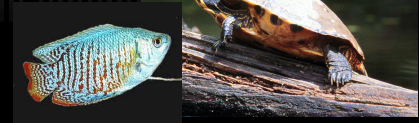


## A Recent Advance in Reptile Ecology

*Discovering Effects of Incubation Temperature & Divining Their Meaning*

## Reptiles are Ectotherms

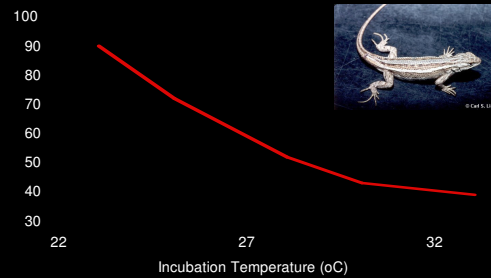
- ✓ Thermoregulating critical to fitness
- ✓ Thermal conditions during incubation/gestation critical too



## Influence of Incubation Temperature

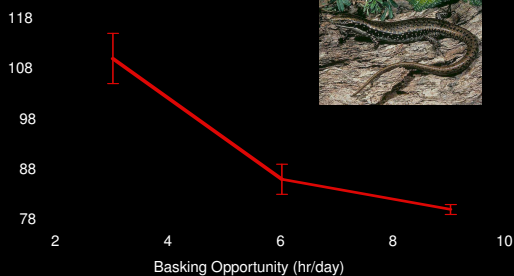
- ✓ Physiology:
  - ✓ Gestation time
    - ✓ Higher temperatures = faster gestation
  - ✓ Yolk conversion
    - ✓ Higher temperatures = lower yolk use
  - ✓ Survival
    - ✓ No pattern

## Relationship between thermal opportunity & incubation period (oviparous)



Andrews, Mathias, Warner, 2000, Horn Manner

## Relationship between thermal opportunity & gestation period (live bearer)



Schwarzkopf, Shine, 1991, Oecologia

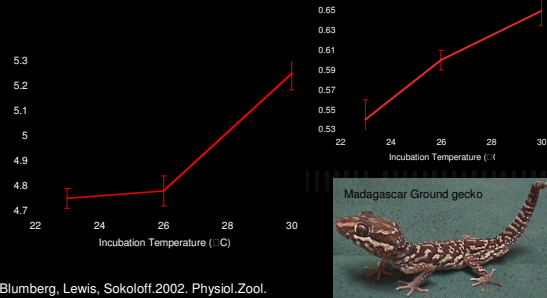
## Influence of Incubation Temperature

- ✓ Physiology:
  - ✓ Gestation time
    - ✓ Higher temperatures = faster gestation
  - ✓ Yolk conversion
    - ✓ Higher temperatures = lower yolk use
  - ✓ Survival
    - ✓ No pattern

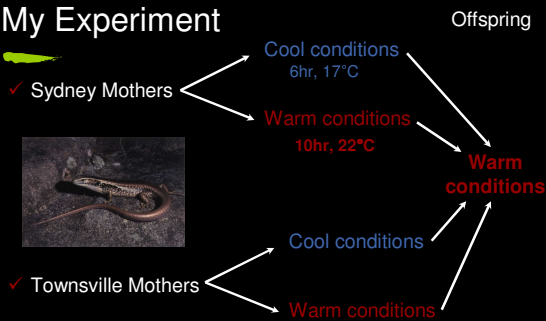
## Influence of Incubation Temperature

- ✓ Morphology
  - ✓ Body length
    - ✓ High temperature often smaller
  - ✓ Mass & condition
    - ✓ High temperature often lighter
  - ✓ Limb & tail length
    - ✓ High temperature often shorter

## Relationship between incubation temperature & size & shape (oviparous)

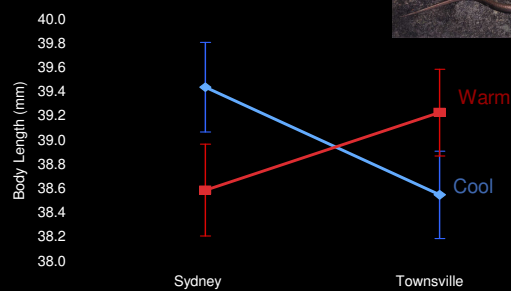


## My Experiment

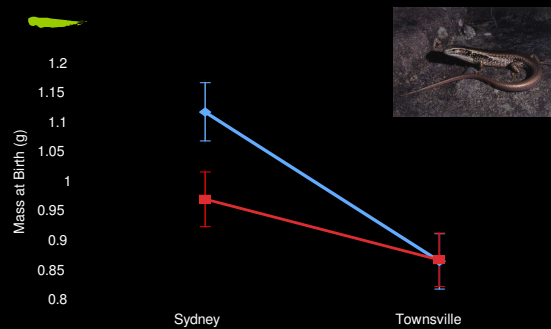


Caley, Schwarzkopf. 2004. Evolution

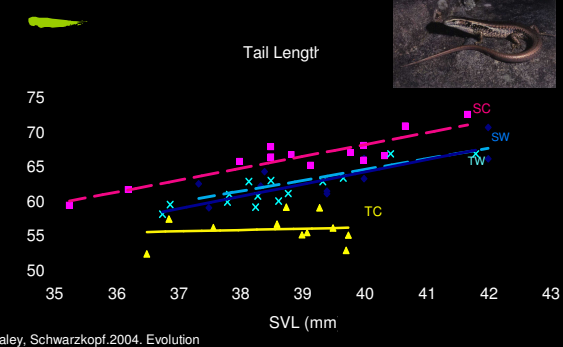
## Relationship between incubation temperature & size & shape (viviparous)



## Relationship between incubation temperature & size & shape (viviparous)



## Relationship between incubation temperature & size & shape (viviparous)



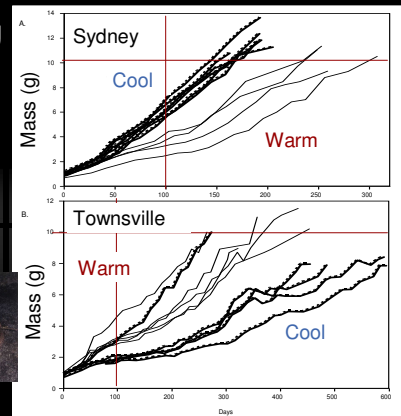
## Influence of Incubation Temperature

### ✓ Performance

- ✓ Running speed
- ✓ Activity
- ✓ Thermoregulation
- ✓ Post-hatching growth rate



## Post-hatching Growth Rate



Caley, Schwarzkopf. 2004. Evolution

## Influence of Temperature

### ✓ Behaviour

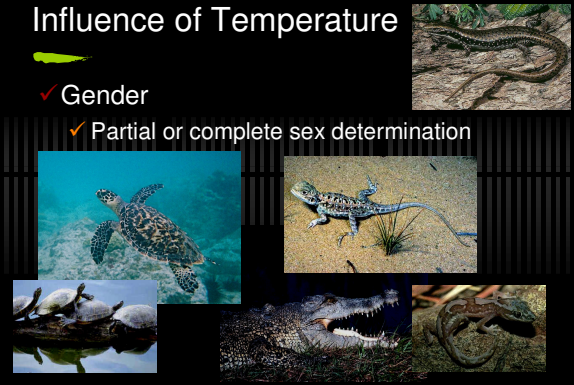
- ✓ Predator escape
- ✓ Sexual display
- ✓ Aggression



## Influence of Temperature

### ✓ Gender

- ✓ Partial or complete sex determination



## Interaction between TSD & other effects

- ✓ Which came first: TSD or Temperature Dependent Incubation Effects?
- ✓ Incubation effects occur in both TSD & GSD species - may drive evolution of TSD

## Importance

- ✓ How long do TDIE last?
- ✓ Are they evolutionarily important?
  - ✓ Evidence both ways
- ✓ How relevant are artificial incubation conditions?
  - ✓ Sometimes similar to "natural"

## Conclusions

- ✓ There are a staggering number of TDIE
- ✓ They vary in whether their effects are universal - which are universal and why?
- ✓ How important are "natural" versus "artificial" incubation conditions?
- ✓ Relationship between TDIE & TSD needs closer examination - which drives which?
- ✓ More evidence for evolutionary importance - fitness effects, intergenerational effects