

Grasshopper Testes Squashes

OBJECTIVE/RATIONALE

A study of meiosis is necessary for an understanding of normal cell division. The student will identify the normal phases of meiosis in a male grasshopper.

TEKS 121.13 (c) 1A, 1B, 2B, 4A

TAKS ELA 1, 5
Mathematics 8, 9
Science 1, 4

National Science Education Standards A9-12;C9-12

National Health Care Skills Standards .01, .04, .05, .06, .07, .08

National Curriculum Standards for School Mathematics S1; S3; S10; S11

KEY POINTS

Meiosis I:

Interphase I – DNA replication. Chromatin looks like “ball of yarn”.

Prophase I - chromosomes coil and condense to form a tetrad (synapsis).

Metaphase I - tetrads align along equator.

Anaphase I - tetrads split and dyads move to opposite poles.

Telophase I – cleavage furrow forms as cell splits (cytokinesis) to form two haploid cells.

Meiosis II:

Interkinesis – similar in appearance to interphase I without DNA replication.

Prophase II – chromosomes condense and coil.

Metaphase II – chromosomes align along the equator.

Anaphase II – dyads split at centromere and move to opposite poles.

Telophase II - cleavage furrow forms as cell splits (cytokinesis) to form two new cells for each haploid daughter cell (total of 4 haploid cells/ original cell).

** It is difficult to differentiate between stages of meiosis I and meiosis II (example: prophase I vs. prophase II).

ACTIVITIES

I. Complete the **Grasshopper Testes Squash Laboratory Investigation**.

MATERIALS/RESOURCES

Male grasshopper (no ovipositors)
Watch glass
Forceps
Microscope slide
Coverslip
50% acetic acid
2% acetic orcein – available at Flinn Scientific (phone # 1-800-452-1261;
catalog #A0093).
Filter paper
Scalpel
Microscope
Alka Seltzer
Balloon
Gloves
Goggles
Laboratory coat or apron
Biohazard containers
Surface disinfectant
Paper towels

ASSESSMENT

Laboratory Investigation Rubric

ACCOMMODATIONS

For reinforcement, the student will design a poster showing the steps of meiosis.

For enrichment, the student will research a genetic disease and describe the abnormal characteristics of the chromosome.

REFLECTIONS

Grasshopper Testes Squashes Laboratory Investigation

Purpose:

In this laboratory exercise, the student will identify the normal phases of meiosis in a male grasshopper. A live grasshopper will be dissected and the testes removed and stained for observation.

Background Information:

Materials:

Male grasshopper (no ovipositors)
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Paper towels

Procedure:

1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.

3. Prepare work area.
4. Obtain a male grasshopper.
5. Anesthetize with CO₂ (mix Alka Seltzer with water and collect CO₂ in balloon).
6. Remove the appendages.
7. Make a dorsal incision along the abdomen.
8. Look for brightly colored orange or yellow mass and carefully remove with forceps (these are the testes).
9. Place the testes in a watch glass with a small amount of water.
10. Add 2 drops of 2% acetic orcein to the watch glass.
11. Tease the tissue into smaller pieces with forceps.
12. Place a microscope slide on a paper towel.
13. Place a small amount of tissue on the slide.
14. Add 1 drop of 50% acetic acid to the slide.
15. Add 1 drop of 2% acetic orcein to the slide.
16. Place a coverslip on the slide.
17. Cover the slide with filter paper.
18. Roll your thumb over the coverslip and the filter paper. (This will squash the testes causing the nuclei to burst).
19. Place the slide on the stage of a microscope and view the stages of meiosis.
20. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

Data:

Draw and label the stages of meiosis observed from the slides.

Conclusion:

1. Identify the most common and least common stages of meiosis.
2. Which stage of meiosis was most easily identifiable? What characteristics made it easy to identify?
3. Which stage of meiosis was the hardest to identify? Why?
4. What problems did you encounter in this laboratory exercise and what would you do differently to improve your results?
5. If you were to repeat this laboratory exercise, what would you do differently to improve your results?