Bacterium makes the male parasitic wasp redundant

A bacterium in the reproductive organs of female parasitic wasps manipulates the process of cell formation so that unfertilized eggs hatch into daughters.

American parasitic wasps of the *Muscidifurax uniraptor* species are almost all females. A symbiotic bacterium in the wasp's reproductive organs causes unfertilized eggs to hatch into females without the aid of a male or its sperm. The underlying mechanism is less complex than hitherto believed, concluded entomologist Yidong Wang during his PhD research.

The sex of the miniscule parasitic wasp is not determined by sex chromosomes as it is in humans, but by the number of chromosomes in a cell. The males have a single set of chromosomes in every cell, while the females carry a double set. Scientists used to believe that the bacterium in the parasitic wasp, *Wolbachia*, used a range of signals to cause unfertilized eggs to hatch into females, as happens in other parasitic wasps. But in this particular species it uses just one trick: doubling the genetic material in the egg.

Chromosomes

Wang demonstrated this with a female parasitic wasp bred in the lab, which carried not two but three copies of every chromosome. 'Some of her unfertilized eggs contain a single set of chromosomes, and others two,' explains Wang. Those eggs hatched into males and females respectively. The entomologist concluded that the number of chromosome pairs was the only determining factor. So the bacterium only needs to double the genetic material and no further signals from the bacterium are required.

The bacterium intervenes just after meiosis takes place, the division of chromosome pairs to create egg cells. Through a mechanism yet to be identified, the bacterium causes two chromosome sets to fuse, and the egg subsequently hatches into a female wasp. The bacterium has good reason for this, says Wang. 'Unlike the females, the males don't pass the bacterium on to their offspring.' So, the bacterium's chances of survival are greater if the females outnumber the males. NVTWH

The sex is determined by the number of chromosomes in a cell

A parasitic wasp laying eggs in a fly larva. Photo Wikimedia Creative Commons