Title: Squash Preparation of Grasshopper Testis and Study of the Various Stages of Meiosis

Objective: To prepare a temporary stained squash of grasshopper testis and observe the various stages of meiosis under a microscope.

Introduction: Meiosis is a specialized type of cell division that reduces the chromosome number by half, producing haploid gametes. It consists of two successive divisions: **Meiosis I** (reductional division) and **Meiosis II** (equational division). The grasshopper testis is an ideal material for studying meiosis due to its large, easily distinguishable chromosomes.

Materials Required:

1. Live grasshopper (freshly dissected testis)
2. Saline solution (0.9% NaCl)
3. Hydrochloric acid (HCl, 1N)
4. Aceto-orcein or Acetocarmine stain
5. Distilled water
6. Watch glass
7. Scalpel or fine scissors
8. Forceps
9. Glass slides and cover slips
10. Filter paper or blotting paper
11. Compound light microscope

Procedure:

1. **Dissection and Collection of Testis:**
    - Anesthetize the grasshopper and carefully dissect it to expose the testis.
    - Remove the testis using fine forceps and place it in a watch glass containing saline solution.
2. **Fixation and Hydrolysis:**
    - Transfer the testis to a watch glass containing 1N HCl and incubate for 3–5 minutes to soften the tissue.
    - Rinse the tissue with distilled water and blot dry with filter paper.
3. **Staining:**
    - Transfer the testis onto a clean glass slide.
    - Add a few drops of aceto-orcein or acetocarmine stain and allow it to stain for 5–10 minutes.
4. **Squashing:**
    - Cover the stained testis with a cover slip.
    - Gently press the cover slip with the blunt end of a forceps or the back of a pencil to spread the cells into a thin layer.
    - Remove excess stain using filter paper.
5. **Microscopic Observation:**
    - Place the prepared slide on the microscope stage.
    - Start with a low-power objective (10x) to locate the dividing cells.
    - Switch to high power (40x) to observe the different stages of meiosis.

Observations:

- **Meiosis I:**
  - *Prophase I:* Chromosomes condense, homologous chromosomes pair (synapsis), and crossing over occurs.
  - *Metaphase I:* Homologous chromosome pairs align at the equatorial plate.
  - *Anaphase I:* Homologous chromosomes separate and move to opposite poles.
  - *Telophase I:* Two haploid daughter cells are formed.
- **Meiosis II:**
  - *Prophase II:* Chromosomes condense again without DNA replication.
  - *Metaphase II:* Chromosomes align at the equatorial plate.
  - *Anaphase II:* Sister chromatids separate and move to opposite poles.
  - *Telophase II:* Four haploid gametes are formed.

Discussion: The experiment successfully demonstrated the different stages of meiosis in grasshopper testis cells. Hydrolysis with HCl softened the tissues, and staining enhanced chromosome visibility. Meiosis I reduced chromosome number, ensuring genetic diversity, while Meiosis II resulted in haploid gametes. The observed stages confirm the importance of meiosis in gametogenesis and genetic variation.

Conclusion: The squash preparation technique enabled clear observation of meiotic stages in grasshopper testis cells. This experiment highlights the fundamental role of meiosis in sexual reproduction and chromosome reduction.

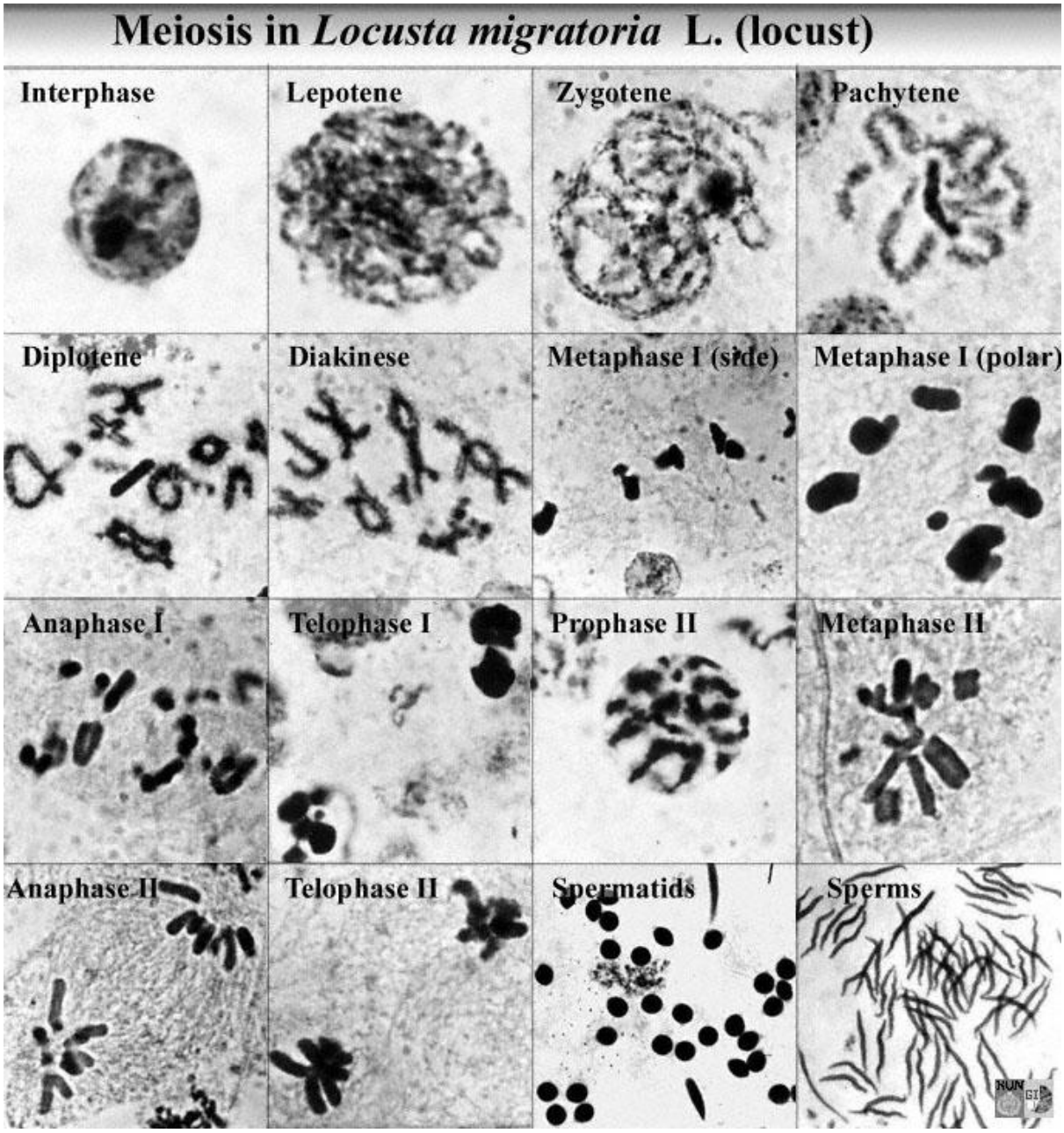

Figure 1: Different stages of meiosis in grasshopper testis squash