

The benefits of 80 million years without sex

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Scientists have discovered how a microscopic organism has benefited from nearly 80 million years without sex.

Bdelloid rotifers are asexual organisms, meaning that they reproduce without males. Without sex, these animals lack many of the ways in which sexual animals adapt over generations to survive in their natural environment.

Although other asexual organisms are known, they are thought to become extinct after relatively short time periods because they are unable to adapt. Therefore, how bdelloid rotifers have survived for tens of millions of years has been a mystery to scientists.

Bdelloids typically live in freshwater pools. However, if deprived of water they enter a dehydrated state in which they can remain for many years, surviving almost complete water loss. They then revive, having suffered no ill effect, once water becomes available again.

The new research shows how *Adineta ricciae*, a species of bdelloid rotifer, has evolved without sex to cope with dry conditions. The research, led by Dr. Alan Tunnacliffe from the Institute of Biotechnology at the University of Cambridge, was published today in the journal *Science*.

Humans and most other types of organisms reproduce sexually - resulting in two copies (or a pair) of each chromosome within a cell, one copy inherited from each parent. The chromosomes contain genes, so

there are usually two copies of each gene in the cell. As a result, the two nearly identical copies of each gene in each cell will create two proteins which are also often nearly identical.

However, the researchers discovered that the two copies of the gene *lea* in *Adineta ricciae* are different and therefore generate proteins with different functions which protect the animal during dehydration. One copy protects essential proteins from clumping together as the animal dries out, while the other helps to maintain the fragile membranes that surround its cells.

This is the first time that this evolutionary trick has been shown in any asexual animal.

Dr. Alan Tunnacliffe commented on the findings: “We’ve known for a few years that gene copies that would have the same DNA sequence in sexual creatures can be quite different from each other in asexuals. But this is the first time we’ve been able to show that these gene copies in asexuals can have different functions.

“It’s particularly exciting that we’ve found different, but complementary, functions in genes which help bdelloid rotifers survive desiccation. Evolution of gene function in this way can’t happen in sexual organisms, which means there could be some benefit to millions of years without sex after all.”

Source: University of Cambridge

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