

POSTER PRESENTATION

EVOLUTIONARY THEORY AND DIFFERENTIAL RATES OF SEXUAL REPRODUCTION IN DIATOMS

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When compared with asexual reproduction, the costs of sexual reproduction are many, and include: 1. Cellular Mechanical Costs: due to the lost time when organisms could be reproducing asexually 2. Cost of Meiosis: due to the energy and materials required to produce gametes 3. Cost of Fertilization: due to the time and energy spent finding a mate 4. Cost of Recombination: due to the probability that the original parental genotype may be lost. Balancing these costs, sexual reproduction maintains genetic diversity within populations, increasing the chances that some individuals will be fit in any different conditions, as well as by purging deleterious alleles through recombination and expression of alleles through homozygosity. This is especially important when organisms live in environments that are undergo frequent or unpredictable change. The costs of sexual reproduction are felt acutely by unicellular populations that have both asexual and sexual life cycles, since their growth rate is a direct reflection of their fitness. Diatoms (family Bacillariophyta) are a common unicellular alga found in both marine and freshwater environments that possess sexual and asexual life cycles, and in diatoms, sexual reproduction has the added benefit of restoring the larger, vegetative size to a population. Due to differences in sexual reproduction, centric and araphid diatoms are inferred to experience a higher cost for sexual reproduction than raphid pennate diatoms. Based on this, we hypothesize that raphid pennate diatoms will have a undergo sexual reproduction more frequently than centric or araphid diatoms, and predict that in a given diatom community, raphid pennates will show evidence of more frequent and/or more recent sexual reproduction than araphid and centric species in the same community. Samples of diatoms from Lake Phalen in St. Paul Minnesota were collected and the most abundant species in each group was counted and measured: a raphid pennate from the genus *Rhopolodia*, an araphid pennate from the genus *Fragilaria*, and a centric from the genus *Cyclotella*. Histograms of the size distributions were constructed for each species and support the hypothesis that sexual reproduction, as indicated by cell size frequency distributions, has occurred most frequently, and most recently, in the raphid pennate species.