2018

Meiotic Drive in C. elegans: A Violation of Mendel's Second Law

Alexis Brown
Cleveland State University

Emilia Kalutskaya
Cleveland State University

Urja Patel
Cleveland State University

Taylor R. Schilling
Cleveland State University

Meiotic Drive in C. Elegans: A Violation of Mendel's Second Law

College of Sciences and Health Professions

Student Researchers: Alexis Brown, Emilia Kalutskaya, Urja Patel, and Taylor R. Schilling

Faculty Advisor: Aaron F. Severson

Abstract

Under normal conditions, alleles segregate randomly during meiosis so that each one has an equal chance of being passed onto the next generation. However, in some cases, a given allele is more likely to be passed on, along with any nearby alleles. These cases are said to exhibit meiotic drive. Meiotic drive allows biased segregation of particular alleles instead of independent assortment. This process is significant because it can drive evolution by altering the genetic makeup of a population. Such a case exists in *C. elegans*, in which the offspring of males who carry the genetic balancer *qC1* along with an inserted DNA sequence exhibit a ratio of male to hermaphrodite progeny of 80:20. Under normal meiosis, this ratio should be 50:50. With the ultimate goal of discovering the genes responsible for meiotic drive, *qC1* males are mutated and crossed with hermaphrodites in order to find a set of offspring whose ratio of males to hermaphrodites is 50:50, indicating that the gene responsible for the skewed ratio has been mutated. Understanding meiotic drive in *C. elegans* is relevant because normal mechanisms of meiosis are comparable to those in humans and other organisms, so deviation from the normal process may be applicable as well.