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Understanding hermaphrodite species through game theory

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ABSTRACT

We investigate the existence and stability of sexual strategies (sequential hermaphrodite, successive hermaphrodite or gonochore) at a proximate level. To accomplish this, we constructed and analyzed a general dynamical game model structured by size and sex. Our main objective is to study how costs of changing sex and of sexual competition should shape the sexual behavior of a hermaphrodite.

We prove that, at the proximate level, size alone is insufficient to explain the tendency for a pair of prospective copulants to elect the male sexual role by virtue of the disparity in the energetic costs of eggs and sperm. In fact, we show that the stability of sequential vs. simultaneous hermaphrodite depends on sex change costs, while the stability of protandrous vs. protogynous strategies depends on competition cost.