

Effects of Daylight Amounts on Monarch Butterflies in Reproductive Diapause

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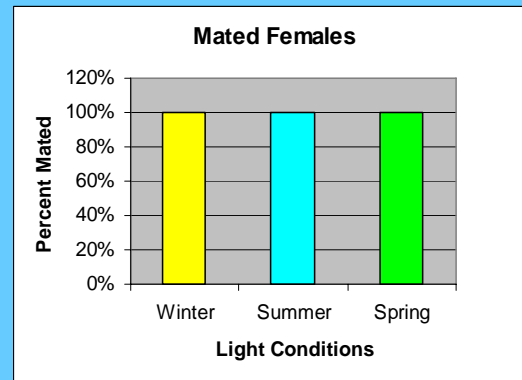
Question: Do spring or summer daylight lengths bring monarch butterflies (*Danaus plexippus*) out of reproductive diapause?

Hypotheses:

Null: The amount of daylight a butterfly receives has no effect on reproductive diapause.

H_{a1}: Butterflies kept under spring and summer daylight lengths will come out of diapause, whereas the ones kept under winter will not.

Methods: In October at Garner State Park, in the Central Flyway of Texas, I collected 15 male butterflies and 18 females butterflies that were in reproductive diapause. In order to tell that they were in diapause I felt the abdomen of the female butterflies to see if there were spermatophores. I set up three areas separated by double thick black trash bags, so no light could get in. I hung full spectrum bulbs in each area to mimic natural light. I placed 6 females and 5 males in each cage. I fed the butterflies with a sponge in a bowl with red Gatorade. Every week and a half I put in a fresh flowering plant. I took them out after 3 weeks.



The spring cage

The winter cage light was on from 7:40 AM-5:30 PM. The spring cage light was on from 6:20 AM-6:50 PM. The summer cage light was on from 6:30 AM-8:40 PM. I was able to tell if the females had mated by feeling the abdomen for spermatophores. I checked everyday for signs of mating.

Results: I did not witness any mating behavior. However, mating occurred because all of the females had spermatophores regardless of the daylight length they received. This means that at least one male in each cage came out of diapause. Only the butterflies in the winter cage actually laid eggs. There were 50+ eggs, showing that at least one of the females came out of diapause

Conclusions: Females had spermatophores regardless of the light lengths they received. This supports the null hypothesis. However, because male monarchs can force females to copulate, I cannot be sure that females actually did come out of diapause. My monarch butterflies were in a warm garage. This suggests that temperature may be a greater factor in causing monarchs to come out of reproductive diapause, which agrees with findings of other researchers. If I did this project again, I would be sure to have my holding ground set up before I started my project. I would also tag my butterflies, so I could track each individual's progress. I would also try to regulate the temperature.

References:

- <http://www.ecology.info/monarch-butterfly-page-3.htm> Retrieved 10/16/05
- <http://www.monarchlab.umn.edu> Retrieved 10/16/05
- <http://www.srh.noaa.gov/ewx/html/postwx.htm> Retrieved 10/16/05
- <http://student.biology.arizona.edu/honors2002/group10/Monarchmigration.htm> Retrieved 10/16/05
- <http://www.monarchwatch.com> Retrieved 10/16/05