Teacher Notes

Themes

- Conservation
- Australian native bees

Key learning outcomes

- Identify some of the bees native to Australia and the roles they play in our environments
- Understand the conditions that help these insects to thrive
- Learn the vocabulary associated with bees and their lives

Key curriculum areas

- **Science:** Science Understanding (Biological sciences); Science Inquiry Skills; Science as a Human Endeavour
- **English:** Language, Literacy
- **HASS:** Geography
- **Cross-curriculum Priority:** Sustainability

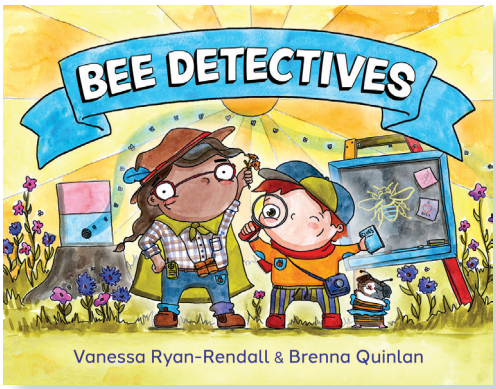
Publication details

Bee Detectives
ISBN: 9781486313396

Teacher notes prepared by Joanna Durst.

CSIRO Publishing
Locked Bag 10
Clayton South, VIC 3169, Australia

Website: www.publish.csiro.au
Tel: 1300 788 000 (local call in Australia)
Email: publishing.sales@csiro.au



Bee Detectives

Vanessa Ryan-Rendall and Brenna Quinlan

About the book

When Olivia and Hamish hear the roar of a chainsaw and see a smoky haze coming from their local park, they're ready to spring into action! But it's not a fire – it's a nest of Australian stingless bees that needs their help. Time to give the Bee Detectives a buzz!

Join Olivia and Hamish as they learn about the bees in our backyards, discovering how they live, what they like to eat and the important work they do to pollinate plants. From Blue-banded and Teddy Bear to Carpenter and Leaf-cutter bees, our two budding Bee Detectives discover how hives are moved to safer places and how to take the sting out of protecting and supporting our native bees.

Explore the wonders of Australia's native bees – and be inspired to become a Bee Detective, too. It's a real buzz!

Recommended for (age range/school year levels)

Children aged 6–9.

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About the author and illustrator

Vanessa Ryan-Rendall is an experienced primary school teacher, gifted education consultant and librarian. She has a keen interest in engaging students in literature while learning more about the natural world, and loves helping children build skills in investigating, problem-solving and creative thinking.

Brenna Quinlan is an illustrator and educator who strives to make the world a better place through her art and her actions. She lives at Australia's most well-known permaculture demonstration site, Melliodora, where she grows food, milks goats, builds soil and engages with the community.

Pre-reading questions or activities

Native versus introduced

Many living things have been brought to Australia over the years – animals and plants that aren't native to our country. They can have a huge impact on the environment, sometimes negative, sometimes positive. The honeybee and the bumblebee are both introduced species.

What are some of the creatures and vegetation that settlers from Europe brought here? What difference have they made to our bushland and to other animals?

Discussion questions

Science

1. Every living thing goes through a life cycle, from young to old, sometimes changing quite dramatically in the process. The four stages for a bee are: egg, larva (plural: larvae), pupa (plural: pupae) and adult.

   What food do the bee babies eat?
   The larvae and pupae eat nectar and pollen.

2. Olivia and Hamish weren't sure what sort of insects they were looking at. Sometimes our native bees can be confused with other insects, like wasps, flying ants or flies. Look at the website https://wildpollinatorcount.com/resources/bee-fly-or-wasp-2/ and discuss with a partner what the differences are between bees and other similar insects.

   - *Flies have two wings, bees and wasps have four wings.*

- *Bees often have an elbow in their antennae, while flies' antennae are short and hard to see.*
- *Where flies have round heads, wasps and bees have triangular heads.*
- *Bees have thick, hairy hind legs (to help collect pollen), while flies and wasps have fine, slender ones.*
- *The waist of a fly is usually hidden, not pronounced. The waist of a bee and a wasp is more noticeable and distinct.*
- *Both bees and wasps have oval eyes where flies have round eyes.*

3. What is pollination, how does it work and why is it important? What makes bees such good pollinators?

   Pollination results in fertilisation so all plants need to pollinate in order to make seeds and fruit, and thereby to reproduce. Pollinators include: insects, wind, birds, other animals, water. The pollen, which carries the male genes, needs to come into contact with the female organs on a plant, the stigma. See: https://australian.museum/learn/species-identification/ask-an-expert/what-is-pollination/

   Native bees can be quite small and therefore can access the tiny native flowers that introduced bees can't. This assists those plants to thrive.

4. Entomologists are scientists who study insects. Why might it be important for us to know about insects?

   Food chains, forensics, agriculture, animal health, food alternatives, human disease.

English

1. In this book, the terms 'native', 'European friends' and 'endemic' are used. What do they mean? You might also hear scientists use terms such as 'introduced', 'feral' and 'indigenous' to describe animals and plants. Look up the meanings of these terms in a dictionary and decide which words best describe each of the bees and plants mentioned in the story. Discuss what impacts non-native species might have on the environment.

   Native: a species that has not been brought from somewhere else but lives where it originated.

   'European friends': the bees that produce the honey we buy in the shops are introduced European bees. As we learn from the book, most Australian native bees don't produce honey over and above what they eat themselves. Some of the introduced bees, however, are not really our friends. (Example: The bumblebee was smuggled into Tasmania in the 1990s and has become a pest. They compete with native bees and birds for nectar, they pollinate noxious weeds more readily and are able to sting repeatedly.)

Endemic: a species that is unique to a specific place or habitat, and only lives in that area.

Introduced: brought to an area by humans. Also called alien, non-native and exotic.

Feral: escaped, untamed species that becomes a problem (weed, predator, etc.).

Indigenous: a naturally occurring species that is found in several places.

Sustainability

1. To encourage native bees in your garden or school grounds, what things can you do with your family, your friends and your teachers?
   - *For bee food, plant the flowers they like.*
   - *For shelter, build a bee hotel or provide logs and soil they can use.*
   - *For safety, use natural methods of weed and insect control elsewhere in the garden.*

Activities

Science

Nectar plants

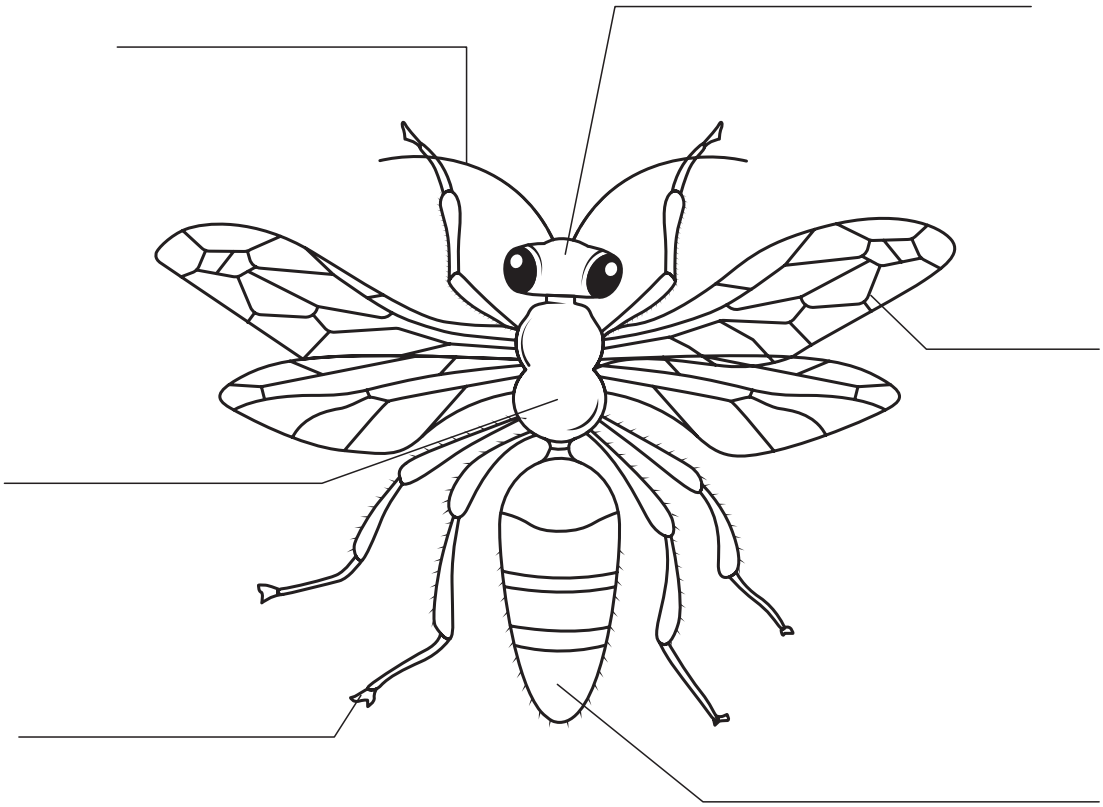
Bees rely on nectar from flowers to sustain their colonies. There are pictures of some Australian flowers in the book but can you draw another plant that bees like, chosen from the list below? Is the plant you chose an Australian native or has it been introduced?

- lavender
- pincushion hakea
- tea tree
- grevillea
- sage
- native rosemary
- bottlebrush

English

Insect anatomy

Insect bodies are labelled in particular ways. Using the following drawing, apply the labels in the Word Bank box to the correct parts of the body.



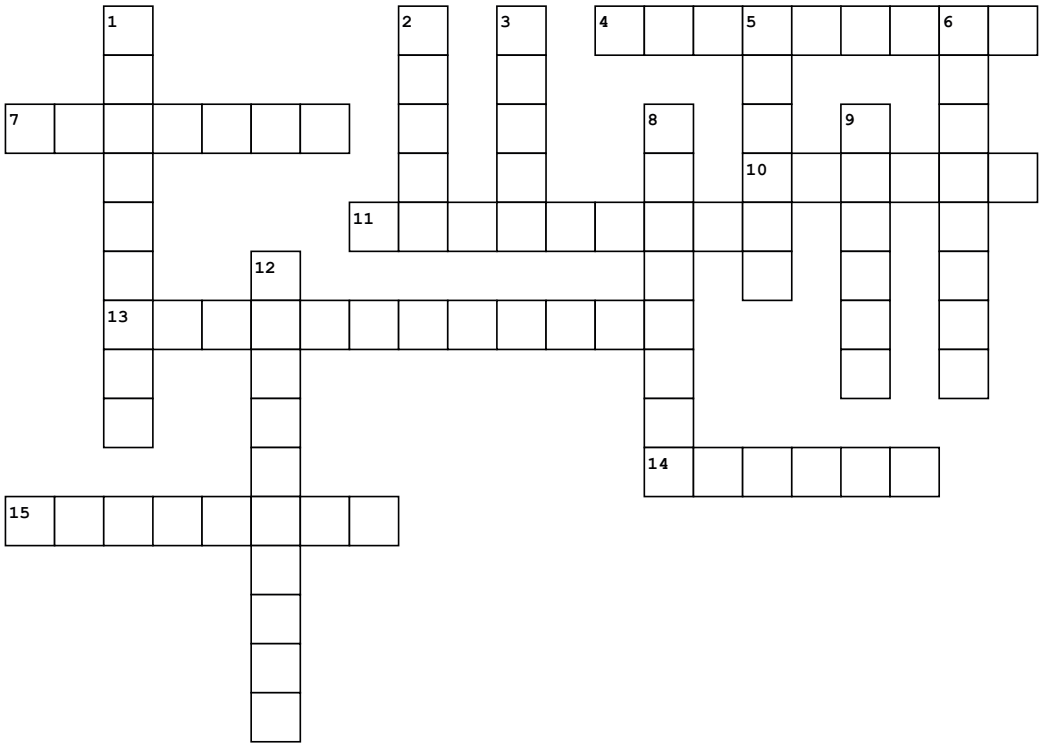
Word Bank		
abdomen	antenna	head
leg	thorax	wing

Source: Adapted from https://homeschoolhelperonline.com/label-the-insect-worksheet/

English

Bee detective words

Using the clues and the book, fill in the crossword puzzle below.



Across

4. Without a sting
7. Something found in only a specific place
10. The part of an insect's body between the neck and the waist
11. One of the bees in this book
13. An insect scientist
14. Shape of the Tetragonula honeycomb
15. Living alone

Down

1. One of the bees in this book (5, 4)
2. Male worker bee
3. A group of closely related species
5. A sugary liquid produced by plants
6. The name for honey made by native bees
8. The guinea pig's name
9. Tiny yellow grains on flowering plants
12. Another word for buzz pollination

Source: Crosswordlabs.com

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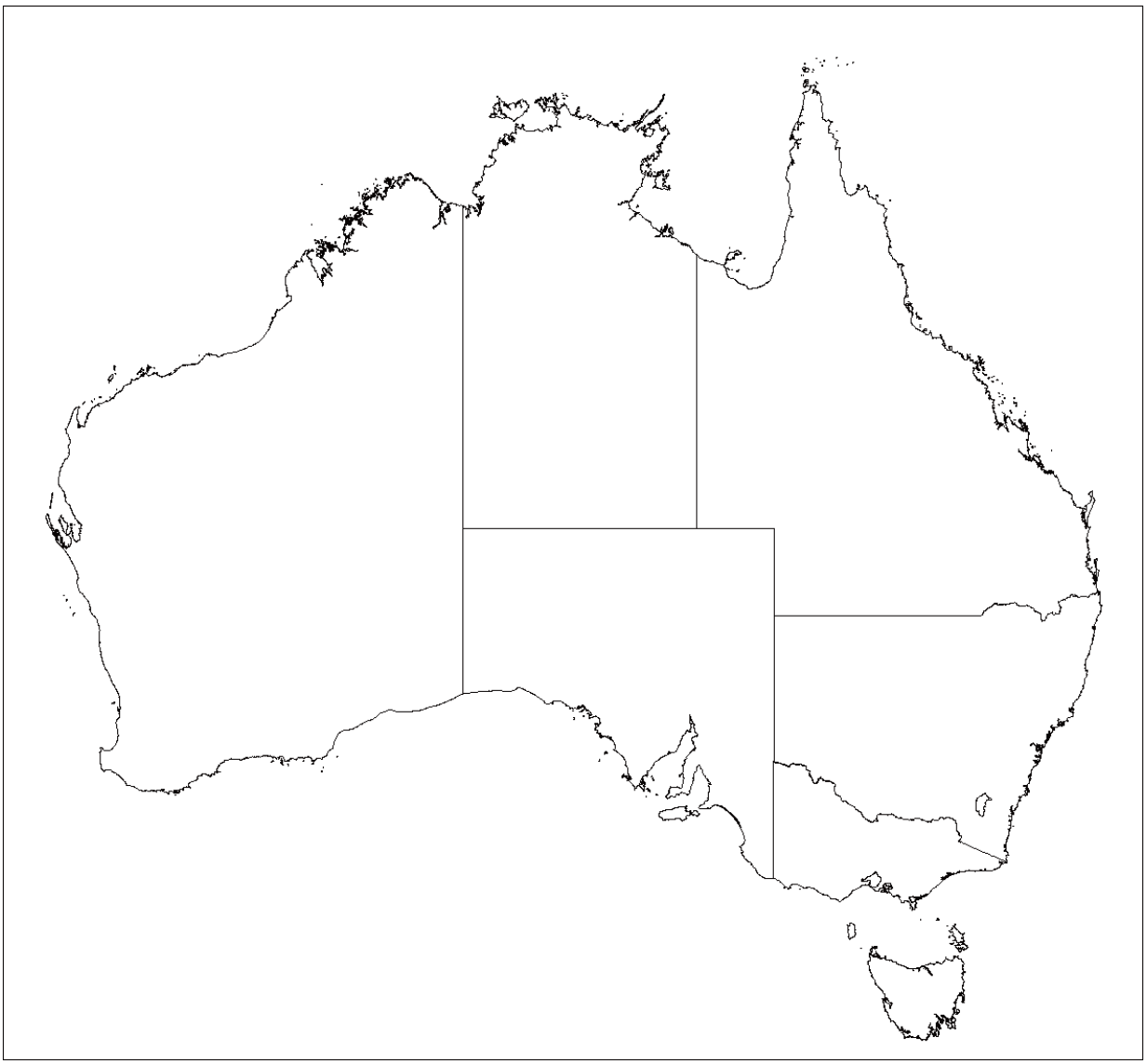
HASS: Geography

Where bees live

On this map of Australia, label the various states and territories (Western Australia, Victoria, Tasmania, South Australia, Queensland, Northern Territory, New South Wales, Australian Capital Territory). Then record on your map at least one bee that is found in each state and territory (see: https://www.aussiebee.com.au/beesinyourarea.html).



Source: © University of Melbourne 2001

Teacher Notes

Australian Curriculum Links

Year level	Learning area: Science	Other learning areas
Years 1/2	**Science Understanding: Biological Sciences** • Living things have a variety of external features (ACSSU017) • Living things grow, change and have offspring similar to themselves (ACSSU030) **Science Inquiry Skills: Processing and analysing data and information** • Use a range of methods to sort information, including drawings and provided tables and through discussion, compare observations with predictions (ACSIS027) **Science as a Human Endeavour: Use and influence of science** • People use science in their daily lives, including when caring for their environment and living things (ACSHE034)	**English: Language** • Understand the use of vocabulary about familiar and new topics and experiment with and begin to make conscious choices of vocabulary to suit audience and purpose (ACELA1470) **HASS: Inquiry and skills** • Sort and record information and data, including location, in tables and on plans and labelled maps (ACHASSI036) **Sustainability: Human–nature relationships** • World views that recognise the dependence of living things on healthy ecosystems, and value diversity and social justice, are essential for achieving sustainability.
Years 3/4	**Science Understanding: Biological Sciences** • Living things depend on each other and the environment to survive (ACSSU073) **Science as a Human Endeavour: Use and influence of science** • Science knowledge helps people to understand the effect of their actions (ACSHE051)	**English: Language** • Incorporate new vocabulary from a range of sources into students' own texts including vocabulary encountered in research (ACELA1498) **HASS: Inquiry and skills** • Interpret data and information displayed in different formats, to identify and describe distributions and simple patterns (ACHASSI078)

Related children's books from CSIRO Publishing

Plantastic! A to Z of Australian Plants (https://www.publish.csiro.au/book/7956/)
A Hollow Is a Home (https://www.publish.csiro.au/book/7729)
Phasmid: Saving the Lord Howe Island Stick Insect (https://www.publish.csiro.au/book/7226)

Related identification books from CSIRO Publishing

Bees of Australia: A Photographic Exploration (https://www.publish.csiro.au/book/7786)
A Guide to Native Bees of Australia (https://www.publish.csiro.au/book/7388)

Other CSIRO resources

CSIRO has developed and delivered a broad range of high-quality STEM education programs and initiatives for nearly 40 years. Our programs aim to inspire the pursuit of further STEM education among students and the community, to equip the emerging workforce with tomorrow's skill sets, and to strengthen collaboration between industry and classrooms across Australia. For more information visit: https://www.csiro.au/en/Education