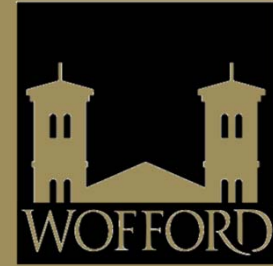


**THE MYSTERY OF MULTIPLE MATING
IN FEMALE *DROSOPHILA
MELANOGASTER*:**

**DO GENETICALLY DIVERSE
OFFSPRING OFFSET THE COSTS OF
MATING?**



Stephanie
Ackerson

Paul Cox

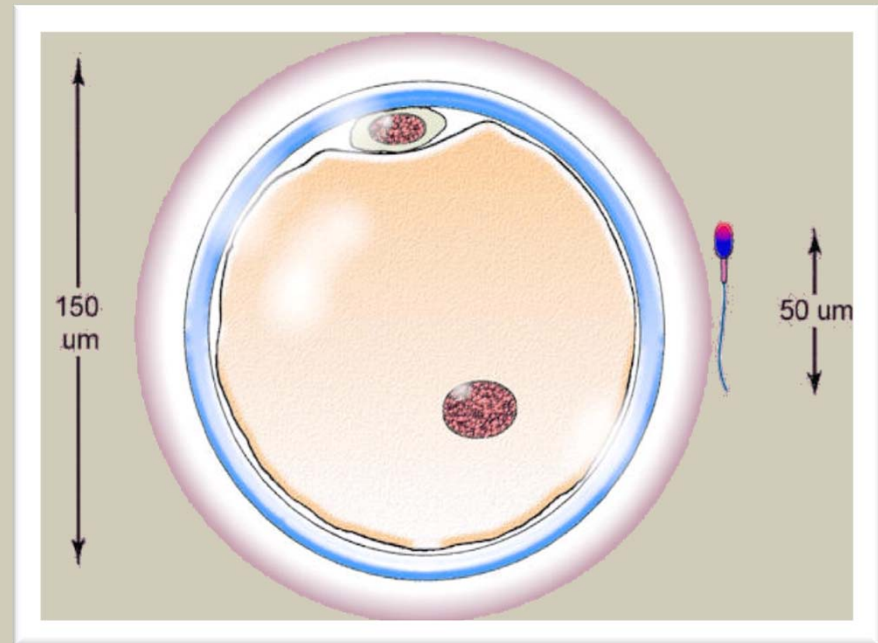
Harmony
White

On behalf of
Bio 352,
Research in
Evolutionary
Biology

MATING SYSTEMS - THEORY

- **Males should mate multiply**
 - Sperm are energy efficient to produce
- **Females should be monogamous**
 - Eggs are larger and more costly to produce

(Bateman 1948)



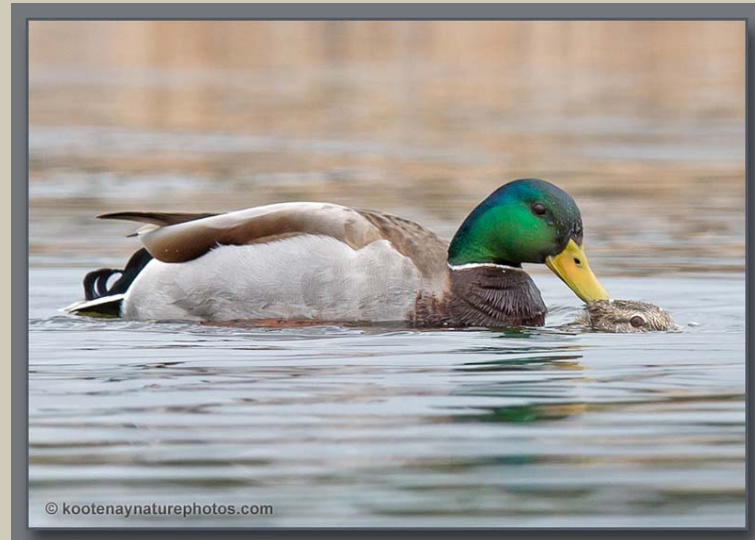
COST OF MATING TO FEMALES

- Maternal care of offspring
- Harm from males



Female brown bear and cubs

Mallard male and female



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POLYANDRY IS COMMON

- Despite theoretical predications and costs of mating to females, polyandry is common in animals.



Honeybee queen



Emperor tamarin pair (*Saguinus imperator*)

BENEFITS TO FEMALES

Dance flies (genus *Empis*)



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■ Direct (Arnqvist & Nilsson 2000)

- Food gifts
- Access to resources



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Gray tree frog

■ Indirect (Jennions & Petrie 2000)

- Good genes
- Genetic diversity of offspring

DROSOPHILA MELANOGASTER

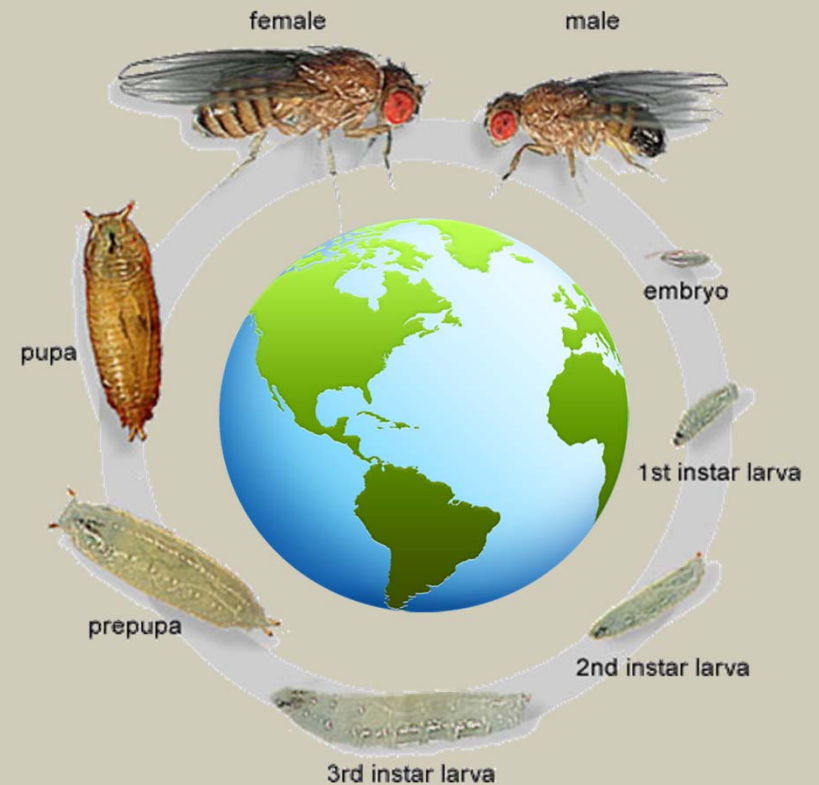
■ Model Organism

- Genetics well-understood
- Easy to rear in the lab



Drosophila on fruit

The life cycle of *Drosophila melanogaster*



MATING IN *DROSOPHILA*

- Both sexes promiscuous (Imhof et al. 1998)
- High costs to females (Chapman et al. 2003)
 - Harassment
 - Toxic male seminal fluid
- Direct benefit → fertilization (Gromko & Pyle 1981)
- Indirect benefits → not found



Drosophila melanogaster mating pair

HOW CAN WE EXPLAIN THE PARADOX?



Hypothesis:

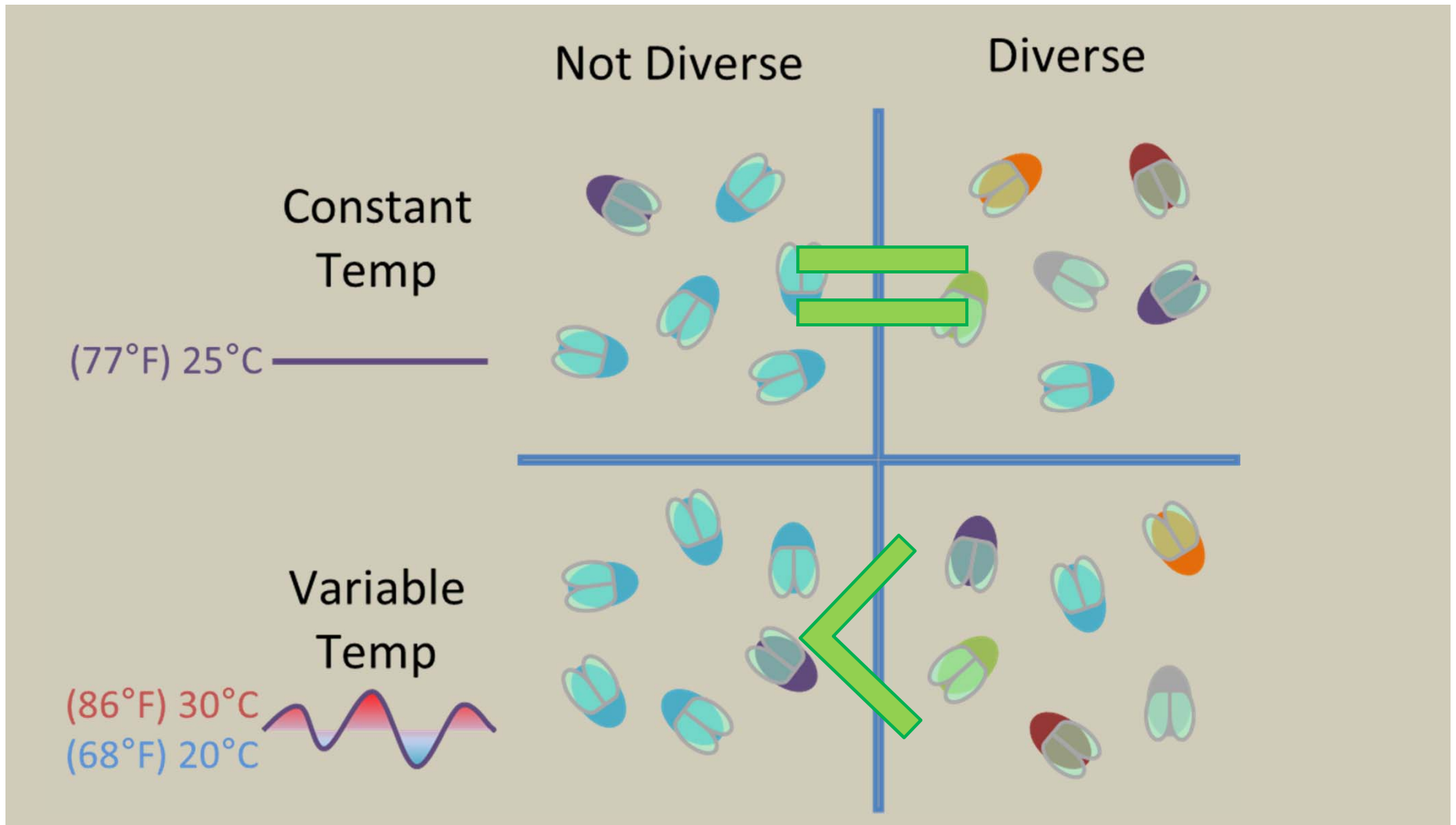
- Females mate with multiple males to produce genetically more diverse offspring.
 - Genetic bet hedging
 - Increases female reproductive success in changing environments
- (Fox & Rauter 2003)

FLIES

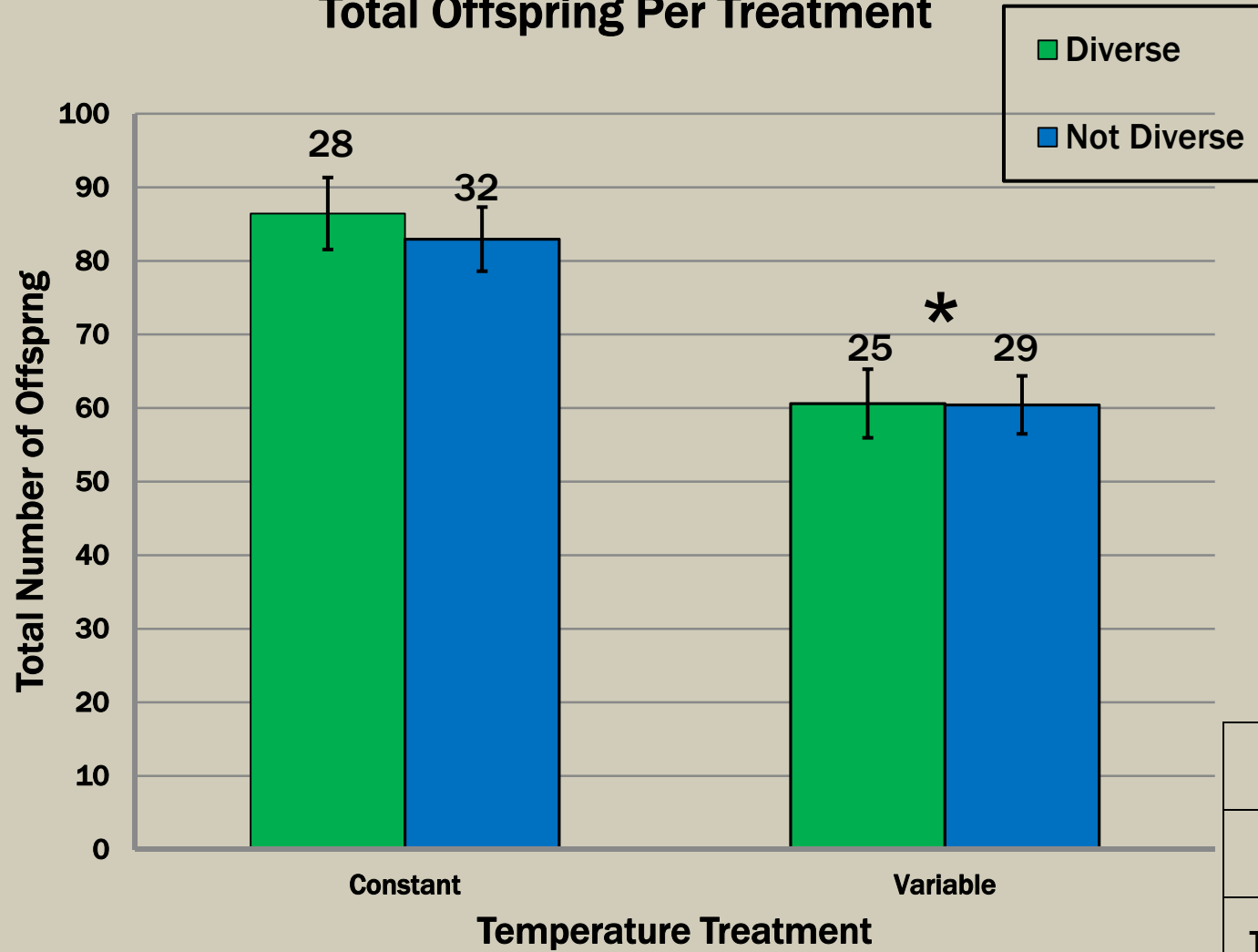
- Recombinant inbred lines from *Drosophila* Synthetic Population Resource (DSPR)
 - 8 female and 9 males lines
- Agar molasses food



METHODS OVERVIEW

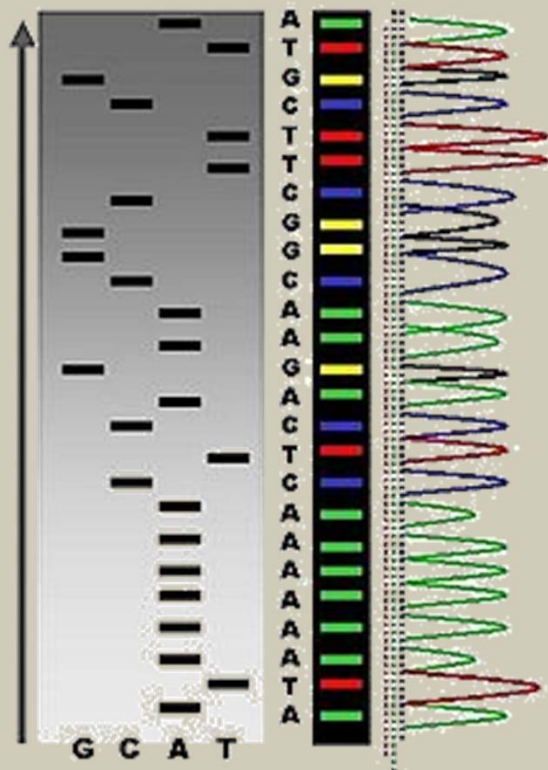


Total Offspring Per Treatment



Source	P-Value
Treatment	0.6829
Temperature	<0.0001
Temperature by Treatment	0.7135

LIMITATIONS OF STUDY



- Genetic variability in lab populations
 - Generally high, but can be depleted in some traits (Berger 1971, but see Briscoe et al. 1992)
- Matings were not observed
 - Offspring kept for genetic analysis

ALTERNATIVE HYPOTHESES

- **Many small benefits?**
(Pyle & Gromko 1981)
- **Indirect selection**
(Pyle & Gromko 1981)
- **Convenience Polyandry**
(Cordero Rivera & Andrés 2002)



Calopterygid damselflies mating

SUMMARY

- **Hypothesis:** Polyandry produces genetically more variable offspring.
- **Result:** Temperature, but not mating treatment, influences female reproductive success.
- **Conclusion:** polyandry in fruit flies still remains a mystery.

BIO 352: RESEARCH IN EVOLUTIONARY BIOLOGY



Paul Cox



Diandra Landa



Harmony White



Dr. Ivy
a.k.a Lord of the Flies



Corey McCubbin



Hamp Freshley



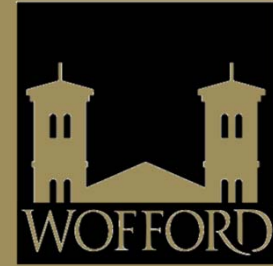
Stephanie Ackerson

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