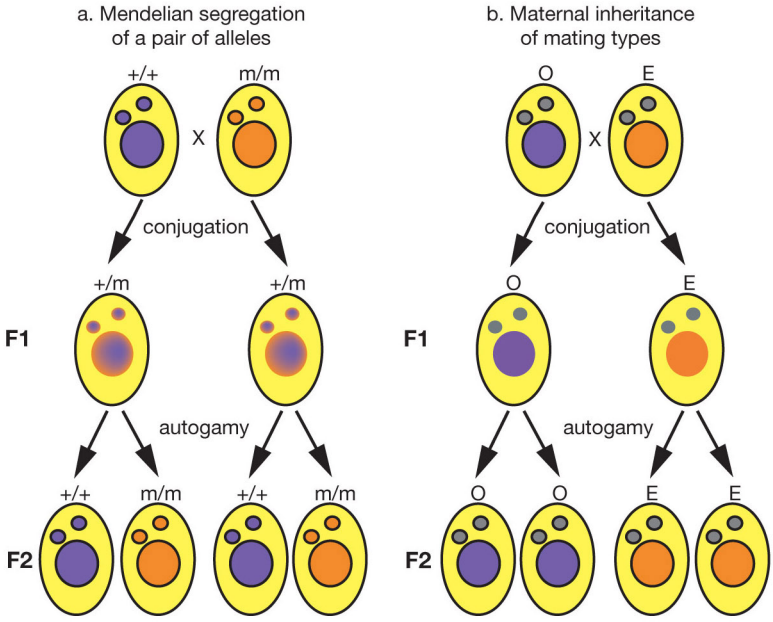

Figure 2. Mendelian vs. Cytoplasmic Inheritance

(*a*) Conjugation and autogamy are illustrated by a cross between two *Paramecium* cells, each homozygous for different alleles, M or m. Conjugation involves the reciprocal exchange of one of two identical gametic nuclei. This results in F_1 exconjugants with identical heterozygous genotypes. Autogamy, a self-fertilization process, generates an entirely homozygous genotype in just one sexual generation such that these F_2 individuals have a 50% chance of becoming M/M or m/m. (*b*) Phenotypic difference between F_1 clones reveals cytoplasmically inherited characteristics. In *Paramecium*, mating type (O or E) is irreversibly determined during the development of the somatic macronucleus (*large circle*) from the totipotent germ-line micronucleus (*small circle*); however, the parental macronucleus directs differentiation of each exconjugant toward maintaining the existing mating type.