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The Evolution of Sexual Imprinting

Sexual imprinting occurs when individuals acquire mating preferences by observing the phenotypes of other individuals in the population. Offspring might imprint on their fathers (paternal imprinting), mothers (maternal imprinting), or on randomly selected members of the parental generation (oblique imprinting). Imprinting is common in nature, and it is expected to have implications for speciation and for the evolution of sexual selection. However, how imprinting itself evolves is poorly understood. Past imprinting studies have compared the different modes of imprinting across a range of imprinting strengths, but they have not found evolutionarily stable states (ESSs). Here, for the first time, we have determined and compared candidate ESSs for each mode of imprinting when females are the choosy sex across a variety of imprinting costs and for a range of sexually dependent marker trait viabilities. When a fixed cost is imposed upon imprinting, no imprinting evolves. Also, when imprinting is put under no cost or a biologically reasonable relative cost, paternal evolves to become absolute while maternal and oblique evolve to an intermediate ESS or fail to evolve at all. When ESSs of different modes of imprinting compete, paternal always prevails when present. However, when maternal and oblique compete across a range of viabilities, either can prevail as the ESS, depending on t he magnitude of cost and the character of the marker trait. We conjecture that instances of maternal and oblique imprinting observed in nature arise primarily in systems in which paternal imprinting is not possible, such as when fathers are not present during child rearing.