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Ants inhabit 'world without sex'

By Victoria Gill
Science reporter, BBC News

An Amazonian ant has dispensed with sex and developed into an all-female species, researchers have found.

The ants reproduce via cloning - the queen ants copy themselves to produce genetically identical daughters.

This species - the first ever to be shown to reproduce entirely without sex - cultivates a garden of fungus, which also reproduces asexually.

The finding of the ants' "world without sex" is published in the journal Proceedings of the Royal Society B.

Anna Himler, the biologist from the University of Arizona who led the research, told BBC News that the team used a battery of tests to verify their findings.

Unusual evolution

By "fingerprinting" DNA of the ant species - *Mycocepurus smithii* - they found them all to be clones of the colony's queen.

And when they dissected the female insects, they found them to be physically incapable of mating, as an essential part of their reproductive system known as the "mussel organ" had degenerated.

Asexual reproduction of males from unfertilised eggs is a normal part of some insect reproduction, but asexual reproduction of females is "exceedingly rare in ants", wrote the researchers.

"In social insects, there are a number of different types of reproduction," explained Dr Himler. "But this species has evolved its own unusual mode."

She and her colleagues do not know exactly why this particular species has become fully asexual, and how long ago the phenomenon evolved.

They are carrying out further genetic experiments, which will enable them to estimate how long ago the evolutionary change occurred.

No sex please

There are advantages to life without sex, Dr Himler explained.

"It avoids the energetic cost of producing males, and doubles the number of reproductive females produced each generation from 50% to 100% of the offspring."

But combining genetic material in sexual reproduction gives future generations many more advantages.

"If we're more diverse, we're more resistant to parasites and disease," explained Laurent Keller, an expert in social insects from the University of Lausanne.

"In a colony of clones, if one ant is susceptible to a parasite, they will all be susceptible. So if you're asexual, you normally don't last very long.

"But in ants we're seeing more and more reports of unusual methods of reproduction," added Professor Keller, who was not involved in this study.



These ants do not need males

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He also points out that social insects, like ants, may be particularly well suited to this type of reproduction because it enables the queen to control the caste and sex of all the offspring in her colony.

The first farmers

Dr Himler's interest in *Mycocepurus smithii* was originally sparked not by their unusually biased sex ratio, but by their ability to cultivate crops.

"Ants discovered farming long before we did - they have been cultivating fungus gardens for an estimated 80 million years.

"They collect plant material, insect faeces and even dead insects from the forest floor and feed it to their crops," she said.

Many different species of ant - including the famous leafcutter ants - cultivate fungi, relying on it for nutrition.



But this particular species is able to grow "a greater number of crops than other ant species", she explained. More interested in gardening than sex

"When we started to study this species more closely, we just weren't finding any males. That's when we started to look at them in a different way."

Since the fungus crop reproduces asexually, Dr Himler thinks it might give the ants some kind of advantage "not to operate under the usual constraints of sexual reproduction".

"There is certainly more work to be done in this system," she added. "We're quite excited about the direction this research might take us, and its implications."

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