



This will give you a buzz

About the Honey Industry

This project is an initiative of the Australian Horticultural Corporation and has been produced by National Curriculum Services.



This will give you a buzz

To the Teacher

About the Project

Australia ranks as one of the four leading honey exporting countries in the world. There are some 14,000 registered beekeepers in Australia with about 2,000 of these working commercially to produce 87 per cent of Australia's honey.

Australia produces and sells about 30,000 tonnes of honey each year (60% domestic consumption, 40% for export). 26,000 tonnes is officially recorded. The balance, sold at the farm gate, is not recorded. Most of Australia's honey comes from the various eucalypt plant species (gum trees).

The aim of the project is to outline to teachers and students information about the honey industry and the nutritional benefits of honey.

The project contains a series of student activity sheets which provide both content and tasks for students. Each student activity sheet is self-contained although there are a range of extension activities which can be completed outside the classroom.

The activity sheets are designed to be photocopied as required.

The material is aimed at students in upper primary school levels and relates to studies in the Health and Physical Education, Science and Studies of Society and the Environment Key Learning Areas.

The project equates to Level 4 of the Australian curriculum statements and profiles. This relates to the upper primary years although it is recognised that teachers will make decisions as to the most appropriate year levels for their local curriculum.

Students who participate in the activities will develop

- knowledge about the nature of the honey industry
- an appreciation of the nutritional benefits of honey
- an understanding about the significance of the honey industry to the economy
- research skills focusing on locating and presenting information
- cooperative partner and group work skills.

The learning outcomes attached to each Strand provide many possibilities for student activities. It is anticipated the activities will serve as a stimulus for the development of additional ideas at the school level.

The student activities link the main Strands.

Teacher Guidelines

'This Will Give You A Buzz' is best seen as a unit within the SOSE curriculum. The content has been used to frame activities that facilitate learning outcomes within the strands of :

- Resources
- Place and Space
- Investigation and Communication
- Time, Continuity and Change
- Natural and Social Systems



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To the Teacher

Contents

The project contains the following student activity sheets:

Student Activity Sheet No.	Topic	Strand	Learning Outcomes
1	About honey – from the beginning	Time, Continuity and Change	Describes ways of life of people in the past
2	Why honey?	Natural and Social Systems	Examines the flow of a product
3	The busy bee	Natural and Social Systems	Compares features of natural systems
4	The hive – home and factory	Resources	Explains factors that affect resource use and development
5	They seek it here, they seek it there – the gathering	Place and Space	Focuses on association between natural and human features
6	The source	Place and Space	Focuses on association between natural and human
7	Making the honey – a process	Resources	Focuses on variation in resource use and development
8	Harvest time	Natural and Social Systems	Describe an example of a cycle within a natural system
9	Home and abroad	Natural and Social Systems	Discusses economic decisions made
10	Honey facts	Investigation and Communication	Explain factors that affect resources



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To the Teacher

Acknowledgments

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Enquiries about the project should be directed to:

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For further information about the industry in general, bees and honey, the following associations and society welcome contact from teachers. Visits by school groups to beekeepers can be arranged through these organisations.

NSW (COUNTRY)

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PO Box 290
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NSW (METROPOLITAN SOUTH AND WEST)

The Amateur Beekeepers' Association of NSW
Bee Museum
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NSW (METROPOLITAN/NORTH AND EAST)

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KARDINYA WA 6163
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One

About Honey

Since the earliest days honey has been a source of food and energy. From the first food-gatherers to the ancient civilizations of the Egyptians, Greeks and Romans – records show the value of the bees and their honey.



In pre-European Australia, a type of honey was a food for some Aborigines. This honey was produced by *trigona* bees, a species native to Northern Australia. These bees nest in hollow trees and produce a small amount of rich dark honey called *sugar bag* or *honey pot*. They are small (5mm) black social bees (belonging to a hive) and have no stings.

Honey sold in shops comes from *honeybees*. The honeybee (*Apis mellifera*) was introduced to Australia in 1822, soon after the homesick European settlers arrived. Honeybees quickly adapted to the Australian climate. Honeybees were needed to fertilise (pollinate) the European crops, which were established in the new land.

The honeybee is a most amazing insect. Its family (hive) consists of :

- workers
- drones
- a Queen Bee.

Bees collect nectar, pollen and water each day to take back to the hive so that future generations can live. The raw nectar comes from flowers. They mix this with secretions from their glands, thereby transforming it and after it is deposited in the comb, it ripens into honey.

Honey is primarily of vegetable origin. Its sugars are formed by a mixture of the sun, water and carbon dioxide in the air.

Bees produce:

- honey – to provide food reserves for the hive
- beeswax – to make honeycomb (traditionally used for candles and cosmetics),
- pollen – to nurture their young (which when dried and preserved is a valuable nutrient)
- propolis – to seal their hive from wind and rain (which can be used as an antiseptic)
- bee venom (which can be used to relieve arthritic and rheumatic pains).





One

About Honey

Activities

- 1 Why do you think the early European settlers were homesick? See if you can find copies of letters or drawings by early settlers about their new country and its difficulties and pleasures. If you have migrated to Australia or have friends who have done this find out what makes them feel 'homesick'. Check first with other members of your class for their comments.

Try writing a letter, as an early settler, to someone in the 'old country'.

- 2 With a partner identify and list other species – animal or insect – which you know have been introduced to Australia.
- 3 As a class, make a composite list and identify the country of origin of each animal/insect.
- 4 a) In pairs, investigate the animals and insects in the chart below and try to fill in the empty boxes:

Species	Animal	Insect	Native	Introduced
fox	✓			✓
dung beetle		✓		✓
mosquito				
rabbit				
wallaby				
magpie				
cat				

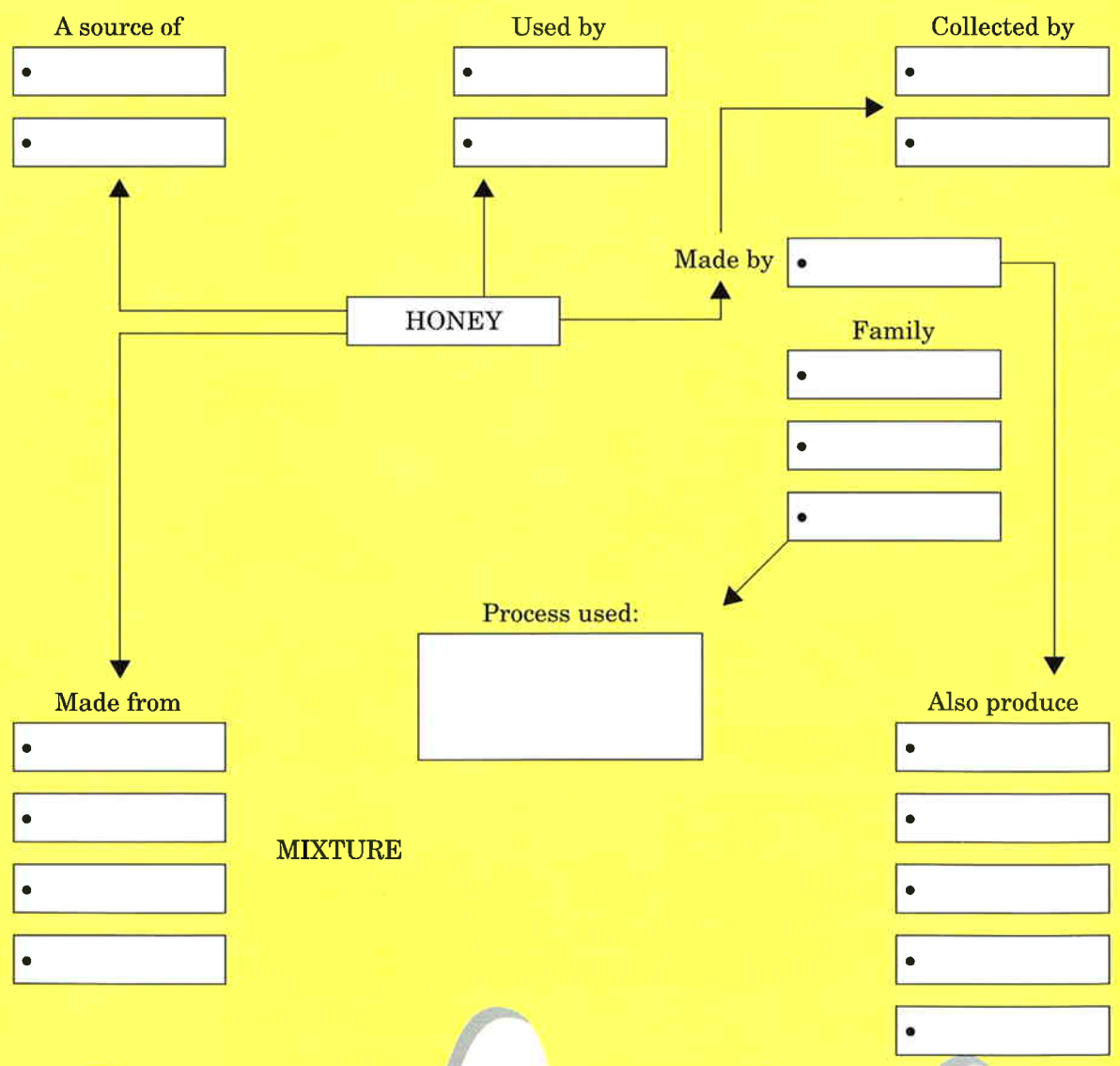


About Honey

b) Transfer the introduced species to the next chart and complete it as well.

Species	Animal	Insect	Country of Origin	Habitat
fox	✓		Europe	sheltered areas
rabbit	✓		Europe	farmland
honey bee		✓	Europe	forests and farmland

c) With your partner, complete the Information Web below.





one

About Honey

- d) If you were a honey bee, what would be the jobs you would have to do? List them in order from most to least important.

Extension Activities

- 5 Reference is made to the Ancient Egyptians, Greeks and Romans and their use of honey. When did these civilizations exist? As a group prepare a timeline which clearly shows these civilizations.
- 6 The first imported bees to Australia came from England.
What regulations are there now to restrict the import of animals into Australia? Why is this?
- 7 Find out what foods were eaten by Aboriginal people before white settlers came here. See if you can discover what effects white people's foods have had on aboriginal health.





XWO

Why Honey?

Honey is a quick, safe and natural energy giver because its simple sugars are quickly absorbed into the blood stream. Honey contains many vitamins and minerals.

Honey is made up of :

- natural sugars 80% (mainly levulose, dextrose and glucose)
- moisture 17%
- mineral traces 3%.



There are many recipes which use honey for flavour – there are probably more than 100 different ways honey can add flavour to a food.

The bee's value however is not confined to making honey. Honeybees also help our fruit and vegetables grow. Without bees trees and flowers may not make fruit, nuts or seeds and there would be no honey. Bees, orchards and market gardens are an essential part of our food chain.

When the bee gathers *nectar* her body becomes dusted with *pollen*. As she moves from flower to flower the pollen passes from male to female stigma and cross-pollination (or fertilization) takes place which leads to new seeds and plant regeneration.

Activities

1 With a partner, check in dictionaries, encyclopaedias and other references these terms:

- nectar
- pollen
- cross pollination

Find out how:

- Peas get into packets in super-markets
- Why you shouldn't eat potato plant leaves
- Why strawberries have that name

If you wanted to visit a market garden, what would you have to do? Are there any market gardens near you?



xwo

Why Honey?

2 Honey is used in many foods. Write down three foods you have eaten in the last week which have honey in them.

Think about breakfast, lunch, tea and snacks. List as many foods or uses for honey for these meals.

Breakfast	Lunch	Tea	Snacks
<ul style="list-style-type: none"> • Honey on toast • • • • 	<ul style="list-style-type: none"> • Honey sandwich • • • • 	<ul style="list-style-type: none"> • Honey on carrots • • • • 	<ul style="list-style-type: none"> • Biscuits: Honey Joys • • • •

3 Honey is used in many recipes. Read these instructions and follow directions to make fantastic Honey Joys.

HONEY JOYS

Ingredients:

4 cups Corn Flakes.

1/3 cup sugar.

90g margarine.

1 tablespoon honey.

Method:

Heat margarine, sugar and honey until frothy, add Corn Flakes and mix well. Spoon into patty cases and bake in a slow oven (150°C – 160°C) for 10 minutes. Allow to cool. Makes 24.





X TWO

Why Honey?

Your Tasks:

- How much money would you need to buy the ingredients? List the items and their cost.
- If you were selling these at a stall what would you charge if you were to make 5¢ profit from each Honey Joy?
- How much profit will you make altogether?

I eat my peas with honey
I've done so all my life
They do taste kinda funny
But it keeps them on the knife



- 4 Browse through a collection of recipe books. Create a honey of a menu! List the foods you'd serve in a Honey Cafe.



Entree •
•
•

Main •
•
•
•

Sweets •
•
•
•

Drinks •
•
•
•

(You could have a meeting to discuss honey drinks!)

Extension Activities

- 1 Look through the collection of recipe books at home or in your class. Find at least three recipes that include honey as an ingredient.
- 2 Select one recipe from your list. Work with your class to make two batches of the recipe, the first with all the ingredients; the second without including the honey. Taste the two samples. What difference does honey make to the recipe?



The Busy Bee

There are three types (castes) of bees in a normal hive:

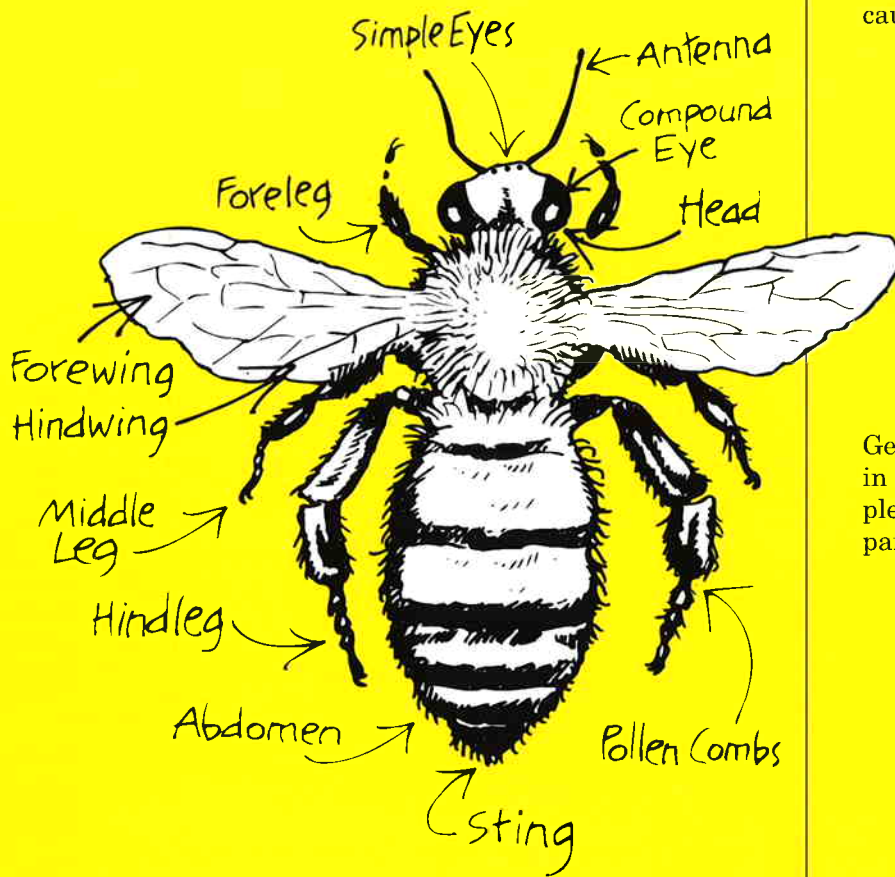
The Worker

This is the smallest bee, 13-17 millimetres long. The worker bee gathers food for the hive, cleans the hive and helps rear the young. The worker bee collects nectar and water through its long mouthpiece called a *proboscis*. Its tongue is used to suck the nectar from the flowers. On its long hind legs there are pollen 'baskets' to carry the pollen back to the hive.

On the front legs there are antenna 'cleaners' which have brushes, combs and spurs which brush pollen from the eyes, clean the antennae, wipe dust from the wings and which pack the pollen baskets. The two centre legs are the bee's main support. They also are used for cleaning.

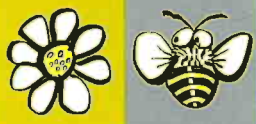
The Sting

One of the most interesting parts of the worker bee is the sting. A bee's sting is barbed so it sticks in the skin when the bee flies off. The sting stays in the skin pulling venom glands and the surrounding tissues out of the bee's abdomen, causing the bee's death.



Generally, a bee will only sting when it is in a life threatening situation; for example, when it is trapped in clothing or partly crushed under a bare foot.





Xtree

The Busy Bee

Activity

1. What is the best way to remove the sting? Tell a partner.
2. How can you relieve the pain if you are stung? You may need to visit the local chemist for help to find what products can help the pain.
 -
 -
 -
3. Can you find examples of man-made weapons which are like bee-stings?
4. Find out about the stings of other creatures?
5. Ask a very old person about "bluebags" and bees. You may find out other interesting things as well.

The worker bee is the only bee with an effective sting. Because drones are never called on to defend the hive they have no sting and the Queen's sting is barbless. Delivery of her sting does not cause her death.

The Drone



These are the future fathers. Their only task is to mate with the Queen bee. Once the drone bee mates with the Queen bee he dies. Drones have no other real purpose. They cannot forage because their mouthpieces are too short for collecting nectar. They cannot make pollen. They cannot defend the hive because they have no sting. They cannot make beeswax. Their role is to help the Queen bee breed. They are fed by the worker bees. Only a very small number of drones ever get to mate with a queen. Mating does not occur in the hive, but outside, in flight.

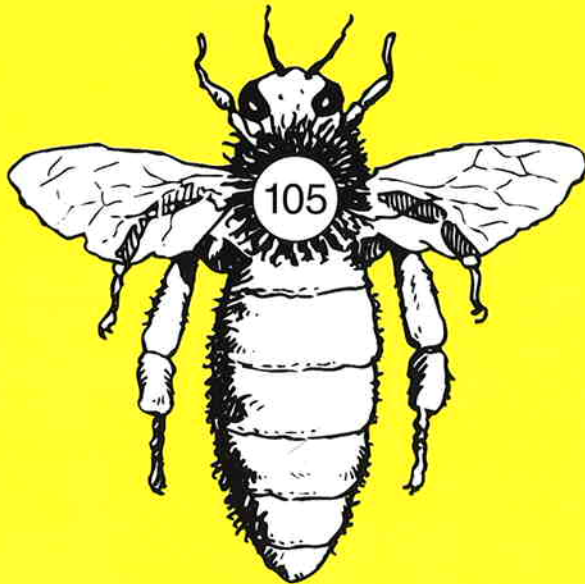




xkree

The Busy Bee

The Queen Bee



The female bee is either a sterile worker or a fertile queen. The male is the drone.

The queen is the largest bee and each normal colony has only one. Her sole purpose is to lay eggs. She is the mother of the hive. She leaves the hive only to mate or when the hive reproduces by swarming. Her body is especially formed for egg laying. Fertilized eggs hatch into larvae.

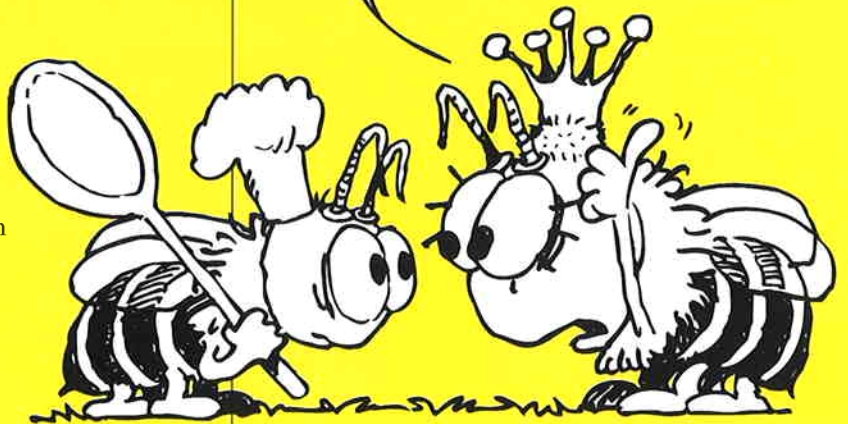
Discs (for example, 105) are used on queens by beekeepers for numbering them. The discs are glued to the thorax. This part of the queen bee is usually less hairy and sometimes smooth which allows the disc to remain stuck.

These grub-like larvae become either workers or queens, depending on what they are fed during incubation. For example, a diet of Royal jelly, secreted by the workers, followed by honey and pollen makes a worker. Larvae who are fed Royal jelly only during incubation become the queens.

The first young queen to emerge destroys all other developing queens so she can reign supreme. Once this is done she soon sets out on her mating flight.

After mating the young queen returns to the hive and begins to lay her eggs – at the peak of the season, up to 3000 a day (more than her own body weight each day). This can add up to a million eggs in her lifetime. Eggs hatch into larvae in three days. Workers take 21 days to reach maturity from when the egg is laid (drones 24 days, queens 16 days).

Workers of this hive unite,
Get busy making honey;
The larvae will keep us up all night
If you can't fill their tummies.





Xtree

The Busy Bee

Fact File

Use a dictionary to discover the meaning of:

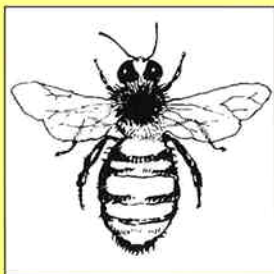
- **proboscis** – how many other creatures can you discover with probosces?
- **antennae** – “Are there bees in that hive? “No, there”
- **fertilizer**
- **sterile** – Try to find out how making creatures sterile can help to control pests.
- **larvae** – You might be startled by this one!

Activities

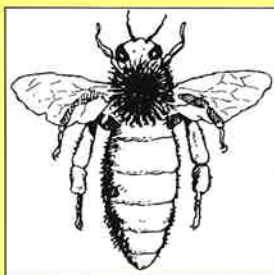
- 1 Look at these pictures of bees. From the earlier descriptions match the pictures with the words.



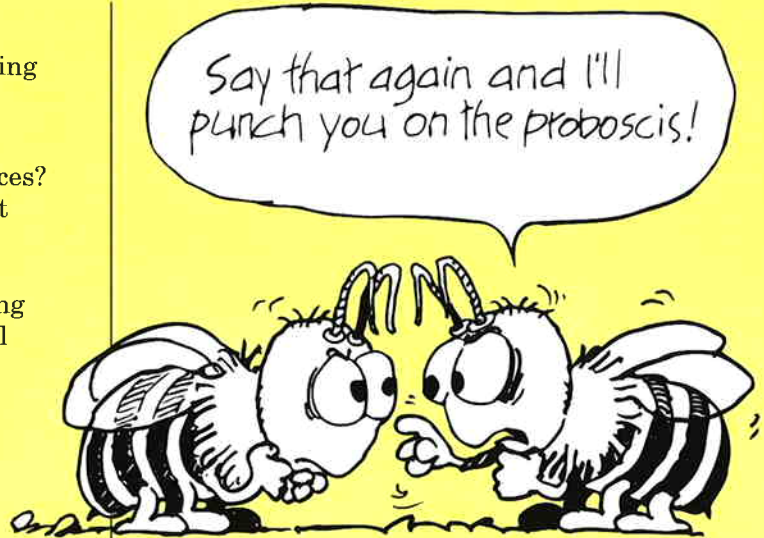
Drone?



Queen?



Worker?





Three

The Busy Bee

2 After reading the Fact File decide which attribute matches each bee:

Attribute	Queen	Worker	Drone
smallest bee			
future father			
only bee with effective sting			
largest bee			
cannot make wax			
between 13- 17mm long			
mates with Queen bee			
lays eggs			
the only one in the colony			
gathers food			
cannot defend hive			
accompanies every swarm			
collects pollen grains from flowers			
leaves hive to mate			
fed by worker bees			
helps rear young			
body formed for egg laying			
inspects each cell			
pollen baskets on legs			
helps Queen bee breed			
is mother of the hive			



The Busy Bee

- 3 Draw a diagram to show how the pollen is taken to the hive.



Three

The Busy Bee

4 Mark these statements as True or False:

a) Female larvae hatched from fertilized eggs become queens.

True or False

b) Larvae fed royal jelly, honey and pollen become workers.

True or False

c) Male larvae, hatched from unfertilized eggs become drones.

True or False

d) Drones die from losing their sting.

True or False

5 Label the diagram of a worker bee with these features:

- proboscis
- antenna
- abdomen
- sting
- forewing
- hindwing
- head
- pollen baskets

The Worker Bee

