

Royal jelly makes bee queens, boosts nurture case

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New Australian National University research may explain why eating royal jelly destines honeybee larvae to become queens instead of workers – and in the process adds new weight to the role of environmental factors in the nature/nurture divide.

Scientists from the Research School of Biological Sciences at ANU have discovered that a copious diet of royal jelly flicks a genetic switch in young bees that determines whether they'll become a queen, or live a life of drudgery.

Their findings are published in the latest edition of the journal *Science*.

“Royal jelly seems to chemically modify the bee’s genome by a process called DNA methylation and disrupts the expression of genes that turn young bees into workers,” explains Dr Ryszard Maleszka.

“When we ‘silenced’ a gene controlling DNA methylation without recourse to royal jelly, we discovered that the larvae began to develop as queens with the associated fertility, rather than as infertile workers.”

Dr Maleszka and his colleagues believe this is the first time that DNA methylation has been functionally implicated in insects. The molecular process is common in vertebrates – including humans.

“If you have identical human twins, and one develops schizophrenia, then you need another mechanism to explain how this can occur when

they have the same genetic blueprint,” Dr Maleszka says.

“DNA methylation links genomes to environmental factors like nutrition and modifies how genes express themselves. Discovering this in bees, which are a much simpler biological model than humans, means we have a better opportunity of understanding more about how this process occurs.”

The researchers will continue to study how DNA methylation affects bees, as they suspect that the process could also be responsible for how the insects’ brains develop, and may thus be connected to bee behaviour and even social organisation. The research suggests that environmental factors, such as how organisms are nurtured, can have a major influence on how they develop.

The research team includes Joanna Maleszka, Dr Robert Kucharski, Dr Sylvain Foret and Paul Helliwell. The current work grew out of the honeybee genome project, which mapped the entire genetic blueprint of bees. Royal jelly is a food substance secreted by adult bees that is fed in some measure to all young bees. The larvae that is chosen to be queen is fed an exclusive diet of royal jelly.

Source: Australian National University

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