

Mindless brutality? No, it's the spiteful gene

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We have all heard of the selfish gene, but in extreme circumstances genes can be downright spiteful too, scientists have discovered. Researchers at Edinburgh University who studied the brutal behaviour of bacteria and insects say spiteful behaviour is not only justified at times but is hard-wired into our genes.

Andy Gardner and Stuart West, at the university's institute of cell, animal and population biology, delved through reams of scientific literature and found numerous examples of organisms going out of their way to cause harm to others — even if it meant killing themselves in the process — if it helped make life easier for their closest relatives.

"We know that it makes sense for organisms to be selfish, or to be altruistic towards even distant relatives, but this kind of spiteful behaviour was thought to be biologically implausible," said Dr Gardner. "What this shows is that there is a gene or a set of genes for spitefulness."

In the world of bacteria and insects, genes that encourage spitefulness lead to behaviour that matches the most heroic

examples of human self-sacrifice. When, for instance, *E coli* bacteria find food is running low some switch to "suicide mode" — they explode in a brief shower of toxins that can kill all bacteria nearby.

Crucially, close relatives of an exploded bacterium have a gene making them immune to the toxins. So by sacrificing itself to kill unrelated bacteria, the *E coli* makes food more plentiful for its closest relatives.

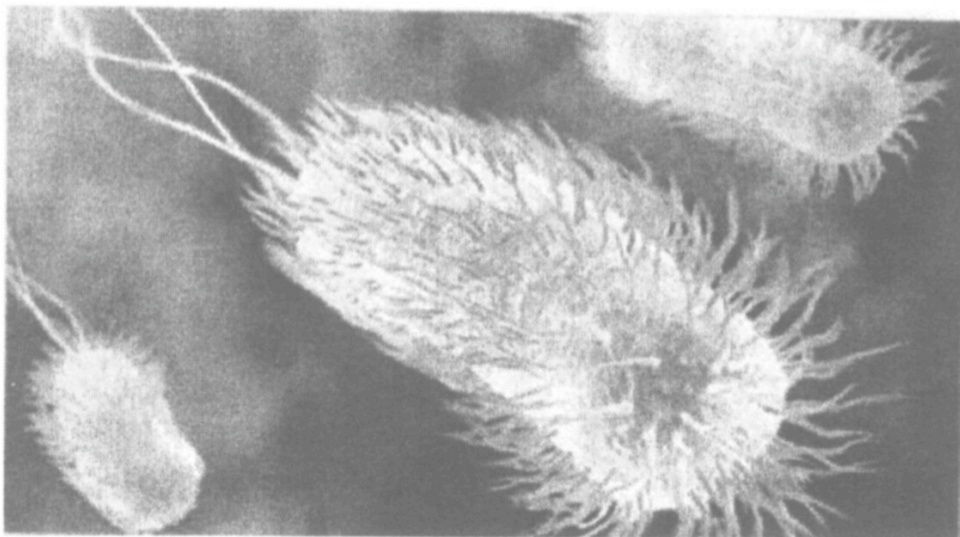
"It's not good for the bacteria doing it because it dies in the process, but the benefits come because its kin, which carry the same genes, have a better chance," explained Dr Gardner, whose work appears in the latest issue of the *Journal of Evolutionary Biology*.

The report describes how spiteful behaviour is not confined to microbes. Certain species of wasp inject their eggs into caterpillars, turning the hapless creatures into living baby food for the growing larvae. But because a caterpillar can become the host to many eggs from different wasps, some larvae risk going hungry. To make sure they get enough food, some wasp eggs

develop fast, not into wasp larvae but into snake-like organisms that swim around inside the caterpillar, sucking out and destroying embryos that are not recognisably close relatives. "They only kill the embryos that are less related to them than average, and by murdering the others their closest relatives have an advantage," said Dr Gardner. "This shows you can get creatures going out of their way to hurt each other."

Spiteful behaviour has been largely ignored by evolutionary biologists because they have believed it was unlikely to arise in the wild. But the latest work suggests it could be more common than suspected.

But while genes might make bacteria and insects prone to bouts of spite, they are unlikely to account for dubious human behaviour. "It could explain any deep, primal spiteful emotions if we ever have any, but suicide bombers and issues of what you could call spite in the news are more to do with people's beliefs than their genes. People don't really do what their genes tell them to do," said Dr Gardner.



E coli bacteria ensure their genes' survival by 'suicide toxic bombing', killing 'non-family' to save food for relatives, say scientists Photograph: Science Photo Library