

Investigating Reproductive Strategies

Abstract

Students work in pairs to compare five aspects of an organism that reproduces sexually with one that reproduces asexually. As a class, students share their comparisons and generate a list of general characteristics for each mode of reproduction, and discuss the advantages and disadvantages of both.

Learning Objectives

- There are two modes of reproduction, sexual and asexual.
- There are advantages and disadvantages to both sexual and asexual reproduction.

Estimated time

- Class time 50 minutes
- Prep time 10 minutes

Materials

Copies of student pages

Instructions

1. Divide students into pairs.
2. Hand each pair:
 - The Investigating Reproductive Strategies worksheet
 - 2 organism descriptions - one for an organism that reproduces sexually and one for an organism that reproduces either asexually or using both strategies - (see chart below).

	Sexual	Asexual	Both Sexual and Asexual
Reproductive strategies used by organisms described in this activity	Blue-headed wrasse	Amoeba	Brittle star
	Duck leech	Salmonella	Meadow garlic
	Grizzly bear	Whiptail Lizard	Spiny water fleas
	Leafy sea dragon		
	Red kangaroo		
	Sand scorpion		

3. Instruct each pair to read about their assigned organisms and complete the comparison table on the Investigating Reproductive Strategies worksheet.
4. When all pairs have completed the comparison table, have them post their tables around the room.

5. Ask students to walk around the room and read the comparison tables with the goal of creating a list of general characteristics for organisms that reproduce sexually and one for organisms that reproduce asexually.
6. As a class, compile lists of general characteristics for organisms that reproduce sexually and asexually on the board. Learning objectives and discussion points for each category on the Investigating Reproductive Strategies worksheet are listed on pages 2-4 to help you guide the discussion.
7. Ask students to discuss the advantages and disadvantages of each mode of reproduction in their pairs. Have them prepared to support their reasoning.
8. Add advantages and disadvantages to the list of general characteristics for each mode of reproduction.
9. Lead a discussion on the types of situations or conditions in which each mode of reproduction would be most advantageous or disadvantageous. Do students think one reproductive mode is generally better? Why?

Discuss

- There are advantages and disadvantages to both sexual and asexual reproduction.
- For an individual it is “best” if the greatest number of its offspring survive to reproduce, carrying its genes into the next generation.
- Some species produce large numbers of offspring, but only a few may survive to reproduce. Other species produce few offspring, but parents provide extended care to improve each offspring’s chance of survival.
- For a species it is “best” if individuals survive and reproduce so that the species does not go extinct.
- Genetic variation, through new combinations of alleles, results only from sexual reproduction. Certain variations may help individuals survival and reproduce, giving the population the potential to adapt to new and changing environments.
- Organisms that can use both sexual and asexual modes of reproduction may be most adaptable to different conditions.

Learning Objectives/Discussion Points

	Sexual	Asexual
Relative complexity of organism (including size)	Complex organisms tend to reproduce sexually.	Simple organisms tend to reproduce asexually.

Number of parents who contribute genetic information to the offspring	Two parents contribute genetic information. Offspring are unique from their parents and from each other.	One parent contributes genetic information. Offspring are exact genetic copies (clones) of the parent.
Reproductive mechanism	Gametes from two parents join. With sperm fertilize eggs inside the body, the chances of gametes meeting are increased. Each individual may produce fewer eggs and/or sperm. When eggs and sperm are released to join outside the body, the gametes have a lower chance of meeting. Organisms that reproduce in this way must produce many gametes.	Asexual reproduction does not involve gametes. Reproduction is by splitting in half, or forming new individuals that are released from the "parent."
Relative amount of parental care	Offspring tend to have longer gestation periods, and developing offspring are protected. Parents tend to care for their young, increasing the chances that offspring will survive. Organisms that invest time and energy in caring for their young tend to have fewer offspring. Some sexually reproducing organisms neither gestate nor care for their young. These offspring are vulnerable to predators or the environment. These organisms tend to produce large numbers of gametes and/or offspring. This increases the chances that some offspring will survive and reproduce.	Offspring receive little or no parental care. Organisms that reproduce by forming new individuals that separate from the parent do provide a form of parental care before the offspring are released. Organisms that do not care for their young tend to produce large numbers of offspring. Organisms where few offspring survive to reproduce have large numbers of offspring. Organisms that split to produce an "adult" offspring often can rapidly reproduce again.
Genetic variation in the offspring	Genetic variation comes only from sexual reproduction, in which genetic information from two parents combines. Genetic variation helps a species (as a whole) survive. In the event of a change in environment or increased competition for resources, some organisms may have slight trait variations (due to genetic variation) that allow them to survive. Over time, natural selection may favor these differences, resulting in new adaptations.	Offspring have little to no genetic variation. (note: variation does still arise through random mutation) In the event of a change in environment or competition for resources, offspring may not have trait variations that will allow them to survive. If a parent has traits that are well adapted to a particular environment, its offspring will have these same traits, which may provide them with a survival advantage.

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