

Research Project

Postcopulatory sexual selection in hermaphrodites: Mechanisms of selective sperm use

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Project title Postcopulatory sexual selection in hermaphrodites: Mechanisms of selective sperm use

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Department

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The study of sexual selection attempts to explain the evolution of structures and behaviour associated with reproduction. Thus far, theories on sexual selection have been developed and tested almost exclusively in species of separate sexes (gonochorists), such as insects, birds and mammals. We investigate different aspects of sexual selection in simultaneous hermaphrodites. Since simultaneous hermaphrodites combine a female and a male function, conflicts arise within and between individuals that do not exist in gonochorists. Land snails with different reproductive systems (both facultative and obligate selfing and outcrossing) have been chosen as study objects because experimental manipulations and laboratory breeding can be performed with relative ease. It has been proposed that the sexual conflict between the two genders in simultaneous hermaphrodites could be resolved by gamete trading. Theory predicts that sperm trading should occur in hermaphrodites in which the female role controls fertilization, e.g. in gastropods with a gametolytic gland and/or sperm storage such as the land snail *Arianta arbustorum*. We examined whether individuals of *A. arbustorum* adjust the number of sperm they release to the number they receive from their mating partner (i.e. whether sperm trading occurs). There was a high degree of reciprocity in spermatophore transfer: in 45 of the 46 investigated mating pairs both partners delivered a spermatophore which contained spermatozoa. The number of sperm transferred ranged from 0.8 Mio. to 4.0 Mio (mean = 2.2 Mio; N = 91). However, the numbers of sperm transferred by the two mating partners were not correlated. This indicates that sperm trading does not occur in this simultaneously hermaphroditic land snail. We also examined whether individuals of *A. arbustorum* differentially release sperm to virgin or non-virgin partners with respect to the potential risk of sperm competition in a given mating. The results indicate that individuals of *A. arbustorum* are not able to adjust sperm expenditure to the mating history of the partner. The study of sexual selection attempts to explain the evolution of structures and behaviour associated with reproduction. Thus far, theories on sexual selection have been developed and tested almost exclusively in species of separate sexes (gonochorists), such as insects, birds and mammals. We investigate different aspects of sexual selection in simultaneous hermaphrodites. Since simultaneous hermaphrodites combine a female and a male function, conflicts arise within and between individuals that do not exist in gonochorists. Land snails with different reproductive systems (both facultative and obligate selfing and outcrossing) have been chosen as study objects because experimental manipulations and laboratory breeding can be performed with relative ease. It has been proposed that the sexual conflict between the two genders in simultaneous

hermaphrodites could be resolved by gamete trading. Theory predicts that sperm trading should occur in hermaphrodites in which the female role controls fertilization, e.g. in gastropods with a gametolytic gland and/or sperm storage such as the land snail *Arianta arbustorum*. We examined whether individuals of *A. arbustorum* adjust the number of sperm they release to the number they receive from their mating partner (i.e. whether sperm trading occurs). There was a high degree of reciprocity in spermatophore transfer: in 45 of the 46 investigated mating pairs both partners delivered a spermatophore which contained spermatozoa. The number of sperm transferred ranged from 0.8 Mio. to 4.0 Mio (mean = 2.2 Mio; N = 91). However, the numbers of sperm transferred by the two mating partners were not correlated. This indicates that sperm trading does not occur in this simultaneously hermaphroditic land snail. We also examined whether individuals of *A. arbustorum* differentially release sperm to virgin or non-virgin partners with respect to the potential risk of sperm competition in a given mating. The results indicate that individuals of *A. arbustorum* are not able to adjust sperm expenditure to the mating history of the partner.

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Keywords sex allocation, gastropods, snail, sperm size, reproductive conflict

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Published results

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