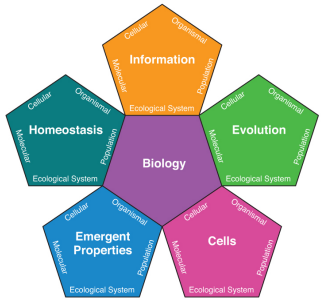
Integrating Concepts in Biology



PowerPoint Slides for Chapter 17: Behavior and Information Exchange

Section 17.1: What is information at the population level?
Section 17.2: How is information transmitted between members of animal species?

by A. Malcolm Campbell, Laurie J. Heyer, & Christopher Paradise

Section 17.1: What is information at the population level?

Biology Learning Objective

- Describe the functions of communication and information transfer between organisms.

Connections and main ideas of Information

1. Heritable information provides for continuity of life.
2. Imperfect information transfer produces variation.
3. Information can be expressed and regulated without loss of content.
4. Non-heritable information is transmitted within and between biological systems.

Connections and main ideas of Information

1. Heritable information provides for continuity of life.
2. Imperfect information transfer produces variation.
3. Information can be expressed and regulated without loss of content.
4. Non-heritable information is transmitted within and between biological systems.

- Humans communicate with each other
- You don't know a language when you're born

1. You inherit the ability to learn a language

4. These words represent non-heritable information transmitted from me to you

3. If you understand me, there has been no loss of content

2. If you misunderstand me, there has been imperfect information transfer

A population of birds and information transfer between individuals

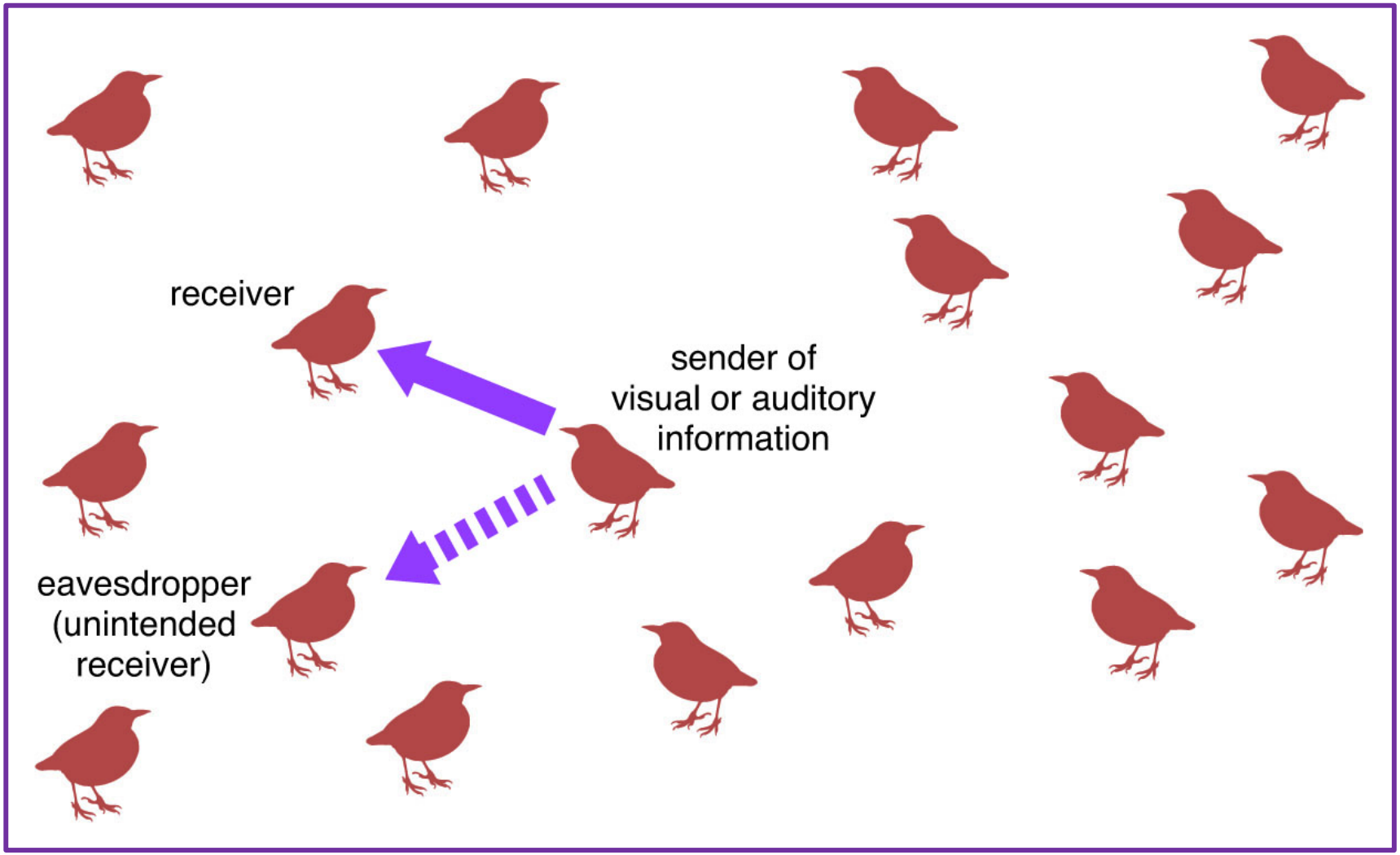


Figure 17.1

A population of birds and information transfer between individuals

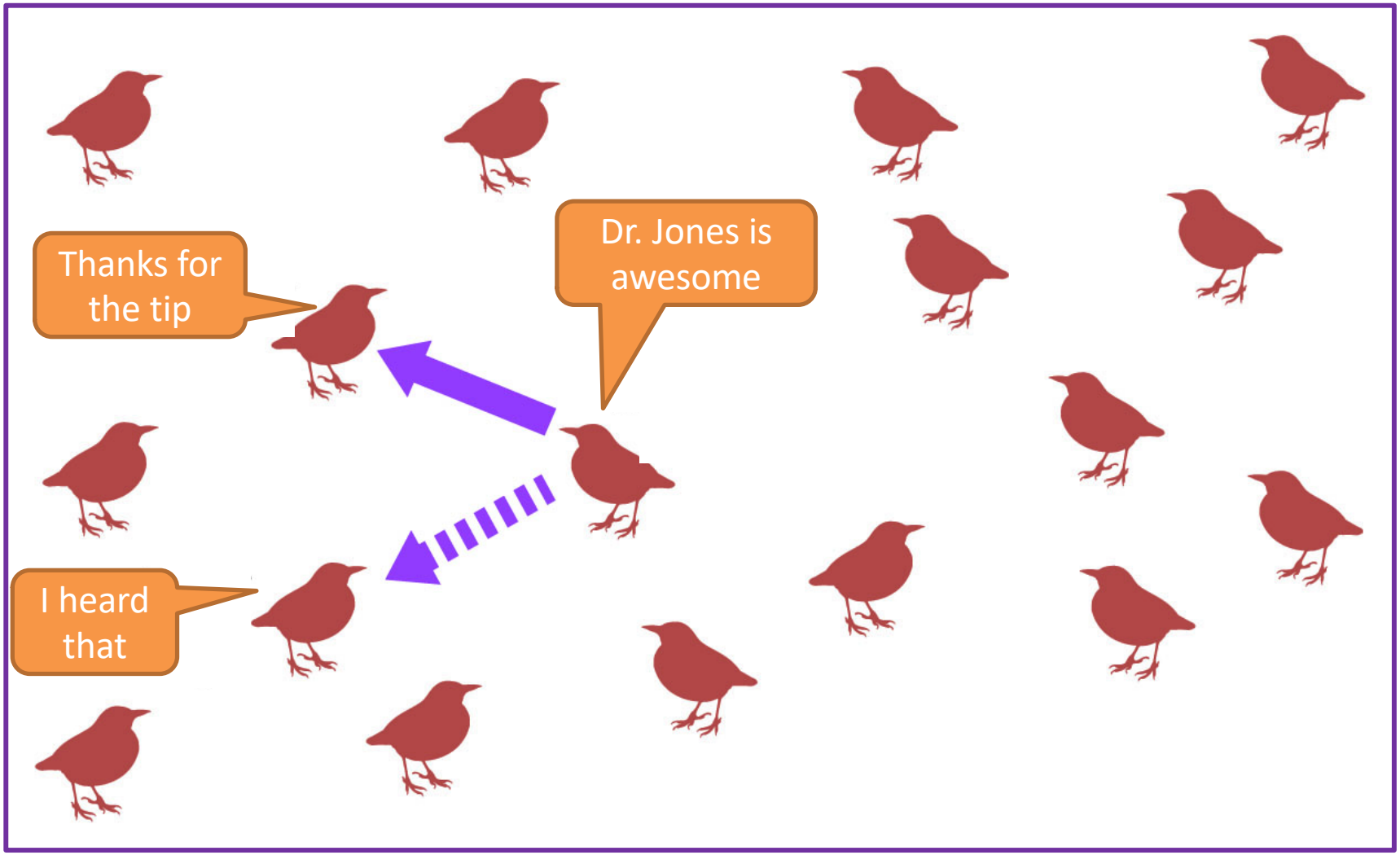


Figure 17.1

Section 17.2: How is information transmitted between members of animal species?

Biology Learning Objective

- Describe the functions of communication and information transfer between organisms.
- Explain how animals communicate and find each other through the use of different signals.
- Evaluate costs and benefits of signaling using light and/or sound.
- Interpret playback experiments used to decode signals sent between members of the same species.

Behaviors associated with information transfer

Figure 17.2

A. Author: Richard Bartz, 2008, Creative Commons. B. Author: Wegmann, Creative Commons. C. Public Domain. Brooks Tracy, USFWS. D. Author: Mongo. Public domain.

The Science of Summer - Fireflies with Dr. Sara Lewis

Variation in firefly interpulse intervals

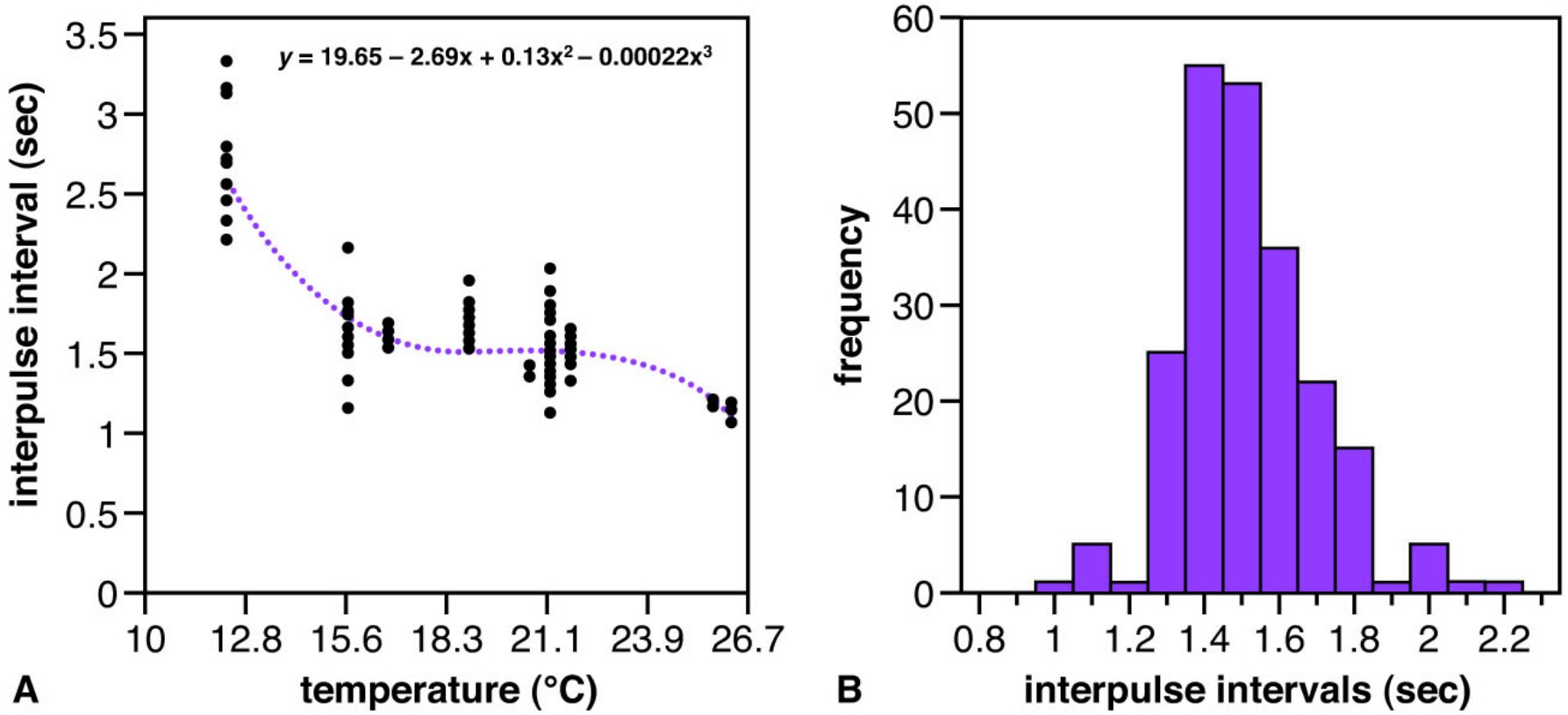


Figure 17.3

Modified from Michaelidis et al. (2006) Figures 1 and 2.
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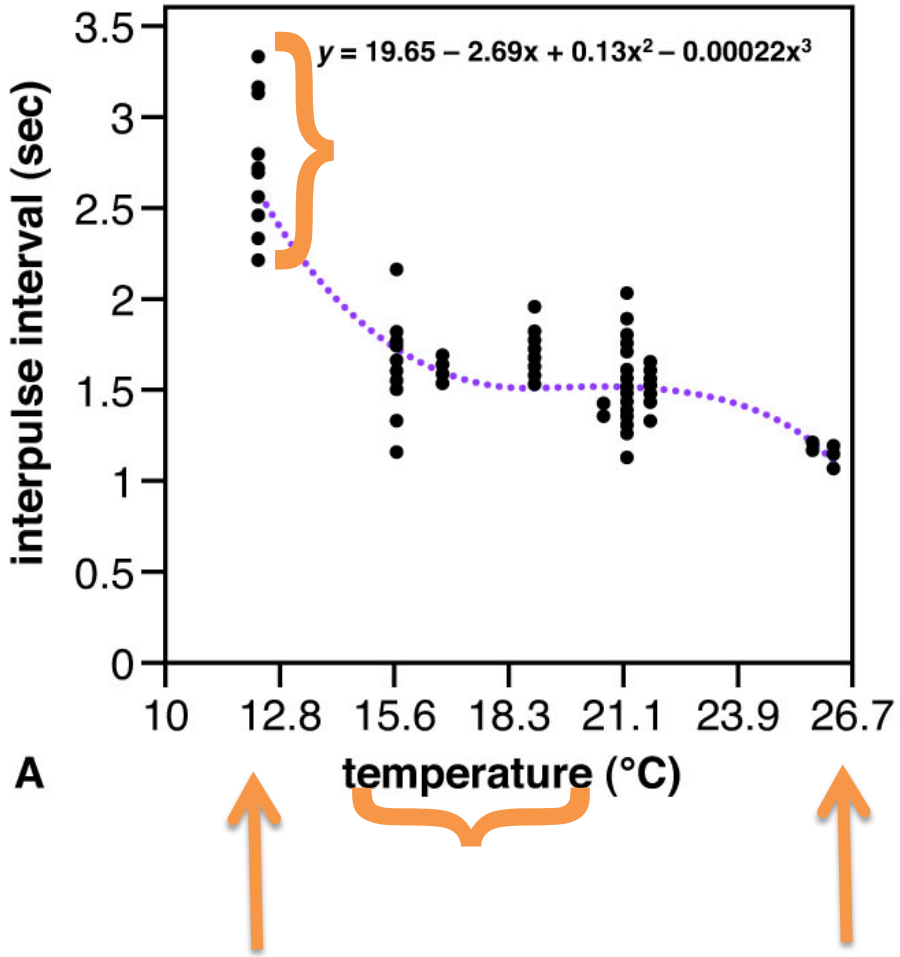
Variation in firefly interpulse intervals



Describe variation in information transfer.

What are consequences of low or high temperatures to information transfer?

Figure 17.3A

Variation in firefly interpulse intervals

Variation in information transfer – describe this frequency distribution.

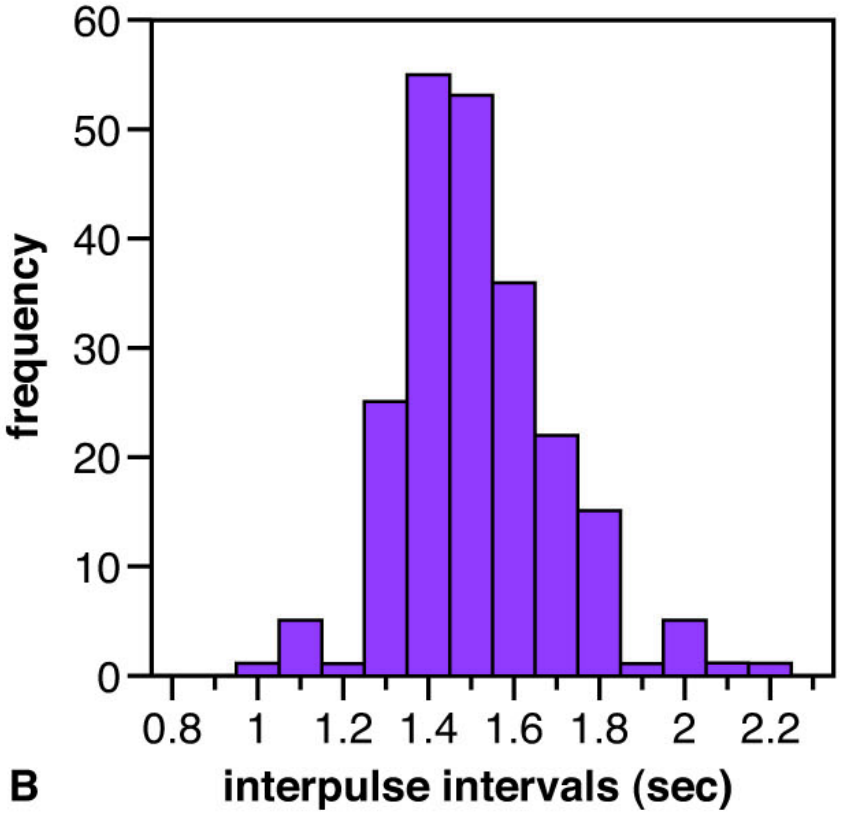


Figure 17.3B

Bio-Math Exploration 17.1: Computing adjusted IPI

variable	description of variable	example 1 value (seconds)	example 2 value (seconds)
A	actual IPI at 26.1°C	1.165	1.066
B	value of regression curve at 26.1°C	1.102	1.102
C	value of regression curve at 21.1°C	1.516	1.516
	adjusted IPI = A – B + C	1.579	1.480

Table BME 17.1

Bio-Math Exploration 17.1: Computing adjusted IPI

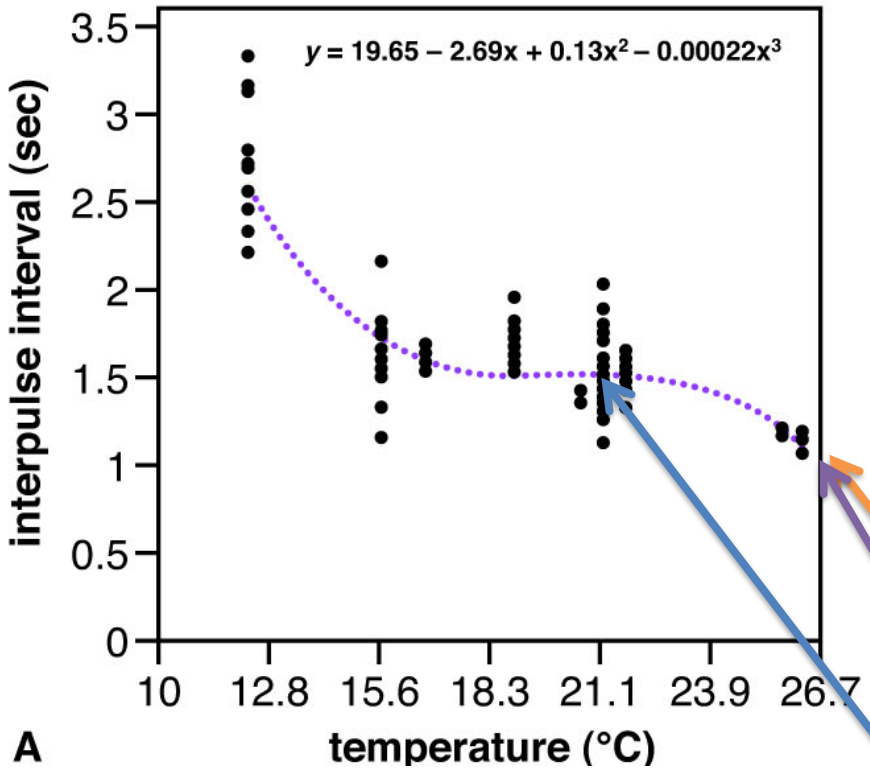


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Figure 17.3A

Variation in firefly interpulse intervals

Adjusted values shown in this frequency distribution

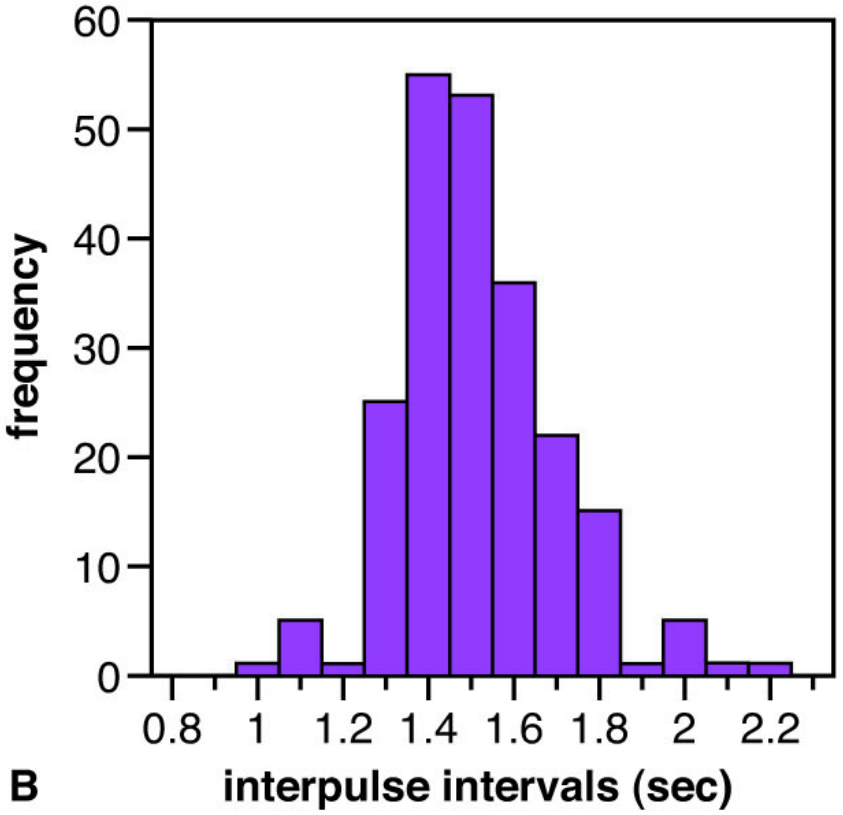


Figure 17.3B

Response of female *P. greeni* fireflies to simulated male signals at different temperatures

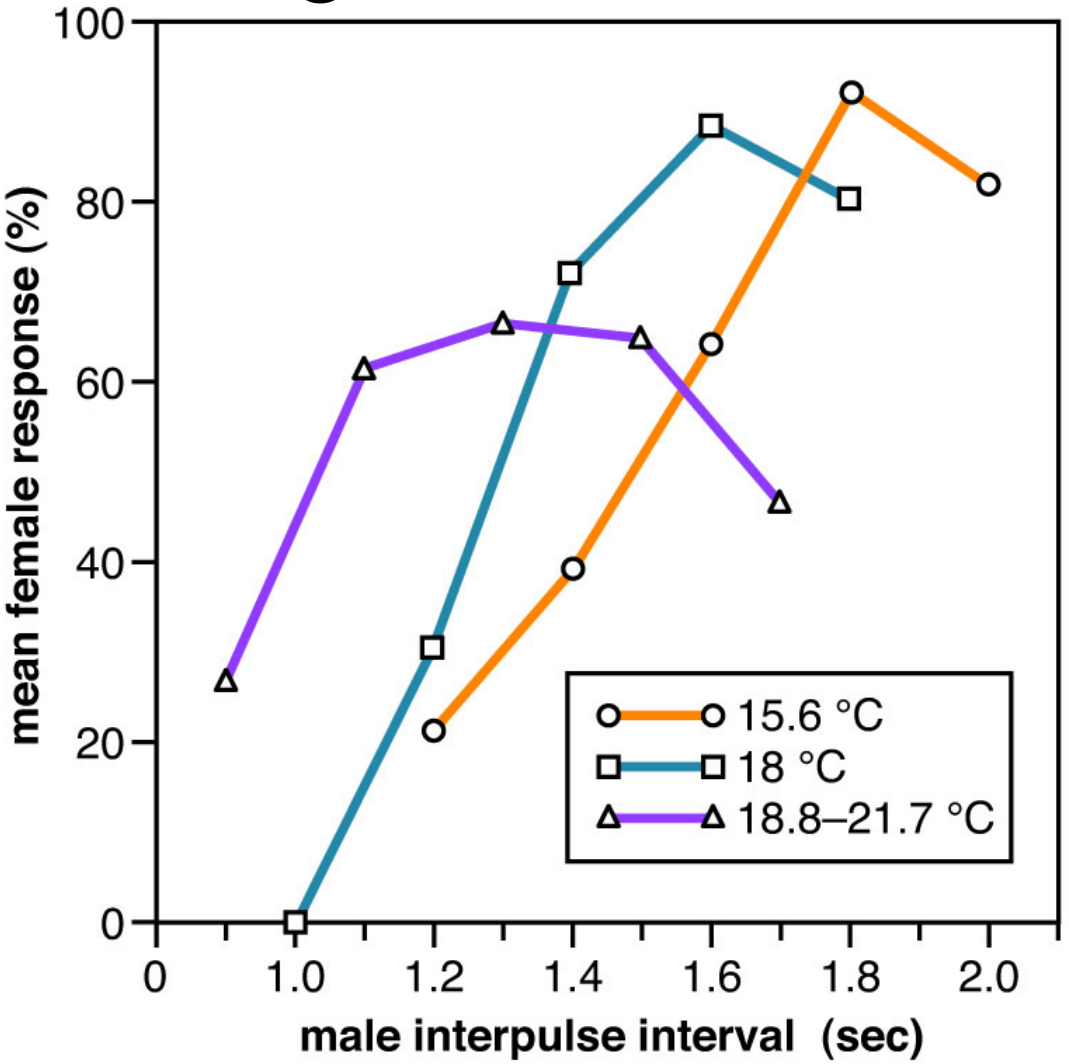
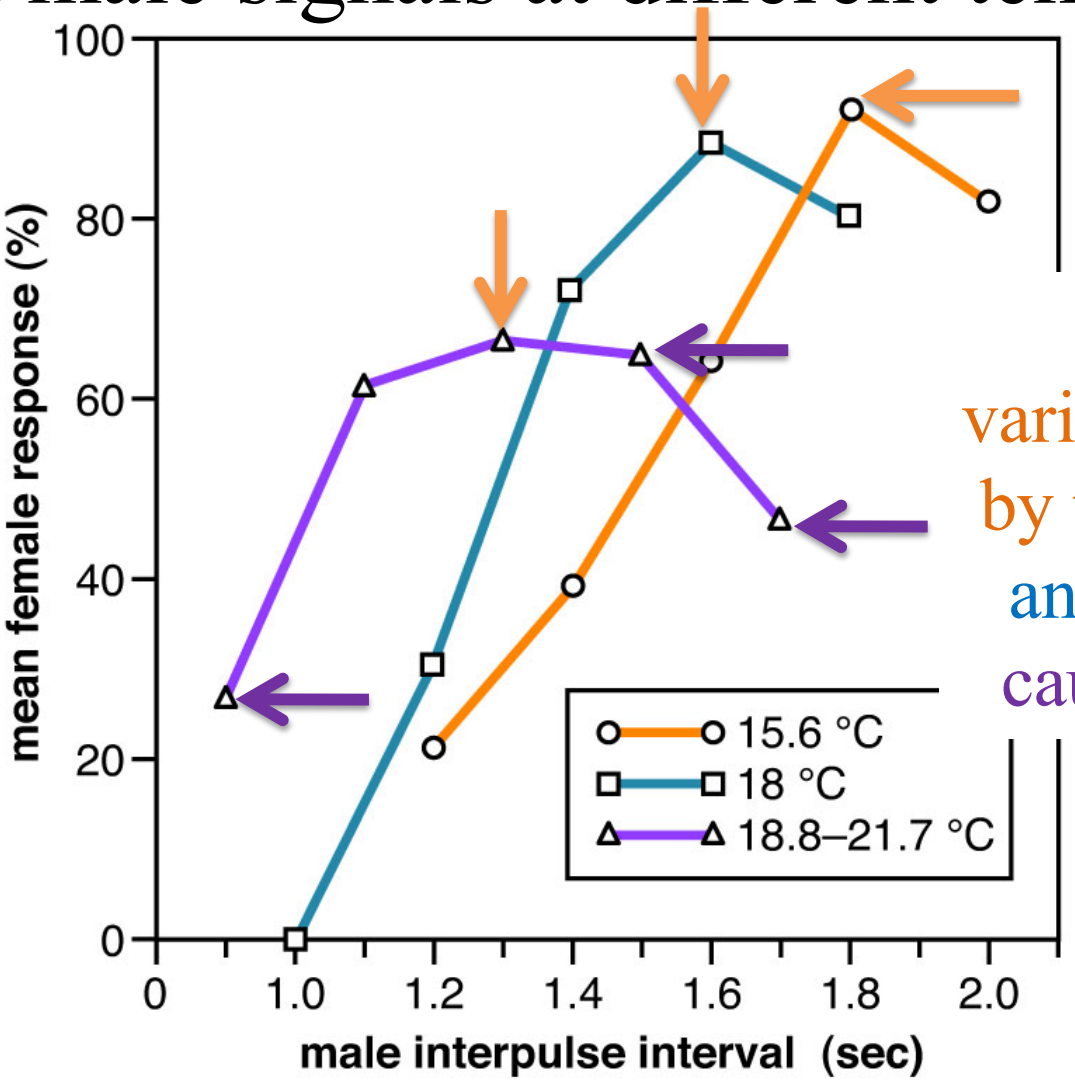


Figure 17.4

Response of female *P. greeni* fireflies to simulated male signals at different temperatures



Explain variation caused by temperature and variation caused by IPI

Figure 17.4

Female *P. greeni* tested for responsiveness to varying IPI

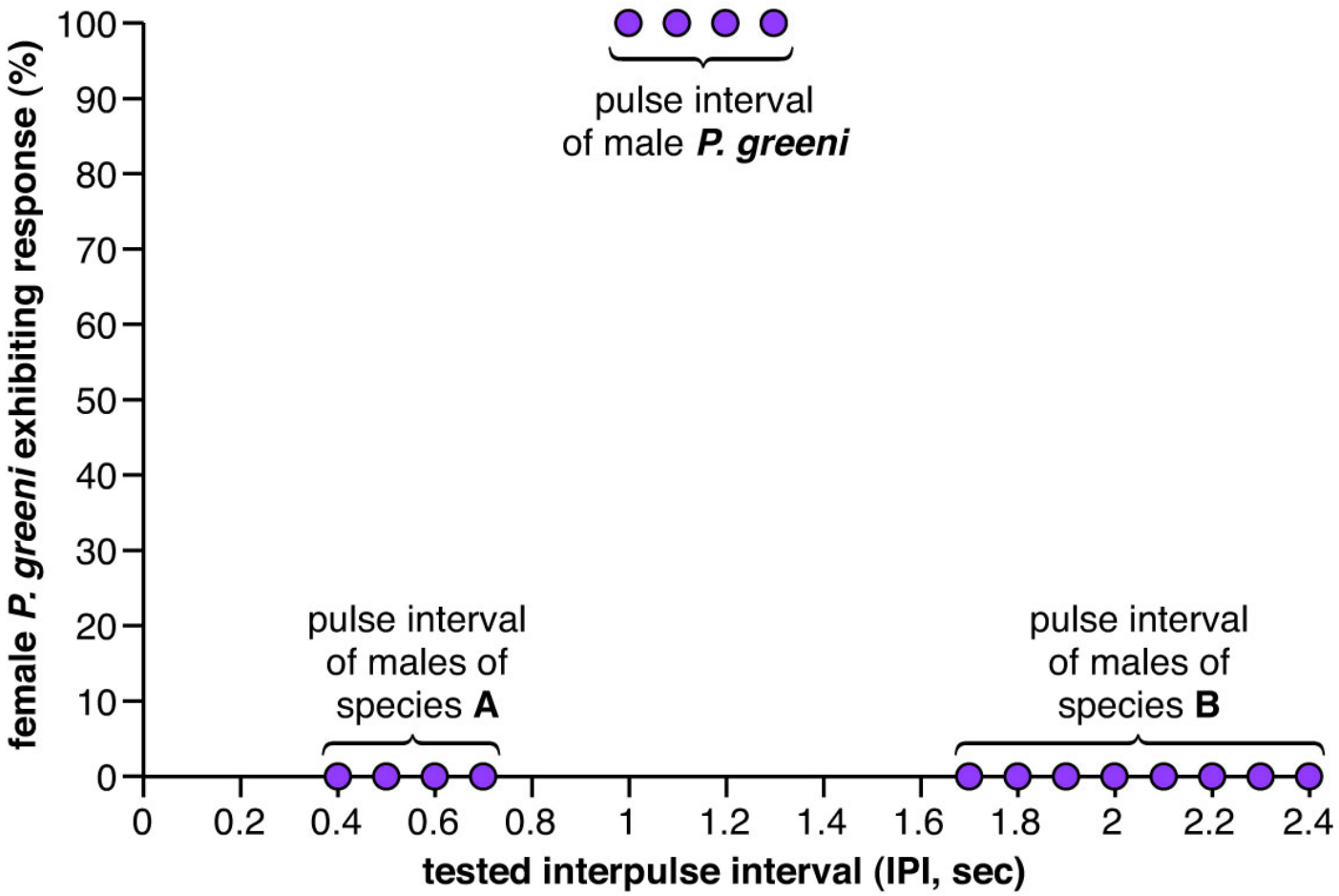
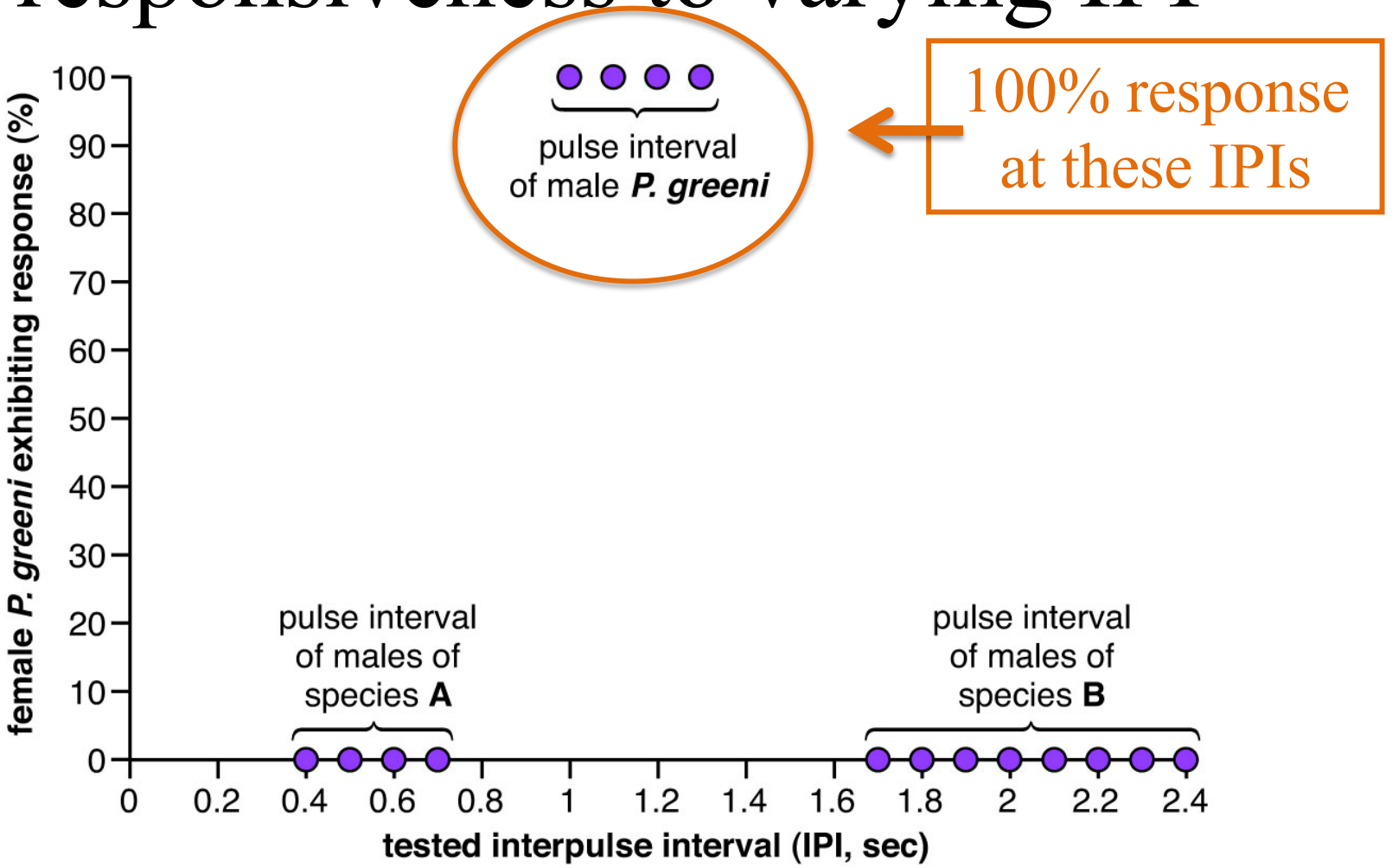


Figure 17.5

Data from Lloyd JE (1969).

Female *P. greeni* tested for responsiveness to varying IPI



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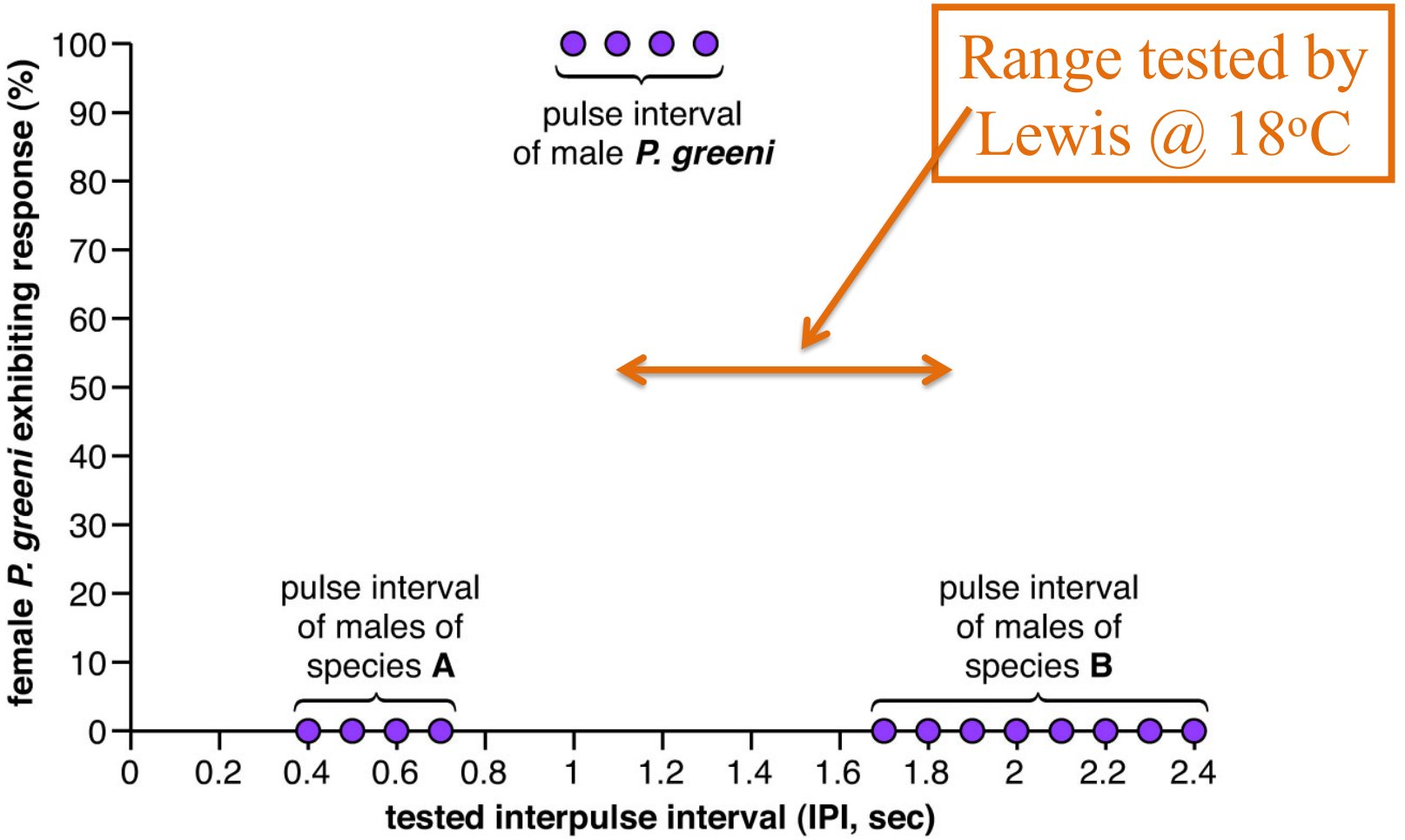

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