Why the Process of Meiosis Creates Better Genetic Diversity than Asexual Reproduction

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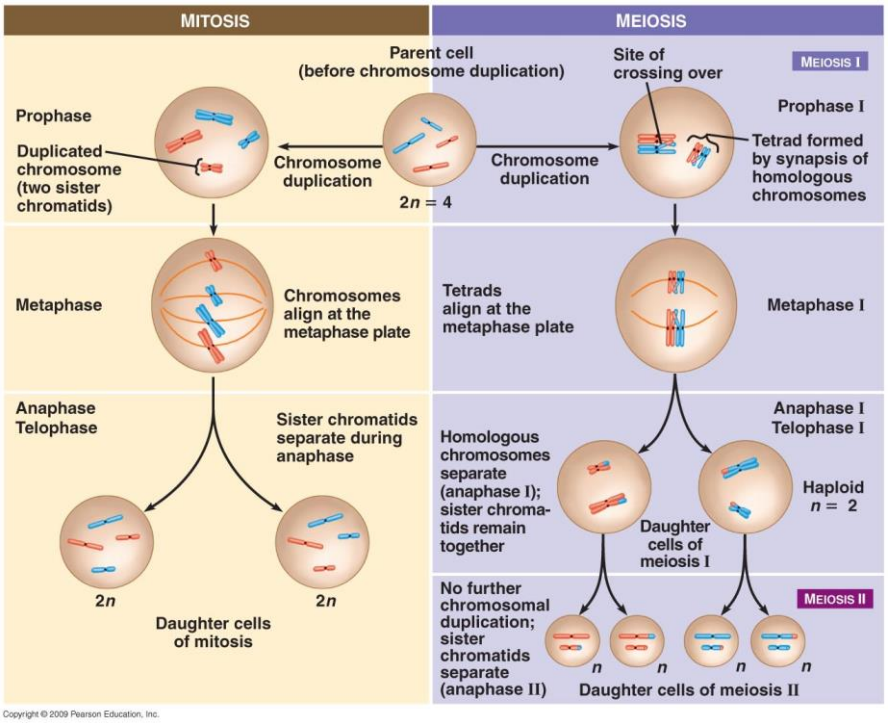

(Article modified to include the diagram above)

P1 It is the biological **imperative** of every organism on Earth to pass on its genes to the next generation. Given the diversity of life, it should come as no surprise that there are quite a few ways that species reproduce. Despite the variation, nearly all forms of reproduction can be grouped into two categories: asexual or sexual reproduction. Reproduction doesn't just replace individuals that die; it contributes to the creation of genetic diversity within a species. The type of reproduction that a species performs has consequences for the genetic diversity of the next generation.

P2 **Genetic Diversity**

Species are populations of individuals that can and do reproduce together. The differences between individuals in a population are more than just skin deep -- they differ in their genes. Genetic variation among individuals in a population is what ensures that the species will be able to survive in a changing environment. Ecosystems aren't **static**, they're **dynamic**, and species need raw genetic variation on which natural selection can operate. If all of the individuals in a population are too genetically similar, then a single disease or change in the environment could drive the species to extinction. Reproduction plays a large role in controlling genetic diversity in populations.

P3 **Asexual Reproduction**

Asexual reproduction is the process of creating offspring that are genetically identical to the parent. A single organism is able to do this. This mode of reproduction is common in single-celled organisms and also occurs among plants, fungi and animals. Asexual reproduction can involve cell division (bacteria, archaea), or in plants and fungi, pieces can break off of the organism and become self-sufficient clones of the parent—a process known as *budding*. In every type of asexual reproduction, the offspring are usually genetically identical to the parent, so no new genetic variation is introduced into the population. Only if a mutation occurs during cell division will the offspring differ.

P4 **Meiosis**

Normal cell division is called "mitosis." Most cells are diploid, meaning that they have two sets of chromosomes. When diploid cells divide via mitosis, they produce two daughter cells that are also diploid. Sexual reproduction relies on a special type of cell division called "meiosis." Meiosis produces four daughter cells that are haploid, meaning that there is only one copy of each chromosome in each cell. In meiosis the arms of different chromosomes may overlap, break and recombine before the division is complete. This process, called "crossover," creates new combinations of existing genes within the haploid daughter cells. Each haploid cell produced by a parent organism contains half of the parent's genetic material.

P5 **Sexual Reproduction and Genetic Diversity**

Sexual reproduction brings together a haploid cell from two different parents to produce a diploid zygote. The zygote contains a unique combination of genes from both parents and will grow into an individual that has traits of both parents. That particular combination of traits may make the offspring more fit than either of its parents. Through sexual reproduction a population maintains its genetic diversity and creates **unique** individuals with each new generation. Asexually reproducing populations may be comprised entirely of clones and thus have very little or no genetic diversity.

http://education.seattlepi.com/process-meiosis-creates-better-genetic-diversity-asexual-reproduction-5973.html

Questions:

1. ***Using evidence*** from the diagram, ***compare and contrast*** the processes of mitosis and meiosis.

2. ***Explain*** how diversity in the reproductive processes is illustrated in the diagram.

3. Paragraph 2 uses the words "*static*" and "*dynamic*." ***Using evidence from the text*** to support your response, ***explain*** the meaning of the terms and why they are appropriate in a discussion of genetic diversity.

4. ***Compare and contrast*** how genetic diversity is achieved in mitosis and meiosis. ***Cite text*** to support your answer.

5. ***Explain*** the relationship between the introduction in Paragraph 1 and the phrase "*…..offspring more fit than either of its parents"* used in paragraph 10. Support your response ***using evidence from the text.***