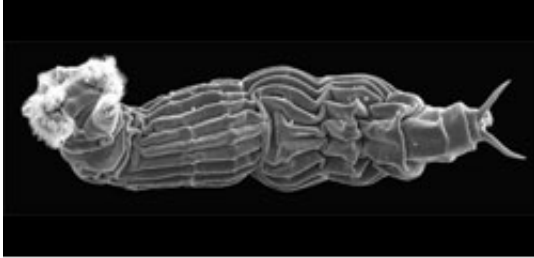


No sex for 40 million years? No problem

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The bdelloid rotifers have confounded scientists by surviving for millions of years and evolving into distinct species, despite being asexual creatures

A group of organisms that has never had sex in over 40 million years of existence has nevertheless managed to evolve into distinct species, says new research published today. The study challenges the assumption that sex is necessary for organisms to diversify and provides scientists with new insight into why species evolve in the first place.

The research, published in *PLoS Biology*, focuses on the study of bdelloid rotifers, microscopic aquatic animals that live in watery or occasionally wet habitats including ponds, rivers, soils, and on mosses and lichens. These tiny asexual creatures multiply by producing eggs that are genetic clones of the mother – there are no males. Fossil records and molecular data show that bdelloid rotifers have been around for over 40 million years without sexually reproducing, and yet this new study has shown that they have evolved into distinct species.

Using a combination of DNA sequencing and jaw measurements taken using a scanning electron microscope, the research team examined bdelloid rotifers living in different aquatic environments across the UK, Italy and other parts of the world. They found genetic and jaw-shape evidence that the rotifers had evolved into distinct species by adapting to differences in their environment.

Dr Tim Barraclough from Imperial College London's Division of Biology explained: "We found evidence that different populations of these creatures have diverged into distinct species, not just because they become isolated in different places, but because of the differing selection pressures in different environments.

"One remarkable example is of two species living in close proximity on the body of another animal, a water louse. One lives around its legs, the other on its chest, yet they have diverged in body size and jaw shape to occupy these distinct ecological niches. Our results show that, over millions of years, natural selection has caused divergence into distinct entities equivalent to the species found in sexual organisms."

Previously, many scientists had thought that sexual reproduction was necessary for speciation because of the importance of interbreeding in explaining speciation in sexual organisms. Asexual creatures like the bdelloid rotifers were known not to be all identical, but it had been argued that the differences might arise solely through the chance build-up of random mutations that occur in the 'cloning' process when a new rotifer is born. The new study proves that these differences are not random and are the result of so-called 'divergent selection', a process well known to cause the origin of species in sexual organisms.

Dr Barraclough adds: "These really are amazing creatures, whose very existence calls into question scientific understanding, because it is generally thought that asexual creatures die out quickly, but these have

been around for millions of years.

"Our proof that natural selection has driven their divergence into distinct species is another example of these miniscule creatures surprising scientists – and their ability to survive and adapt to change certainly raises interesting questions about our understanding of evolutionary processes."

Citation: 'Independently evolving species in asexual bdelloid rotifers', *PLoS Biology*, Monday 19 March 2007.

Source: Imperial College London

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