of the early universe could have been destroyed through mergers and collisions with each other. Many astronomers thought this explained the discrepancy, but there was one problem: if there were that many mergers, we should see a lot of those galaxies orbiting one another and heading towards collisions. But we don’t.

“It was known that there are not enough mergers; this was an unexplained problem,” says Graham.

Graham and his colleagues think they now have an explanation. They have found that many galaxies in surveys of the local universe had been

mischaracterised. Their analysis of images reveals that 21 galaxies that originally looked like giant elliptical 3D clouds of stars were actually flat 2D discs with bulges in the middle. This is because unless the thin edge of a disc galaxy is facing us, it can look like a 3D clouds of stars (*Astrophysical Journal*, [doi.org/439444](https://doi.org/10.1086/439444)).

Those bulges have “exactly the same physical mass and compact size as the galaxies in the early universe”, Graham says. “The original, compact spheroid of stars remains basically unchanged in their centres.” This suggests that the vast majority of compact spheroids aren’t actually missing, they have just grown a disc, possibly by gathering hydrogen gas and stars from smaller galaxies but without major mergers. “They were hiding in plain sight,” says Graham.

The results suggest that there are 1000 times as many of these compact galaxies in the local universe than previously thought – roughly as many as there were in the early universe.

Graham says part of our own galaxy’s central bulge may once have been one of these compact galaxies. The disc that formed around it would have contributed some stars to the bulge, as could other processes such as mergers.

Emanuele Daddi at the French Alternative Energies and Atomic Energy Commission was one of the first to notice the apparent excess of compact spherical galaxies in the early universe. “The idea did not occur to us that they could actually be bulges of local [disc galaxies] that had not yet grown their discs,” says Daddi. “Neither did the few hundred papers that subsequently studied the problem consider this idea.”

Daddi thinks a mystery remains. The bulges in the nearby galaxies seem larger than those in the early universe, which leaves him with some doubt that this explanation will definitively solve the problem.

Michael Slezak ■



GABRIEL PÉREZ-DÍAZ

A galactic Russian doll?



**ROYAL SOCIETY OF CHEMISTRY**

### Get ready for the Emerging Technologies Showcase 2015

Join us on 29 June for the Royal Society of Chemistry's flagship event, where innovation takes the stage.

The daytime event:  
Burlington House, Piccadilly

The winners announcement:  
BAFTA 195 Piccadilly

Register at <http://rsc.li/et15>  
**#RSEmergingTech**

Registered charity number: 207890

W21 \$8.95  
08 NEW SCIENTIST :0100  
16 MAY  
NET  
AT  
67451  
656554569001 180515 4  
GLENFERRIE AUTHORISED NEWSAGENCY

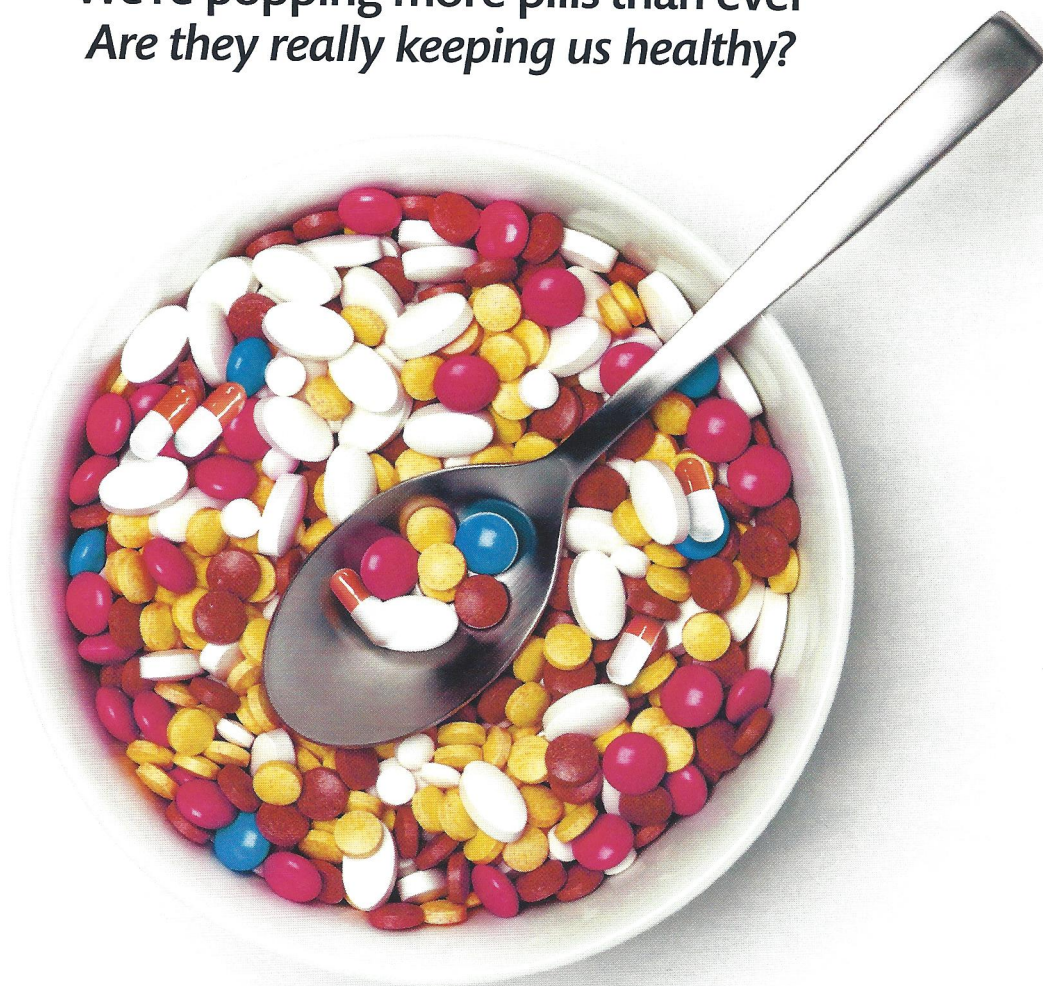
**HIDING THEIR LIGHT**  
We've found millions of missing galaxies

# newScientist

WEEKLY 16 May 2015 No3021 Australia \$8.95 (Inc.GST) New Zealand NZ\$8.95 (Inc. GST) Print Post Approved 100007877

## OUR DAILY MEDS

We're popping more pills than ever  
*Are they really keeping us healthy?*



**OMMM... AARGH!**  
The dark side of mindfulness

**RIGHTS OF (SPACE)MAN**  
Justice and freedom  
on the Martian frontier

**CHAINSAW SHARKS**  
The plight of the  
world's weirdest fish

**PUPPY FAT**  
Lipid supplements  
to slow down ageing

News, ideas and innovation [www.newscientist.com](http://www.newscientist.com)

