

Translating Evolutionary Biology Field Research into an Inquiry-Based Experience for the Middle School Classroom



Lauren Lucas, Post-Bac Program,
Secondary Science Education, UW

Zach Gompert, Graduate Mentor,
Program in Ecology, UW

Paul Crips, Mentor Teacher
Carey Junior High School, Cheyenne, WY

Outline

1. Summer Research Experience

- The Big Picture
- Hypothesis Tested
- Methods
- Results and Interpretation

2. Translating the Research Experience into Classroom Experience

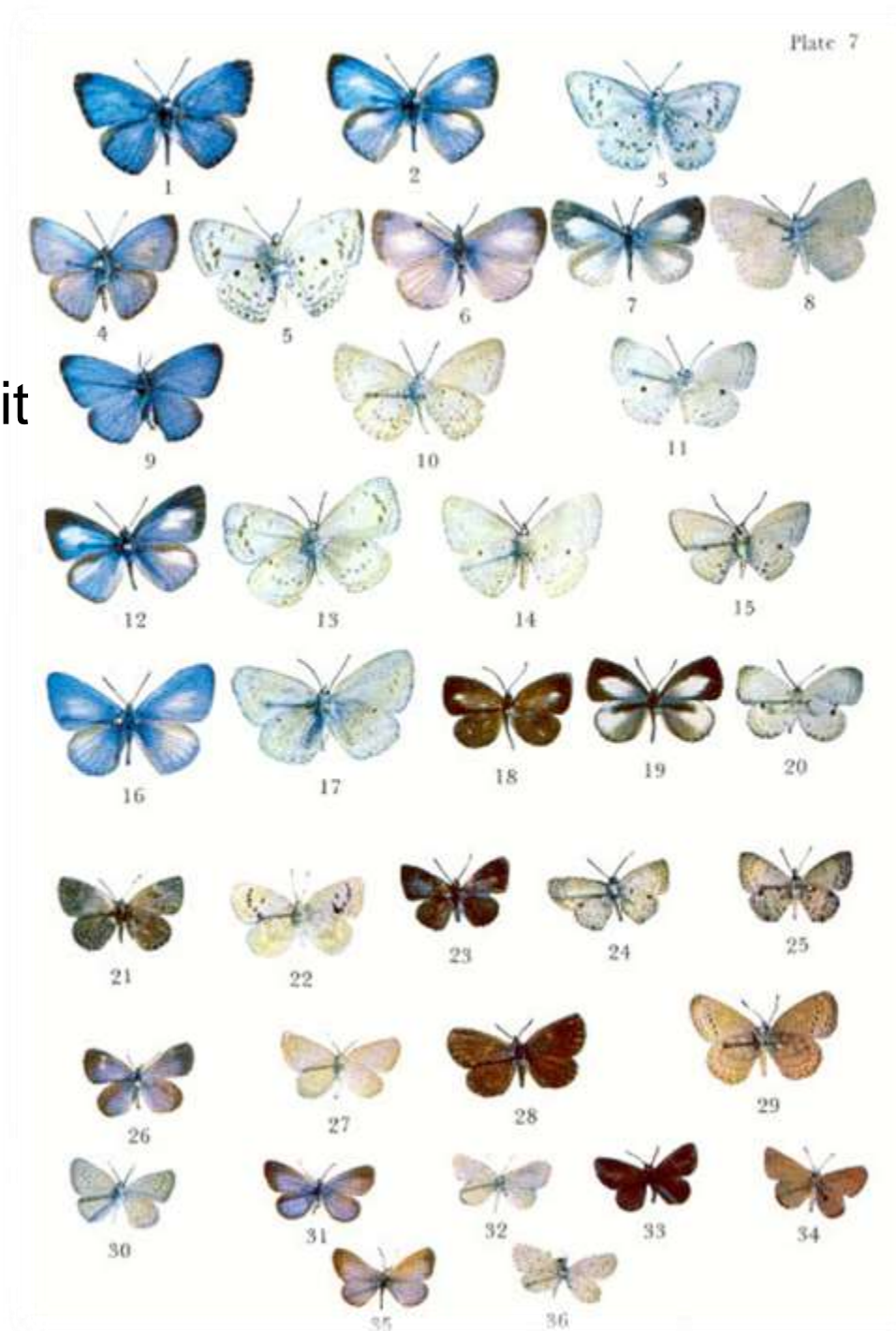
- Development of Evolution Unit
- Classroom Implementation Outcomes
- Future Plans

1. Summer Research Experience

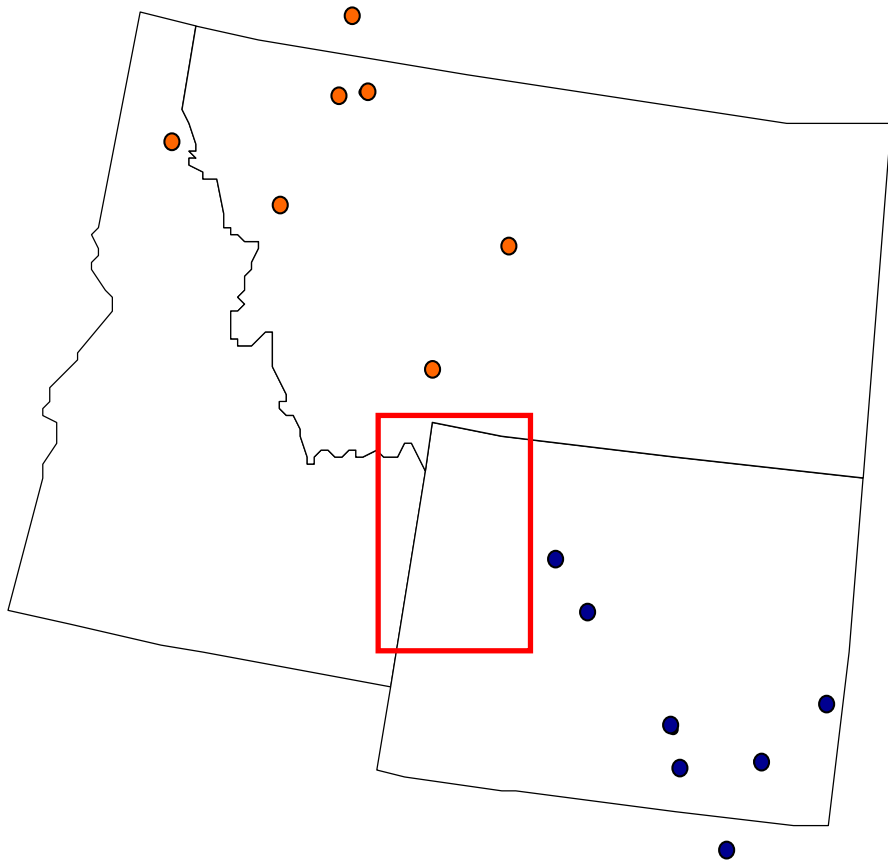


The Big Picture

- How does biological diversity arise and how is it maintained?
- Species must be reproductively isolated to prevent fusion.
- Hybrid zones provide windows into the speciation process.



Lycaeides Rocky Mountain hybrid zone



L. idas



L. 'hybrid'



L. melissa

Summer 2009 Hypothesis Tested:

Adaptation to different host-plants
(female oviposition preference)
contributes to isolation in *Lycaeides*.

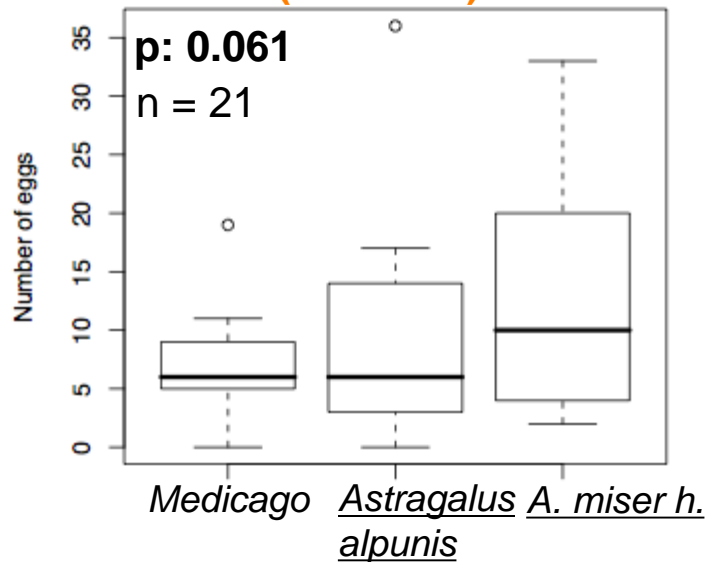


Methods

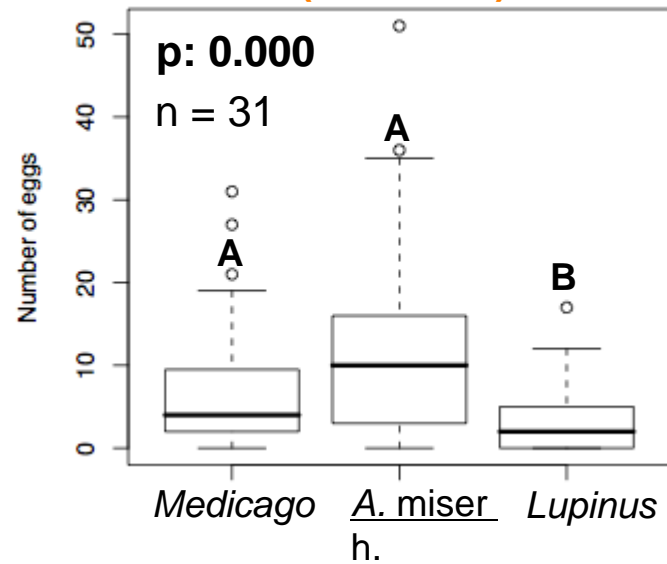


Results

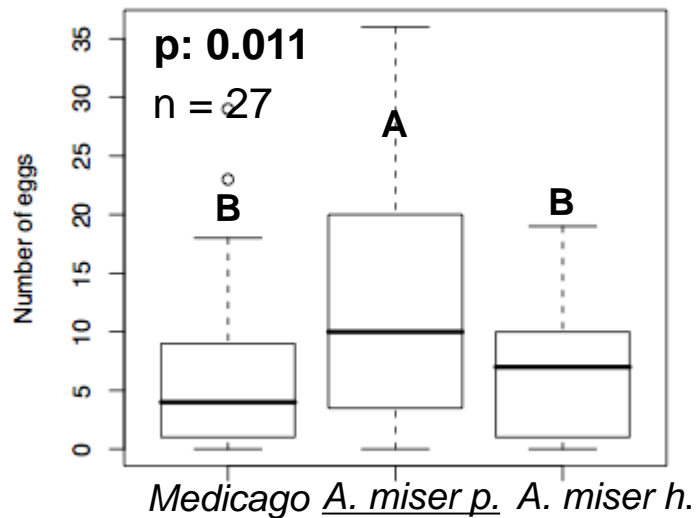
L. idas (northern)



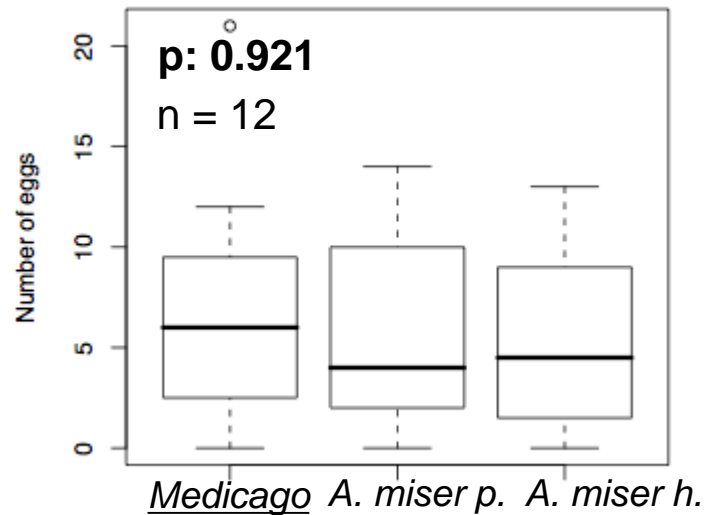
L. idas (southern)



L. 'hybrid'



L. melissa



Interpretation of Results

- Populations vary in host-plant use and females generally prefer their native host-plant.
- Host plant preference may contribute to isolation between *L. melissa* and *idas*.
- To be continued during Summer 2010.



A photograph of a classroom where several students are seated at long, dark tables. In the foreground, a boy in a yellow hoodie is looking towards a girl in a white hoodie. Another boy in a dark hoodie is sitting next to him. In the background, other students are visible, some working at their desks. The text '2. Translating the Research Experience into Classroom Experience' is overlaid in large, bold, red font across the center of the image.

2. Translating the Research Experience into Classroom Experience

Development of Evolution Unit

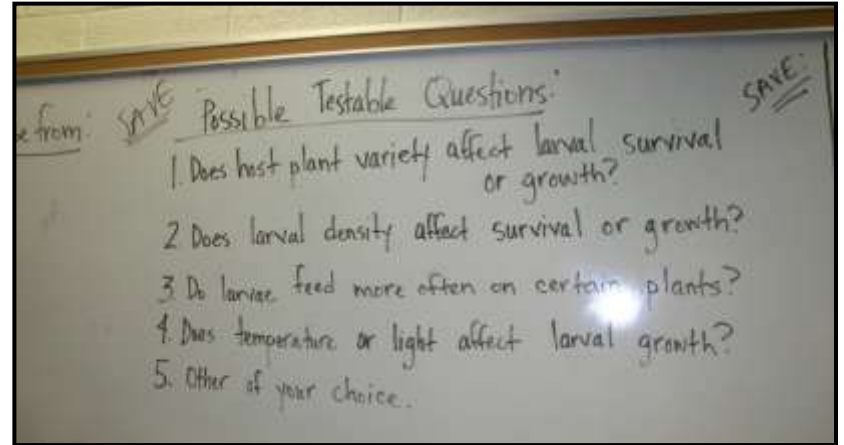
- Draw-A-Scientist
- Daily activities regarding natural selection
- Butterfly Inquiry Project



Butterfly Inquiry Project



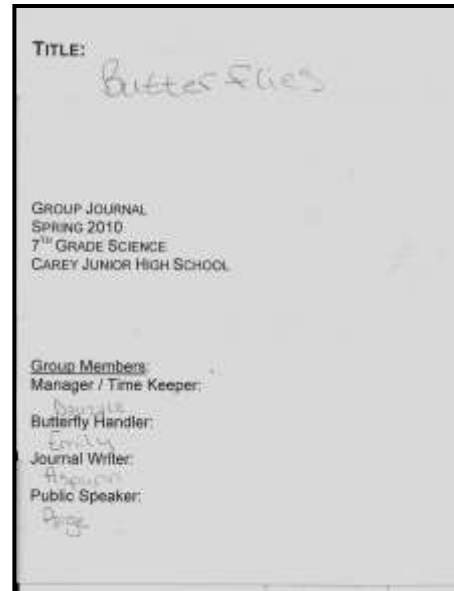
Visit from a scientist



Choice of Testable Questions



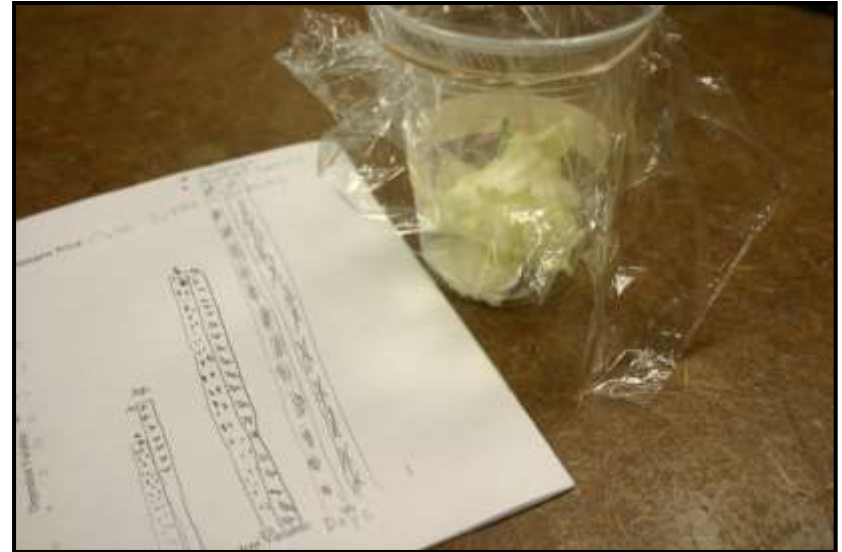
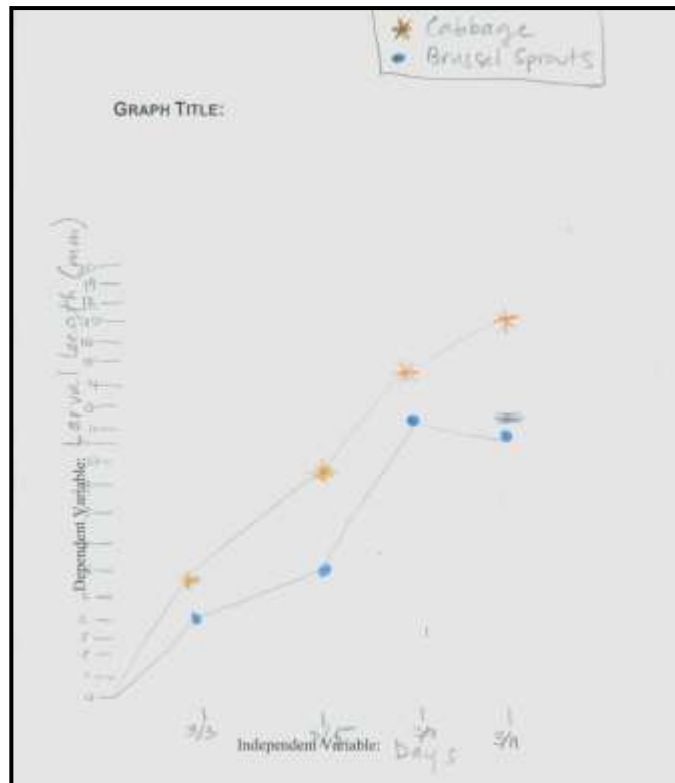
Experimental Design



Group Journal

Classroom Implementation Outcomes

Students successfully answered their testable questions regarding butterfly adaptation and became experts on the life cycle of the Cabbage White butterfly.



3B: Larvae have no preference for brussel sprouts and organic cabbage
Larvae survive better in dark than light environment
Larvae grow at same rate on brusseli and brussel sprouts
Larvae grow at a slower rate in the dark or the light ✓✓

4B: Larvae prefer nonorganic cabbage over organic cabbage ✓
Larvae grow faster in higher density
Larvae eat more brusseli vs. brussel sprouts
Larvae eat more brusseli than nonorganic cabbage













2A: Larvae at high and low density grow at the same rate
Larvae grow faster on cabbage vs. brussel sprouts
Larvae ate more brussel sprouts than organic cabbage

Classroom Implementation Outcomes

- What I would change for next time:
 - Model how to make scientific observations.
 - Hold all students accountable for journal-writing.
 - Switch group roles weekly.
 - End with a poster session.




Group Name: Joseph, Delaney, Megan, Brian

Activity: Butterfly Experiment

	We took turns.		
	We listened to each other.		
	We followed directions.		
	We finished on time.		

★ Our group was best at equally divided the jobs.

↗ We need to work on staying on task

 We'd like a conference.  

©2002 by K. Haugen, Kids Can! Eugene, OR. Permission to copy for non-commercial classroom use only.



Future Plans

- The butterfly inquiry project can be expanded to include adult butterfly experiments and *Brassica* quantitative genetics experiments.
- I will continue to translate evolutionary biology research into classroom experiences through the NSF *Research Experience for Teachers* program.

Acknowledgements

- Wyoming NSF EPSCoR Wyoming Science Teacher Education Program
 - Barbara Kissack, Anne Sylvester, Joe Stepan, Rick Matlock
- Dr. William Medina-Jerez, Secondary Education, University of Wyoming
- Dr. Chris Nice, Biology, Texas State University
- Dr. Jim Fordyce, EEB, University of Tennessee

