The purpose of life: why the textbook needs an update

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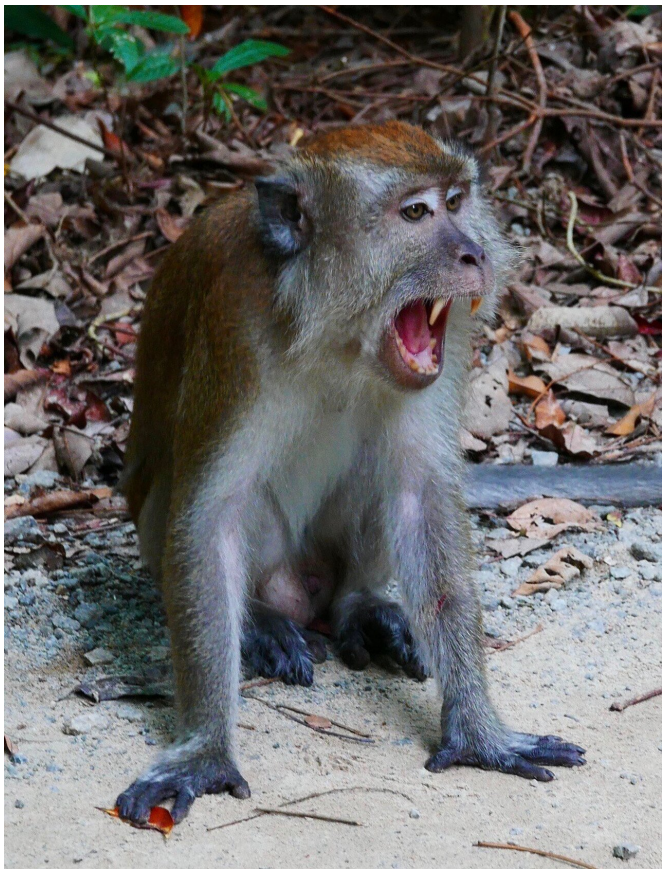

A macaque. Credit: Wes Keys

New research from Australia and Finland could help explain one of nature's strangest quirks—why some animals forego mating to help other animals procreate.

The study challenges decades-old ideas about evolution, and why animals behave as they do.

Co-author Professor Michael Jennions from The Australian National University (ANU) says it was traditionally thought that animals evolved to maximise their reproductive success—sometimes called 'Darwinian fitness'.

"It is logical. Any new traits which happen to result in more offspring will eventually spread throughout the population," Professor Jennions said. "It is why cheetahs run so fast and dolphins swim so well."

But why would some animals—like worker bees and meerkats—give up their own chances of reproducing to help others? British zoologist William Hamilton offered a solution back in 1964.

"Hamilton put forward the idea that animals can enhance the number of genes they pass on not only by producing offspring, but by helping relatives," Professor Jennions said.

"He suggested that animals should strive for high 'inclusive fitness' - which takes into account not only an individual's own offspring, but any impact on its relatives' reproduction."

However, a stumbling block in Hamilton's theory was its claim that an individual's inclusive fitness should exclude any offspring produced with help from others.

Professor Jennions and his co-author Dr. Lutz Fromhage from the University of Jyväskylä in Finland say this is unfeasible in most real-world situations.

"For example, the evolution of the behaviour and morphology of a queen bee cannot be understood in isolation from the help given by workers," Professor Jennions said.

According to Dr. Fromhage, the researchers' computer simulations show that, to justify inclusive fitness as the thing which individuals evolve to maximise, all offspring—including those produced with help from others—must be taken into account.

"None of the effects of received help should be disregarded or stripped away when measuring inclusive fitness," Dr. Fromhage said.

"Our paper is technical, but the outcome is highly practical.

"Field studies of social evolution, be they on bacteria in hospitals, or hyaena in the wild, are inspired by the idea of inclusive fitness."

The research has been published online in the journal *Proceedings of the Royal Society B*.

More information: Lutz Fromhage et al. The strategic reference gene: an organismal theory of inclusive fitness, *Proceedings of the Royal Society B: Biological Sciences* (2019). DOI: 10.1098/rspb.2019.0459