

# In Search of the Maternal Signal Responsible for the Reproductive Polyphenism in Pea Aphids

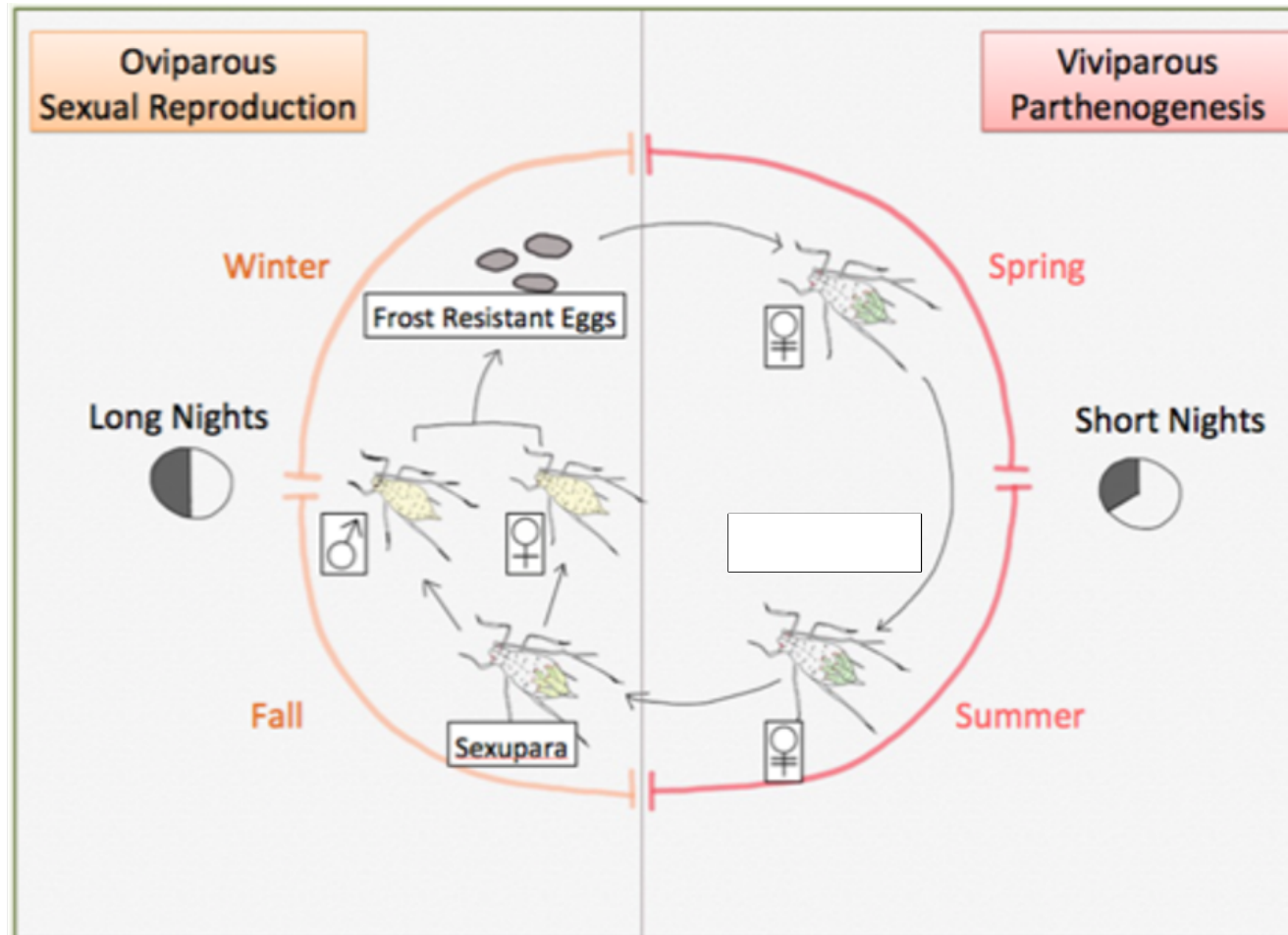
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# Reproductive Polyphenism in the Pea Aphid

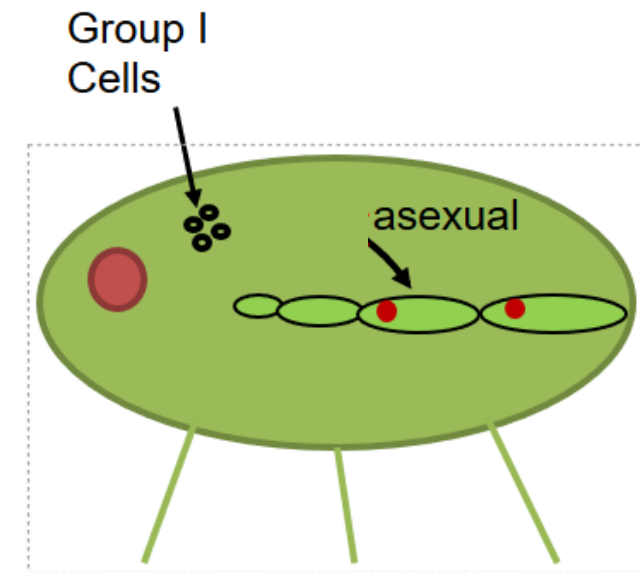
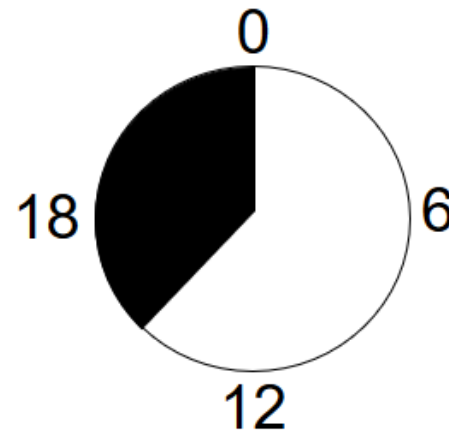


- Aphids are cyclically parthenogenetic [1]
- Short nights (spring) cues aphids to reproduce asexually/viviparously
- Long nights (fall) cue asexual aphids to produce a special type of asexual female called a sexupara
- Virginopara=asexual female producing asexual females
- Sexupara=special kind of asexual female that produces sexual females and males



# Mechanism of the Photoperiod Response

- Adult aphids perceive photoperiod not through eyes but through photoreceptors in the protocerebrum [2]
- Group 1 neurosecretory cells are thought to secrete a hormone, “maternal signal” to the developing embryos [3]
- The maternal signal is thought to be asexual-promoting [3]



# Study Purpose



- Question: Is the maternal signal an asexual-promoting signal originating from the Group 1 cells?
- Goal: To replicate and confirm the finding of Steel & Lees (1977) that proposes an asexual-promoting maternal signal originating from the Group 1 cells in the pea aphid

# Method and Predicted Results



- Three conditions, all under short nights:
  - Virginoparae, Group 1 cells ablated
  - Virginoparae, other neurosecretory cells ablated
  - Virginoparae, control (no ablation)
- The offspring produced will be scored as either sexual or asexual based on the reproductive phenotype of their offspring
- Calculate percent of offspring that were sexual in each condition
- We hypothesize that only when Group 1 cells are ablated will the aphids switch to producing sexual offspring
- Same experiment will be performed on sexuparae to demonstrate that the signal is asexual-promoting; sexuparae should continue to produce sexuals even in the condition with Group 1 cells ablated

# Bibliography

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2. Lees, AD 1964 The location of the photoperiodic receptors in the aphid *Megoura viciae* Buckton. J Exp Biol 41: 119-133.
3. Steel CGH, Lees AD. 1977. The role of neurosecretion in the photoperiodic control of polymorphism in the aphid *Megoura viciae*. J Exp Biol 67: 117-135.