

Older fathers may change child's DNA

Clare Wilson

MEN who have children later in life may pass on changes acquired from their environment, a phenomenon reminiscent of Lamarckian evolution.

French naturalist Jean-Baptiste Lamarck thought that if organisms changed their bodies during their life to adapt to their environment, those changes could be passed to children. Giraffes stretching their necks to reach tall trees, and then passing longer necks on the next generation, is a classic example of this incorrect theory of evolution.

We now know organisms evolve through random DNA mutations: giraffes with mutations that caused longer necks passed these changes to their offspring. But a study of children of older dads suggests it may be possible to pass adaptations to subsequent generations in other ways.

Dan Eisenberg at the University of Washington in Seattle and his team have studied telomeres, stretches of repetitive DNA at the ends of our chromosomes. These shorten each time a cell divides, so usually get shorter over a lifetime. If telomeres get too short, cells

may stop dividing or even die.

A woman's eggs are all made before she is born, but the cells in men's testes divide throughout their lives. Because we inherit telomere lengths from the egg and sperm cells that make us, the children of older fathers should in theory have shorter telomeres, but they don't.

This is probably because an enzyme called telomerase, which extends telomeres by adding more DNA to them, is very active in the testes. Several studies have shown that sperm from older men have longer telomeres than average.

This may enable older men to reproduce without having children with dangerously short telomeres. Because telomerase adds DNA to a chromosome, it may be possible that they pass this acquired, non-genetic trait – longer telomeres – to offspring.

Studying the DNA of nearly 3000 grandparents, plus their children and grandchildren, Eisenberg's team found that this may be the case. A child's telomere length correlates with the age at which their fathers and grandfathers reproduced,

They believe the space rock – an estimated 1 metre across – was debris created when another object hit 500-kilometre-wide Vesta about 22 million years ago.

This large collision resulted in the 17-kilometre-wide Antonia crater on Vesta's surface, mapped by NASA's Dawn spacecraft in 2011. Several clues point to this as the source of the meteorite, says Jenniskens.

The rock was captured by hundreds of security cameras as it fell over the Turkish village of Sariçiçek. By looking at footage of the fireball it created in the sky, the team calculated the



KAY FOCHTMANN/VEEVA/GETTY

Do some fathers prepare their babies for a longer life?

Eisenberg told a meeting of the American Association of Physical Anthropologists in Ohio.

Because telomere length may play a role in longevity, this could represent older fathers adapting their children's DNA for an environment in which it may be possible to live a longer life, says Eisenberg. "The father's age at reproduction is likely to be containing a signal about what the recent environment was like," he

says. "It breaks some of the ways biology is supposed to work."

Eisenberg says that, while the idea the environment influences DNA in this way isn't yet proven, it should be taken more seriously. "It could be a multigenerational signalling mechanism. It's not so crude as the giraffe's neck. But there's a similarity."

While Lamarck had fully functional anatomical systems in mind, it is possible that there is a Lamarckian parallel here, says Steven Leigh at the University of Colorado, Boulder.

NASA traces a meteorite to its distant origins

A RARE meteorite showered hundreds of fragments over Turkey in 2015 – and it looks like we now know just where it came from.

Peter Jenniskens at NASA's Ames Research Center in California and his team have traced the origin of the meteorite to a crater on the asteroid Vesta, one of the largest objects in the asteroid belt beyond Mars.

trajectory of the object as it neared Earth. They discovered it had a short orbit, suggesting it came from the inner asteroid belt – where Vesta is.

What's more, when objects are exposed to high-energy radiation called cosmic rays as they travel in space, chemical changes occur. By studying the meteorite's chemistry, the team found it had travelled through space for 22 million years.

The size of the Antonia crater and the age of material around it suggest it is the likely origin for the meteorite, says Jenniskens (Meteoritics & Planetary Science, doi.org/c4gz).

The Sariçiçek meteorite belongs to a group classified as howardite-eucrite-diogenites (HED). These have long been thought to originate from Vesta or asteroids associated with it.

"About one-third of all HED meteorites are 22 million years old," says Jenniskens. "What it says is that this particular rock came from a big collision event, so we were looking for a big crater." Donna Lu

"The Sariçiçek meteorite was captured by hundreds of security cameras as it fell over Turkey"