Animal Groups Increase Survival

3rd Grade Ecosystems: Interactions, Energy and Dynamics (3-LS2-1)

Lesson 1: Ant Colonies-The Power of Cooperation

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Lesson Overview (Eleven to fourteen 45-minute Science & ELA sessions)

In this lesson, students begin to gather data on animals that live in groups in order to increase their survival. This initial study focuses on ants. Following a preassessment, and Gathering Ideas science talk, students observe ants on the school grounds, recording their observations, ideas, and questions in their science notebooks.

After sharing their findings, they gather more evidence to answer the focus question ("How do ants work together to help them survive?") by watching video clips on ant behavior. The evidence is added to a class chart, which is used (along with science notebook observations/notes) to write an argument answering the focus question. The argument-writing task serves as a combined Science and ELA assessment (meeting both NGSS and ELA Common Core standards).

Students then research answers to their remaining questions about ants using books, websites and other reliable sources. They synthesize what they have learned about ant group behavior in this lesson by creating a class concept map. Finally students reflect on their learning and how they learned it in their science notebooks.

Note: This is the first in a series of lessons focusing on animal groups and how they help animals survive. Subsequent lessons will focus on different types of animals. The goal is for students to have multiple opportunities to gather evidence on different animal groups so they can compare and contrast the way that different animal groups increase survival.

NGSS Learning Goals

NGSS Disciplinary Core Idea:

- Being part of a group helps animals obtain food, defend themselves and cope with changes. Groups may serve different functions and vary dramatically in size. (LS2.D)

NGSS Performance Expectation:

- Construct an argument that some animals form groups that help members survive. (3-LS2-1)

NGSS Science Practices:

- Constructing Explanations and Designing Solutions – Use evidence to construct an explanation

- Engaging in Argument from Evidence - Construct an argument with evidence, data, and/or a model
- Obtaining, Evaluating, and Communicating Information –
  - Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence
  - Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific or engineering practices
  - Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.

Crosscutting Concepts:

- Cause and Effect - Cause and effect relationships are routinely identified and used to explain change
- Systems and System Models – A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. A system can be described in terms of its components and their interactions.

Overarching Essential Questions (applicable to the entire set of Animal Groups lessons):

- Why do some animals live in groups?
- How do animals work together in groups to help them survive?

Lesson 1 (Ant Colonies) Essential Question:

- How do ants work together in colonies to help them survive?

ELA Common Core Learning Goals for 3rd Grade
(Only standards applicable to this lesson are included)

Reading Standards for Informational Text

Key Ideas and Details:

- Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers
- Determine the main idea of a text; recount the key details and explain how they support the main idea
- Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence and cause/effect

Craft and Structure:

- Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area
- Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently

- Distinguish their own point of view from that of the author of a text

Integration of Knowledge and Ideas:

- Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why and how key events occur)
- Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence)
- Compare and contrast the most important points and key details presented in two texts on the same topic.

Range of Reading and Level of Text Complexity:

- By the end of the year, read and comprehend informational texts, including history/social studies, science and technical texts, at the high end of the grades 2-3 text complexity band independently and proficiently

Writing Standards

Text Type and Purposes-Opinion Pieces (Argument Writing):

- Write opinion pieces [arguments] on topics or texts, supporting a point of view [claim] with reasons [evidence]
    a. Introduce the topic or text they are writing about, state an opinion [claim], and create an organizational structure that lists reasons [evidence]
    b. Provide reasons (evidence) that support the opinion [claim]
    c. Use linking words and phrases (e.g., because, therefore, since, for example) to connect opinion [claim] and reasons [evidence]
    d. Provide a concluding statement or section

Production and Distribution of Writing:

- With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose
- With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising and editing
- With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others

Research to Build and Present Knowledge:

- Conduct short research projects that build knowledge about a topic
- Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories

Range of Writing:

- Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences

Speaking & Listening Standards

Comprehension and Collaboration:

- Engage effectively in a range of collaborative discussions (one on one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly

    a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion [such as information recorded in science notebooks]
    b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion)
    c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others
    d. Explain their own ideas and understanding in light of the discussion

- Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally
- Ask and answer questions about information from a speaker, offering appropriate elaboration and detail

Presentation of Knowledge and Ideas:

- Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace
- Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details
- Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification

Assessments

Pre-Assessment/Formative:

- Why do you think some animals live in groups? How might living together help these animals?

Science/ELA Summative:

- Write a claim about how ants work together in a colony to help them survive. Back up your claim with evidence that you have gathered or learned during this lesson. Use the argument-writing rubric as a guide for determining what is expected.

Materials

- Science notebooks
- Ant food: crumbled crackers, sugar, sunflower seeds, banana slices, small apple cubes
- Chart paper and markers
- Word wall
- Access to online video clips
- Argument writing materials: Sentence frames (example attached), argument writing worksheet (attached), 3rd grade argument writing rubric (attached)
- Selection of books about ants at different reading levels

Learning Activities

1. Preassessment & Introduction (One 45-minute Science session)

- Explain that the class will be exploring why some animals live in groups by observing different types of animals.
- In science notebooks, ask students to respond to these prompts:
  - Why do you think some animals live in groups?
  - How might living together help these animals survive?
- Have students turn and talk to share their ideas.
- Facilitate a Gathering Ideas Science Talk around the two focus questions: Why do you think some animals live in groups? How might living together help these animals survive? (See *The Essentials of Science and Literacy: A Guide for Teachers*, Karen Worth et al., Heinemann, 2009, Chapters 5 and 6.)
- As a group, chart student ideas.
- Explain that the class will begin our investigation of why animals live in groups by studying ants. We'll be observing ants first-hand and by watching videos. Later, we'll also gather information by reading books and exploring websites. Our focus question is: "How do ants work together in colonies to help them survive? (Post the focus question on the wall.)

2. Observing Ants on the School Grounds (One-two 45-minute Science sessions)

Materials:

- Ant food: crumbled crackers, sugar, sunflower seeds, banana slices, small apple cubes
- Science notebooks

Preparation:

- Identify several anthills on the school grounds that are in locations where students will be able to observe them in small groups.

Learning Activities:

- Explain that the class be going outside to observe ants closely and record observations in their science notebooks. We'll be observing what happens when we put out food for the ants.
- Remind students that scientists are always respectful of the animals they study, so they will not touch or disturb the ants. In addition, ants can bite.
- Outside, place small piles of food near the anthills. Assign small groups to each anthill, making sure the students see where the anthill is.
- Ask students to predict what will happen. What do you think the ants will do with the food when they find it? Why do you think this?
- Encourage students to record what they observe in their science notebooks (drawings and text), as well as their questions. They should record the behavior of the ants and any other details that they observe. Their observations should include the date, time, and location. Drawing should be labeled. Prompts: What do you notice? Why do you think this is happening?
- Take digital photos and/or videos to help spark later conversation and as additional evidence of what students observed.
- Return to the site an hour later. Observe and record ant behavior again. (This can be repeated again one hour later.)
- After all observations have been made, ask students to share their observations with the class and chart them (along with their questions). "What did you notice the ants doing?" Why do you think they were doing that?" Sample chart:

	Ant Behavior Observations	How Might These Behaviors Help Ants Survive?
What We Observed Outside (Date)		

- Create a Wonder Board to record questions that students have about ants. Students can continue to add questions throughout the lesson.

3. Observing Ant Colony Behavior Using Videos from Reliable Sources (Three-four 45-minute Science sessions)

Materials: (Online video clips)

- Planet Life – Life Inside the Colony (BBC), http://www.youtube.com/watch?v=8n0SkIGARuo (1:28:46)
- Ants- Nature's Secret Power, http://www.youtube.com/watch?v=Z-glx7LXcQM (54:06)

- *National Geographic Wild City of Ants, http://www.youtube.com/watch?v=55tXhnlZoOg (44:57)
- What Really Happens When Ants Find Food?, AntsCanada, http://www.youtube.com/watch?v=Dgtepw39NX4 (7:13)
- Ants Create a Lifeboat in the Amazon Jungle, BBCWorldwide, http://www.youtube.com/watch?v=A042J0IDQK4 (2:52)
- Animal Ant Team Work, http://www.youtube.com/watch?v=c7gF3hDoUqk (1:23)
- The Work Force of Ants, http://www.youtube.com/watch?v=wxqQLrCic5k (2:19)
- Grasshoppers vs. Driver Ants, Ant Attack (BBC Earth), http://www.youtube.com/watch?v=LAWnvSXWJP8&list=PL52D37858B3E9FEDE&index=1 (2:26)
- Defending the Ant Nest from Intruders, Ant Attack (BBC Earth), http://www.youtube.com/watch?v=W8vFFM_k1FI (4:04)
- Building a New Ant Home, Ant Attack (BBC Earth), http://www.youtube.com/watch?v=CfxK8ykuHlc&list=PL52D37858B3E9FEDE (1:16)
- Ants: Life in the Undergrowth, David Attenborough (BBC), http://www.youtube.com/watch?v=Er-OnJCn1gg (3:54)
- Giant Abandoned ant Colony Excavated, http://www.youtube.com/watch?v=CmD5ahkOPAQ (3:15)

Learning Activities:

- Review the observations that students made when studying ants outside. Did any of the ant behaviors provide evidence of teamwork (ants working together)?
- Explain that ants live together in colonies similar to how people live together in towns/cities/communities. (Add the word "colony" to the word wall. As new vocabulary words come up during class discussions of the videos, add them to the word wall.)
- Explain that the class will now have a chance to gather more evidence from videos to help answer the focus questions: How do ants work together in colonies to help them survive? There are limitations to how closely we can study ants (including not being able to observe ants underground and in many different locations), so we'll be looking at videos from reliable sources.
- Watch one of the videos (feel free to select clips from the longer segments), sharing the focus question with students beforehand so they can focus their attention on gathering evidence to answer this question: How do ants work together in colonies to help them survive? Students should take notes in their notebooks and jot down their questions/ideas. (Pause the video at certain points to give them time to make notes and/or to ask probing questions/discuss what's happening in the video—similar to the strategies you might use in an interactive read aloud.)
- At the end of the video, ask students to turn and talk (or discuss in small groups) to share their ideas on how ants work together to help them survive. Share as a whole group, charting student ideas (adding to the Ant Behavior chart):

	Ant Behavior Observations	How Might These Behaviors Help Ants Survive?
What We Observed Outside (Date)		
What We Observed on Video 1 (Name of Video)		
What We Observed on Video 2 (Name of Video)		

- Repeat this process with at least two other videos, making sure to allow time for students to share in small groups before asking them to share out with the entire class. (For homework, they could be given the assignment of sharing their observations with classmates via a blog post and commenting on each other's posts.)
- After students have had a chance to gather data from multiple video sources, have them to review their first-hand observations, notes from the videos, and the group charts that the class has created. Ask them to think about grouping their evidence into common categories (e.g., providing shelter and a place to raise young, gathering food, providing protection from enemies).
- Facilitate a Making Meaning Science Talk. Focus Question: How do ants work together to help them survive? Explain that students will need to refer to their science notebooks/notes and class charts during the science talk to provide evidence to support their claims.
- Create a new class chart that compiles evidence under the common categories:

How Ants Work Together in Colonies to Help Them Survive	
Claim	Evidence (Observations)
Ants Work Together to Provide Shelter and a Place to Raise Young	
Ants Work Together to Gather Food	
Ants Work Together to Protect Themselves from Enemies	
Other	

- Introduce the concept of "system"— a group of related parts that make up a whole and can carry out functions its individual parts cannot. Ask the class: "Do you think an ant colony is a system? Why or why not? What is your evidence?"

4. Science & ELA Argument Writing Assessment (Two-three 45-minute ELA sessions)

Materials:

- Sentence frames
- Word wall
- Argument writing worksheet
- Argument writing rubric

Learning Activities:

- As a group, write an argument (claim based on evidence) using the evidence on the group charts to answer the focus question: How do ants work together in colonies to help them survive? (See *Writing in Science in Action* by Betsy Rupp Fulwiler for further information.) Take down the written argument that you have created as a class and now ask students to do this task on their own using the information from their science notebooks, as well as the charts. Share the argument-writing rubric with them so they know what is expected.
- Task: Write a claim about how ants work together in a colony to help them survive. Back up your claim with evidence that you have gathered or learned during class. Use the argument-writing rubric as a guide for determining what is expected. [Note: this task could also be completed as a blog post. Students then could comment on each other's posts (focusing on relevance, strength of evidence, etc.—allowing them to critique each other's arguments.) This could be followed by a science talk.]

Optional Assessment: Students could create a digital story or other type of digital presentation (Prezi, Explain Everything presentation, etc.) to illustrate/present their argument.

5. Answering Questions Using Reliable Sources (Two-three 45-minute ELA sessions)

Materials:

- Books on ants, such as:
  - Insects That Work Together, Molly Aloian et al., Crabtree, 2006.
  - Inside an Ant Colony (Rookie Read-About Science), Allan Fowler, Children's Press, 1998.
  - Time for Kids: Ants!, editors of TIME for Kids, HarperCollins, 2005.
  - Ant Cities, Scott Foresman, HarperCollins, 1987.
- Websites, such as:
  - Face to Face with Ants, http://askabiologist.asu.edu/explore/ant-anatomy

Learning Activities:

- Review the student questions about ants that have not been answered yet (on the Wonder Board). Ask students how they might find out answers to these questions (e.g., books, websites, asking experts, etc.).
- Provide a collection of reading materials at different levels to students on ants (magazine articles, books, websites) and allow them to research answers to their questions, then report back to the class.

6. Wrap-Up & Reflection (One 45-minute Science session)

- Create a class concept map that concisely compiles all the evidence they have gathered to show how group behavior of ants helps them survive. Students will create similar concept maps in subsequent lessons when they study the group behavior of other types of animals. They will use these concept maps to compare and contrast how the group behavior of different animals helps them survive.
- Ask students to reflect on what they learned in this lesson, how they learned it, and additional questions they have (in science notebooks).

Vocabulary (Not a complete list)

Ant
Aphids
Claim
Colony
Cooperation
Eggs
Evidence
Fire ant
Group
Larvae
Leaf-cutter ant
Observation
Pheromone
Queen ant
Tunnel
Worker

Supports/Materials for Different Types of Learners

Instructional strategies for ELL and Special Education students:

- Comprehensive resource: http://schools.birdville.k12.tx.us/cms/lib2/TX01000797/Centricity/Domain/2804/SIOP.pdf
- Interactive word walls (including photos)
- Visual concept maps (including photos)

Extensions:

- Write a story from the viewpoint of an ant explaining your role in helping the colony survive.
- Compare the group behavior of humans and ants. How are they alike? How are they different?

Integration with Other Areas of the Curriculum

Nature of Science:

- Lord of the Ants, Nova, PBS, http://www.pbs.org/wgbh/nova/nature/lord-ants.html

Teacher Background

- *The Essentials of Science and Literacy: A Guide for Teachers*, Karen Worth et al., Heinemann, 2009. An excellent resource for facilitating science talks, using science notebooks and much more.
- *Writing in Science in Action*, Betsy Rupp Fulwiler, Heinemann, 2011. In this book, Betsy, outlines strategies for using modeling and scaffolding to help all students be successful with argument writing in science. The accompanying DVD (which comes with the book) contains several fabulous videos of these strategies in action (e.g., the Soils video).

How Ants Work Together to Help Them Survive

Claims Based on Evidence

Name:_____

In this lesson, we gathered evidence by observing ants outside and by watching videos to answer our focus question: How do ants work together in colonies to help them survive?

Write a claim to answer the focus question. Be sure to provide clear evidence that you have gathered to support this claim.

3rd Grade Science & ELA
Argument Writing Assessment **Rubric**

Novice	Apprentice (Approaching)	Practitioner (Proficient)*	Expert (Exceeds)
• Writing does not begin with a statement of the claim • The claim is not supported with evidence • Writing does not demonstrate an understanding of the topic • Related ideas are not grouped to support the writer's purpose • Words, phrases are not used to link the claim and evidence • No concluding statement is included • Scientific vocabulary is not used	• Writing does not begin with a statement of the claim • The claim is not supported with evidence • Writing demonstrates a partial understanding of the topic • Related ideas are only partially grouped to support the writer's purpose • Words and phrases are used, but do not link the claim and evidence • A concluding statement is included but it is not related to the claim • Attempts are made to use scientific vocabulary	• Writing begins with a statement of the claim • The claim is supported with evidence • Writing demonstrates an understanding of the topic • An organizational structure is created to list evidence • The claim and evidence are linked using words and phrases (e.g., because, therefore, since, for example) • A concluding statement or section is included related to the claim • Scientific vocabulary is used appropriately	• Writing begins with a statement of the claim • The claim is supported with logically ordered evidence • Writing demonstrates an understanding of the topic • Related ideas are logically grouped to support the writer's purpose • The claim and evidence are linked using words, phrases and clauses (e.g., for instance, in order to, in addition) • A concluding statement or section is included related to the claim • Scientific vocabulary is used appropriately

*Proficient = grade level expectation

Source: Adapted from ELA Common Core.

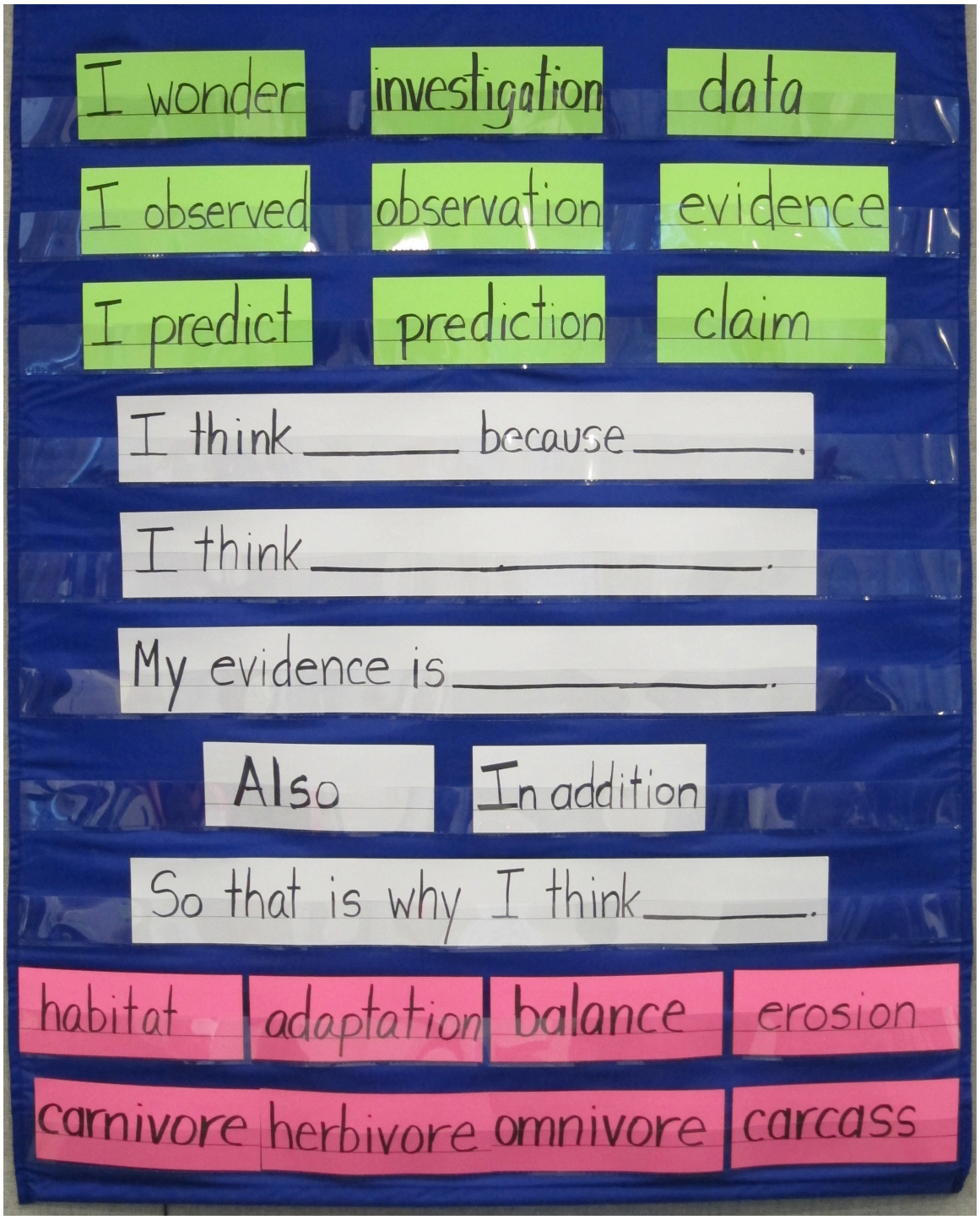
Focus question: How do animals work together in groups to help them survive?

I think ants work together in colonies to help them survive.
I think this because _____
Also,
In addition,
So that is why I think _____

Example Focus Question & Argument Writing Sentence Frames

Example Word Wall

(Substitute Ant Colonies Lesson vocabulary for the pink words at the bottom of the chart)



Source: Janet MacNeil, 2014. Adapted from Betsy Rupp Fulwiler, *Writing in Science in Action,* Heinemann, 2011.