

LESSON PLAN

Exploring the Role of Isolated Populations in Inbreeding

Discuss how scientists define populations, and how inbreeding in small populations has consequences for the health of the population.

Learning Goals:

Populations

- A population is a group of individuals of one species living in the same area that interbreeds
- Small populations may result in inbreeding, which can often cause health problems

Inbreeding

- Inbreeding is when close relatives mate.
- Inbreeding can cause health problems or death in individuals by making it more likely for harmful recessive traits to be expressed.

CHECKLIST

Exploring the Role of Isolated Populations in Inbreeding

In this lesson, students will:

- Be seated in groups of five students.
- Review how scientists define bighorn sheep populations. **(5 min)**
- Investigate and summarize one inbreeding case study. **(10 min)**
- Complete the jigsaw activity for the five inbreeding case studies. **(20 min)**
- Complete the *Exploring the Role of Isolated Populations in Inbreeding* section of the Investigation Booklet. **(5 min)**

(Times indicated are approximate.)

Bighorn Sheep Populations discussion

This discussion reviews how scientists define populations, and how that applies to bighorn sheep.

Discussion

Key Idea: Bighorn sheep live in small mountaintop populations.

Question: What is a population?

Answer: Populations are groups of the same species that live and breed together.

Question: How are the bighorn sheep populations different from one another?

Answer: They are different genetically and geographically.

Question: What geographic feature defines them?

Answer: The bighorn sheep populations are determined by the mountaintops on which they live.

Inbreeding Case Studies activity Part 1

This activity exposes students to the causes and consequences of inbreeding in animal and human populations.

Assign students to groups of five to investigate and summarize one inbreeding case study. Ask students to complete the graphic organizer for their case study.

Part 2 of this lesson has students present completed case studies to new groups, and together each group completes the remaining case studies.

Discussion points for each case study:

1) Domestic dogs

- a) Purebred dogs were inbred for desired characteristics like herding, fetching, and tracking skills
- b) Unfortunately, health problems also resulted like hip, elbow, heart, and eye problems

2) The Florida Panther

- a) Hunting and habitat loss have reduced its numbers to 70 individuals confined to South Florida.
- b) So few panthers remain that they are now inbred, which has caused health problems like heart defects and abnormal sperm. These defects make it even harder for them to survive.

3) Thoroughbred Horses

- a) Thoroughbred horses were selectively bred (inbred) for speed
- b) Some Thoroughbreds have skeletal defects, which can lead to broken bones. They also have reproductive problems.

4) The Hapsburg Royal Family of Europe

- a) The Hapsburg family ruled Austria and Spain as well as many other European countries between the 15-18th centuries.
- b) In order to keep “pure” bloodlines and seal alliances for increased power, the Hapsburgs inter-married one another frequently. Marriages between first cousins and uncles and nieces were fairly common.
- c) One result of this inbreeding is the “Hapsburg Jaw” where the lower jaw grows longer than the upper jaw making for an extended chin.

5) Maple Syrup Urine Disease

- a) The Amish communities had very small founding populations, which led to genes for this disorder to be more common in today’s population.
- b) This circumstance results in the high rate of Maple Syrup Urine Disease in today’s population. This disease can cause seizures, comas, and death, if left untreated.

Inbreeding Case Studies activity Part 2

This activity extends part 1 by reassigning students to new groups to present the case study completed in part 1, and then to complete the remaining case studies.

After completing Part 1 of this activity, jigsaw the students into new groups of five with one student representative from each inbreeding case study. Have each student in the new group share the case study that they previously investigated. Ask the students to complete the rest of the graphic organizers.

Discussion points for each case study:

6) Domestic dogs

- a) Purebred dogs were inbred for desired characteristics like herding, fetching, and tracking skills
- b) Unfortunately, health problems also resulted like hip, elbow, heart, and eye problems

7) The Florida Panther

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10) Maple Syrup Urine Disease

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