Modeling the evolution of a self-fertilizing hermaphroditic worm

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The well-studied nematode worm *C. elegans* consists mostly of self-fertilizing hermaphrodites and few males. To understand how this mating system can evolve, a simple two-step mathematical model of the evolutionary pathway from a malefemale species to a selfing-hermaphrodite species is constructed. First, the frequency of mutant females capable of facultative self-fertilization increases if the benefits of reproductive assurance exceed the cost. Second, hermaphrodites become obligate self-fertilizers if the fitness of selfed offspring exceeds one-half the fitness of outcrossed offspring. Genetic considerations specific to *C. elegans* show that males may endure as descendants of the ancestral malefemale species. These models together with experimental observations suggest a sexual conflict over mating in *C. elegans*: selection favours hermaphrodites that self and males that outcross. The strength of selection on hermaphrodites and males differs, however. Males that fail to outcross suffer a genetic death. Hermaphrodites may never encounter a rare male, and those that do and outcross only bear less fecund offspring. This asymmetric sexual conflict results in an evolutionary stand-off: rare, but persistent males occasionally fertilize common, but reluctant hermaphrodites. A consequence of this stand-off may be an increase in the longevity of this type of mating system.