

“Bees Are VIPs (Very Important Pollinators)” and “Staying Alive”

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CONNECTED
SCIENCE • TECHNOLOGY • MATHEMATICS
2012 LEVEL 2



Overview

Both these articles explore the relationships between honey bees and other living things within their habitat. “Bees Are VIPs (Very Important Pollinators)” explores the symbiotic relationship that has evolved between the honey bee and flowering plants. It describes how, in the process of gathering nectar and pollen, the honey bee helps to pollinate flowers. “Staying Alive” identifies some reasons why the honey bee is becoming endangered. It describes the behaviours of other living things, including humans, that are threatening honey bee survival. Suggestions for saving honey bees are included.

Curriculum context

SCIENCE

NATURE OF SCIENCE

Communicating in science

Achievement objective(s)

L1 and 2: Students will build their language and develop their understandings of the many ways the natural world can be represented.

Participating and contributing

Achievement objective(s)

L1 and 2: Students will explore and act on issues and questions that link their science learning to their daily living.

LIVING WORLD

Life processes

Achievement objective(s)

L1 and 2: Students will recognise that all living things have certain requirements so they can stay alive.

Ecology

Achievement objective(s)

L1 and 2: Students will recognise that living things are suited to their particular habitat.

MATERIAL WORLD

Chemistry and society

Achievement objective(s)

L1 and 2: Students will find out about the uses of common materials and relate these to their observed properties.

Key ideas

- Living organisms compete and co-operate with members of their own and other species in order to survive.
- Honey bees and flowering plants have a symbiotic relationship in which they mutually benefit from their interaction.
- The varroa mite and the honey bee have a parasitic relationship because only one organism benefits.
- Living things depend on other living things and on non-living things. Such relationships can be changed by human activity.
- Scientists use specific vocabulary when communicating scientific ideas.
- We need to question and seek to change human activity that may have a negative effect on the natural environment.

ENGLISH

READING

Ideas

Achievement objective(s)

L2: Students will show some understanding of ideas within, across, and beyond texts.

Indicators

- Uses their personal experience and world and literacy knowledge to make meaning from texts.
- Makes meaning of increasingly complex texts by identifying main ideas.
- Makes and supports inferences from texts with some independence.

The Literacy Learning Progressions

The literacy knowledge, skills, and attitudes that students need to draw on by the end of year 4 are described in *The Literacy Learning Progressions*.

Meeting the literacy challenges

The following strategies will support students as they engage with the information and ideas in the text. Once they understand what the article is about (“the story”), they will be able to explore the key science ideas outlined in the following pages.

The *Connected* series includes a range of texts that provide opportunities for students to locate, evaluate, integrate, and synthesise information and ideas.

It is expected that students will read across the range of texts in this *Connected* to develop their literacy skills and their understanding of the topic.

Text characteristics

- Clearly structured articles with headings that signify the information in each section and help the reader to navigate the texts
- A significant amount of vocabulary that will be unfamiliar to many students (including subject-specific words and phrases)
- Photographs and diagrams that clarify the text and require some interpretation.

1. FINDING THE INFORMATION IN THE TEXT

“Bees Are VIPs (Very Important Pollinators)” is an explanatory text that discusses how pollination takes place. The article’s title and three headings, which are presented as questions, indicate the main ideas in the text:

- Bees are important pollinators.
- Pollination is a process.
- Bees have bodies that are good at pollinating.
- Flowers have features that attract pollinators.

IDENTIFY aspects of the structure, such as the title, headings, and diagrams, that will help students navigate the article and locate the main ideas.

PROMPT the students to use the heading questions to predict what each paragraph will mainly be about.

The first two pages of this text include much vocabulary that may be unfamiliar to students. A shared reading will scaffold their use of strategies to make meaning of the text.

Have the students read to the bottom of page 14 before discussing the meaning of the words “pollen” and “pollinators”. Record these words and the word “pollination” on a whiteboard.

PROMPT them to read on.

In this next section, we’re going to find out how pollination works.

After reading the section, add the words “self-pollinate” and “cross-pollination” to the list of words on the whiteboard. As a class or a group, discuss the definitions of these words and add these to the list, for example:

pollen – grains that contain cells needed for reproduction

pollinators – the animal or thing that does the pollination

pollination – the process of pollinating a flower

The process of evolution not explained in this article. Students don’t need a deep understanding of evolution to grasp the information about pollination. However, evolution is referred to and implied, particularly on pages 16 and 17. An understanding that plants and animals have changed over time by adapting to their environments allows readers to understand that these living things have mutual relationships that have developed over thousands of years.

ASK QUESTIONS to draw out these ideas.

Why do bees pollinate flowers? How do they do this?

PROMPT the students to find key pieces of information on page 16 to answer this question. It may help to list the statements and then show the students how to draw conclusions from the information.

Make an illustration to show how bees depend on flowers and how flowers depend on bees.

“Staying Alive” is an explanatory text that lists and explains the reasons why bees are now endangered throughout the world.

Have the students **SKIM** the headings to list these dangers before they begin reading the text.

Then ask them to **SCAN** the text under each heading, jot down three points that elaborate on those headings, and in pairs compare their findings.

Remind the students that skimming and scanning are helpful strategies for finding the main ideas in an article.

2. USING THE DIAGRAMS TO CLARIFY THE TEXT

Tell the students that diagrams can help to clarify the meaning of complex text.

MODEL by thinking aloud about how the diagrams provide visual support for the text.

Looking at the diagram on page 15, I can see how the purple arrows suggest the different types of pollination. Notice how the self-pollination arrow starts from one stamen and moves to the stigma, while the wind pollination and the insect and animal pollination arrows come from outside the plant to the stigma.

ASK QUESTIONS to support the students to use the diagrams.

The stigma and stamen look quite alike, don’t they? How can you tell them apart?

Can you outline the petals? I wonder what that ovule is at the base of the stigma?

Look at that varroa mite on the bee in the diagram on page 26. How big would you say it was?

Find the information in the text that tells you how big it is.

3. DEALING WITH UNFAMILIAR VOCABULARY

Identify the subject-specific words in these articles. Record the words that relate to pollination (for example, “stigma”, “stamen”, “pollen”) or those that relate to dangers to bees (for example, “pesticides”, “varroa mites”, “colony collapse disorder”).

EXPLAIN to the students that many words in this text may be unfamiliar to them.

PROMPT them to read on for a sentence or two when they first encounter an unfamiliar word.

You might not know that word “pesticides”, but read on until you find information about what it means.

MODEL “reading around” unfamiliar words to gain meaning from context.

It says “Water spreads pollen for some aquatic plants”, so I’m predicting that aquatic plants are those that grow in water.

We’ve worked out what “pesticides” are, so what do you think “insecticides” are?

Students can **IDENTIFY** and **RECORD** vocabulary that is new to them in these articles and compile their own glossaries, adding meanings in their own words, for example:

laden – loaded with something

pollen-laden – loaded with pollen

evolved – changed over time

spring mechanism – something that springs up when it’s touched

Exploring the science

The following activities and suggestions are designed as a guide for supporting students to explore and develop scientific explanations of natural phenomena within the living world.

Key ideas

- Living organisms compete and co-operate with members of their own and other species in order to survive.
- Honey bees and flowering plants have a symbiotic relationship in which they mutually benefit from their interaction.
- The varroa mite and the honey bee have a parasitic relationship because only one organism benefits.
- Living things depend on other living things and on non-living things. Such relationships can be changed by human activity.
- Scientists use specific vocabulary when communicating scientific ideas.
- We need to question and seek to change human activity that may have a negative effect on the natural environment.

Activity 1: Exploring how a flowering plant works

Discuss what makes a flowering plant a living thing. Have the students use samples of flowering plants to identify their main structural parts – the roots, stem, leaves, and flowers.

Discuss the role of each plant part in helping the plant to survive. In groups, the students can create an annotated poster identifying the parts of a flowering plant and their functions.

Activity 2: Exploring the parts of a flower

Prepare and set out the following materials:

- a range of different flowers that clearly display their structures (lilies and fuchsias do this well)
- bamboo skewers and fruit knives to explore the structures
- cotton buds
- hand lenses and magnifying glasses
- a chart identifying flower parts.

Explain that scientists observe living things. Have the students look closely at the different types of flowers and identify the parts that may be a source of pollen and nectar. They can use cotton buds to attempt to extract some pollen and nectar. Prompt them to spend time looking closely at the flowering parts with a hand lens. Students will experience a sense of awe when given the time and tools to undertake this task. Discuss the pollination process and support the students to identify the relevant parts of the flowers and their functions.

Activity 3: Making models of flower parts

Have the students work in groups to plan and construct a model of the flowering part of a plant. Remind them that their model must allow honey bees access to the nectar and pollen so that the bees can help with the pollination process.

Using their models of the honey bee from the activity outlined in the teacher support material for “Thank Goodness for Bees”, ask the groups to prepare a short presentation to demonstrate how their model plant part and the model bees help each other.

Activity 4: Discovering other ways that plants can be pollinated

Remind the students that not all plants are pollinated by insects or other animals. Many, including grasses, are pollinated by the wind. Using samples of grasses in flower, have the students identify the differences in the ways these plant parts are arranged.

Activity 5: Investigating the relationship between honey bees and varroa mites

Explain that the relationship between the honey bee and the flowering plant is an example of a positive symbiotic relationship because both organisms benefit from it. The relationship between the honey bee and the varroa mite is parasitic because it benefits only one of the species involved. Varroa mites are living things that endanger the honey bee.

After reading and discussing the article, explain that varroa mites are living organisms that have life processes just like flowering plants, honey bees, and human beings.

Discuss the life processes of the varroa mite and how, through these processes, it harms the honey bee.

Have the students complete a chart that lists the varroa mite’s life processes, details of how these processes are carried out, and the effects they have on the honey bee.

Varroa mite’s life processes	How the processes work	Effects on honey bees
Reproduction	The varroa mite lays eggs in the cells of bee larvae.	The honey bee becomes host for the varroa mite.
Nutrition	The young mite feeds on the blood of adult bees and larvae.	The honey bee becomes food for the varroa mite. The openings in the bee’s skin allow fungi and bacteria to enter the bee’s body and weaken the bee.
Movement	The young mite attaches itself to the young bee as it leaves its cell. It then moves to other bees and larvae.	More and more bees are affected. The hive becomes unhealthy.

As a follow-up activity, have the students design a Wanted poster that details the characteristics of the varroa mite. (See Activity 13 on page 66 of *Making Better Sense of the Living World*.)

Activity 6: Testing our thinking

Explain that scientists use scientific vocabulary to communicate specific ideas. The article “Staying Alive” explains that pesticides are chemicals and that people spray them on plants to kill weeds and harmful insects and bacteria. Using pesticides can harm bees. It could therefore be inferred that chemicals are harmful. Discuss with the class if this is the case. Are all chemicals harmful or just some chemicals?

Explore what the term “chemical” means by having the students list all the chemicals they know. Record a class list on the whiteboard and ask the students to classify the chemicals into groups according to their use and whether they are harmful. Include in the list common chemicals, such as milk, water, petrol, and orange juice.

Clarify the students’ ideas by discussing the role of the chemical we know as water. Water is a chemical compound made up of the elements oxygen and hydrogen. All living things need water to stay alive.

Explain that the specialised vocabulary of science has meanings that are not always the same as the meanings of words in common usage. Many people think chemicals are the products we use as cleaners and that they are harmful. Compare the scientific meaning of the word “chemical” with the common meaning of the word.

Activity 7: Turning our ideas into action

“Do not spray onto plants that are in flower” is a safety instruction often printed on pesticide sprays.

Discuss this instruction with the students and link it to the impact that harmful chemical sprays can have on honey bees.

Discuss what actions they and their families can take to protect honey bees from harmful substances.

Develop a class treaty that details future actions the class can take to ensure that honey bees that visit their school survive.

MINISTRY OF EDUCATION RESOURCES

- Building Science Concepts (BSC series): Book 39: *Is This an Animal?*; Book 4: *Animal Life Histories*; Book 35: *Is This a Plant?*; Book 25: *Flowers, Fruits, and Seeds*; Book 26: *Making New Plants*
- *Making Better Sense of the Living World* (2001)
- See the Assessment Resource Banks site and linking documents to the Making Better Sense books and the Building Science Concepts series for appropriate tasks:
 - <http://arb.nzcer.org.nz/resources/science/bsc.php>
 - <http://arb.nzcer.org.nz/resources/science/bettersense/>

FURTHER RESOURCES

- See also the resource lists in the BSC and Making Better Sense books
- www.honeycouncil.ca/index.php/canadianhoney_resources