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Selective advantage for sexual replication with random haploid fusion[1] EMMANUEL TANNENBAUM, Ben-Gurion University of the Negev — This talk develops a simplified set of models describing asexual and sexual replication in unicellular diploid organisms. The models assume organisms whose genomes consist of two chromosomes, where each chromosome is assumed to be functional if and only if it is equal to some master sequence. The fitness of an organism is determined by the number of functional chromosomes in its genome. For a population replicating asexually, a cell replicates both of its chromosomes, and then divides and splits its genetic material evenly between the two cells. For a population replicating sexually, a given cell first divides into two haploids, which enter a haploid pool. Within the haploid pool, haploids fuse into diploids, which then divide via the normal mitotic process. When the cost for sex is small, as measured by the ratio of the characteristic haploid fusion time to the characteristic growth time, we find that sexual replication with random haploid fusion leads to a greater mean fitness for the population than a purely asexual strategy. The results of this talk are consistent with previous studies suggesting that sex is favored at intermediate mutation rates, for slowly replicating organisms, and at high population densities.

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