
Why produce males when your daughters are parthenogenetic ? The case of *Mesorhabditis*

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Abstract

Sperm-dependent parthenogenesis, also called pseudogamy, is a reproductive strategy in which females use the sperm of males from another species to activate their oocytes. Later, the sperm DNA does not participate to the development of the zygote, which produces only females. Here we report a new and unique reproductive strategy found in the pseudogamous nematode species *Mesorhabditis belari*, which produces its own males. While fertilization is needed to activate all female oocytes, 92% of oocytes undergo a single meiotic division, do not decondense the male DNA and produce diploid females by gynogenesis. In 8% of the cases, oocytes undergo two rounds of meiotic divisions, the paternal DNA decondenses and mixes with the female DNA, producing exclusively diploid male individuals. The question is then: 'Why do females produce these males instead of relying on the other's sons?' since their genetic material does not participate to the female fitness. A game theory model completed by computer simulations, explains why males are maintained in these populations provided they behave in a particular and efficient way. The behaviour of the males was then studied experimentally and was shown to fit the model's requirements.

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