

Week 13
BIO-1306 - Biology 2 – ICB textbook

Hello and Welcome to the weekly resources for BIO-1306
- Biology 2 – ICB textbook!

This week is Week 13 of class, and typically in this week of the semester. your professors are covering these topics below. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout of the semester.

We also invite you to **look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester.**

If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel or any tutoring services we offer, please visit our website www.baylor.edu/tutoring or call our drop in center during open business hours. M-Th 9am-8pm on class days 254-710-4135.

Keywords: *Herbivore, Dominance Hierarchy, Subordinate*

TOPIC OF THE WEEK:

Cooperation

This week we will be looking at cooperation within species the achieve a shared goal.

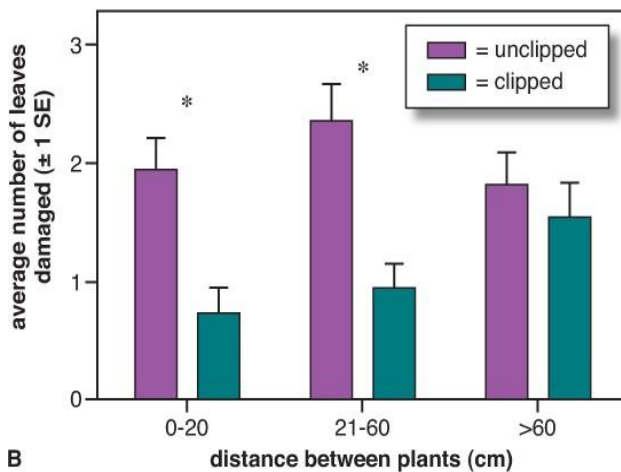
- Herbivore → Animal that eats plants
- Dominance Hierarchy → A hierarchy ranking animals; those above are

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dominant, and those below are subordinate

- **Subordinate** → The animals that have an inferior rank in the dominance hierarchy

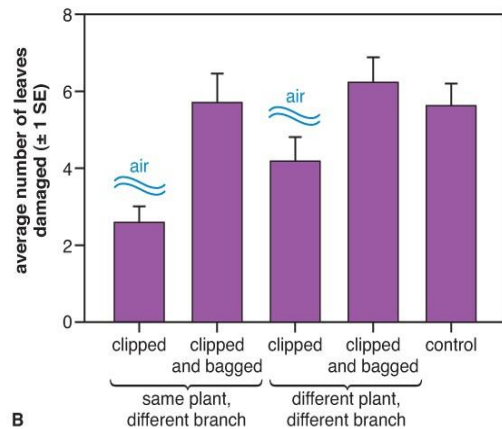
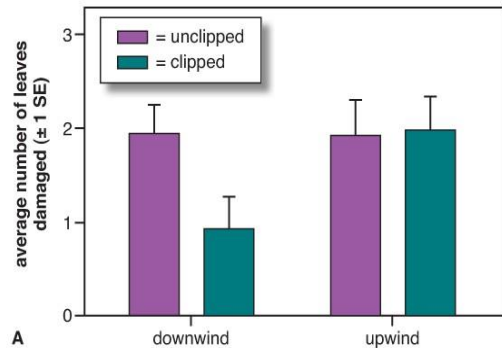
Richard Karban and his colleagues studied cooperation in sagebrush. They wanted to see if plants in the same area could **detect** and **respond to** information transmitted by other plants. The researchers clipped the leaves of sagebrush plants to simulate an herbivore eating its leaves and observed the effects it had on other sagebrush plants nearby.



What did they see? The plants in close proximity to the clipped plants had significantly less damaged leaves than those near unclipped plants. **This showed researchers that distance did play a role in the transmission of signals from the plants.**

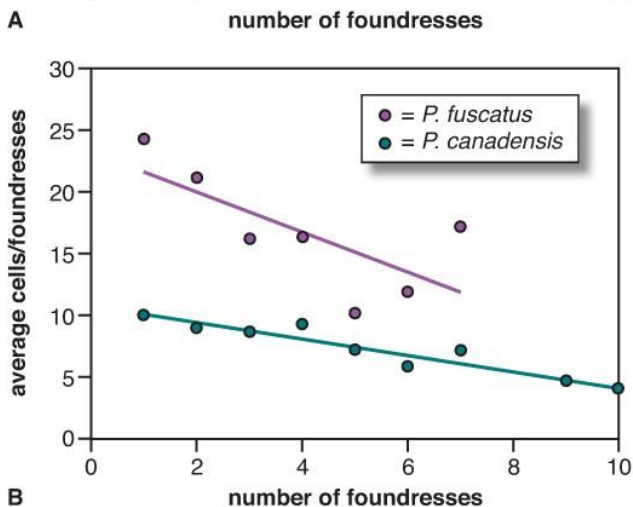
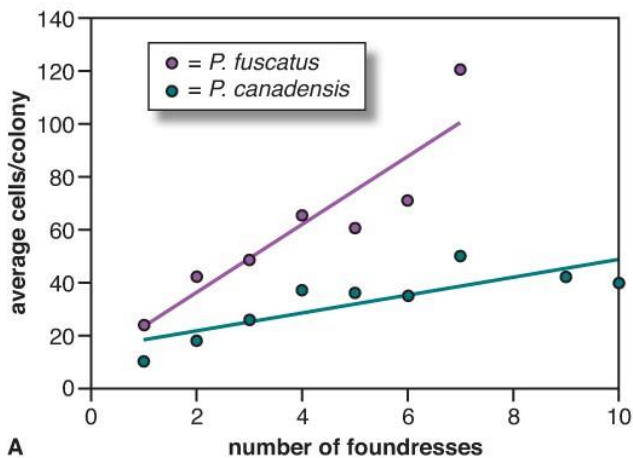
Karban and his colleagues also noticed observed the damage of leaves for plants downwind and upwind of clipped sagebrushes. Thinking that the wind had a role in communication, they also ran trials covering some of the sagebrushes with bags so that there would be little to no exchange with the air from the environment. They observed the amount of damage to the branches and leaves of the same clipped plant or of the plants near the clipped one.

What does this show? Clipping the plants simulated herbivore attack which led the plants to release chemical signals. Herbivore damage was less in those downwind from clipped plants and was less in those without



bags which shows that the **chemical messengers are airborne and rely on the wind to reach other plants nearby.**

Paper wasps were observed to look at cooperation and communication between animals. Mary Jane West-Eberhard studied the cooperation in paper wasps by marking individuals with dots of paints to uniquely identify each wasp in a colony. West-Eberhard saw that each colony is initiated by a *foundress* – a female who will eventually become queen of the colony. There could be multiple foundresses (usually 1-2) but there would be only one queen from the foundresses.



Researchers related the number of foundresses per colony to the cells in that colony. They additionally compared the number of foundresses with the cells per foundress in a colony.

What did they notice? *P. canadensis* usually have fewer offspring in each colony than *P. fuscatus*, but they have more foundresses. West-Eberhard thought that this is a result of differences in climate or habitat. An environment with limited resources would prompt more competition, which would lead to less foundresses being more advantageous. Another habitat with more predation, however, could lead to more foundresses being advantageous.

The main thing they noticed is that **colony size increases with the number of foundresses since they can work together to create a larger, more stable group.**

Between the foundresses, the larger the ovaries, the larger quantity of hormone is produced. This helps determine and communicate which foundress is the queen and which foundresses are submissive to the queen.

Let's Test Ourselves!!

1. Why did researchers clip the leaves of the sagebrushes? (To simulate what?)
2. The queen wasp would be higher or lower in the dominance hierarchy? What about the worker wasps?

Things Students May Struggle With:

1. For this, reading the figures and really trying to understand how the research connects to the big picture is tough. Please try to remember that the key component of this section is how cooperation occurs on a larger scale.

Thanks for checking out these weekly resources!

Don't forget to check out our website for group tutoring times, video tutorials and lots of other resources: www.baylor.edu/tutoring ! Answers to check your learning questions are below.

Answers:

1. *To simulate an herbivore eating its leaves*
2. *Queen wasp would be higher, workers would be lower*

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