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New theory tests sex ratios under asymmetrical local mate competition among parasitoid wasps

For many species, the ratio of sons to daughters a mother produces can have a profound effect on her evolutionary success. Too many sons, or too many daughters, may mean a female does not pass on as many copies of her genes to the next generation as another mother. The crucial determinant of sex ratio for many species will be how likely related individuals will interact, in particular whether brothers will be competing amongst themselves to mate with their sisters. This situation becomes increasingly likely in species with very structured populations, where only one or a few females will produce offspring locally, and related males and females will be mating with each other. To reduce this local mate competition between sons, mothers should bias the sex ratio towards daughters, reducing male competition and providing them each with more females to mate with.

Parasitic wasps that lay their eggs on insect hosts often have such a population structure, and work has shown that sex ratios vary with the number of females contributing to a host or group of hosts, as expected. For example, in the parasitic wasp *Nasonia vitripennis*, females vary their offspring sex ratios in response to both the presence of other females on a patch, and the presence of eggs already laid on the host they are about to use themselves. However, often groups of hosts will be a mixture of parasitised and unparasitised hosts, and the mating environment will be influenced by wasps emerging from all the parasitised hosts, some related to each other but some not.

In a new study featured in the September issue of *The American Naturalist*, David M. Shuker (University of Edinburgh) and colleagues show that females alter the sex ratio they produce on a host by considering whether there are already eggs on the host they are using and if there are other eggs already laid on other hosts in the patch. The researchers developed a new theory to explain what the best sex ratios should be for different situations and to demonstrate that females qualitatively confirm these novel predictions. This suggests that females are incredibly subtle in their use of information from the whole patch when it comes to making their sex ratio decisions.

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