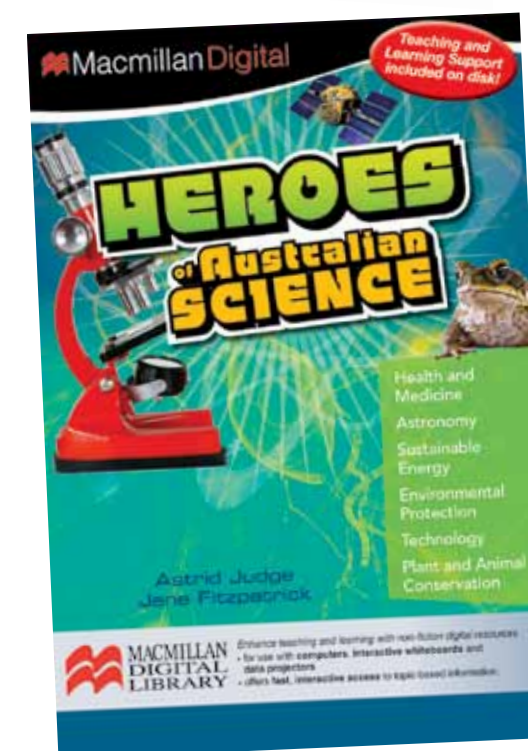
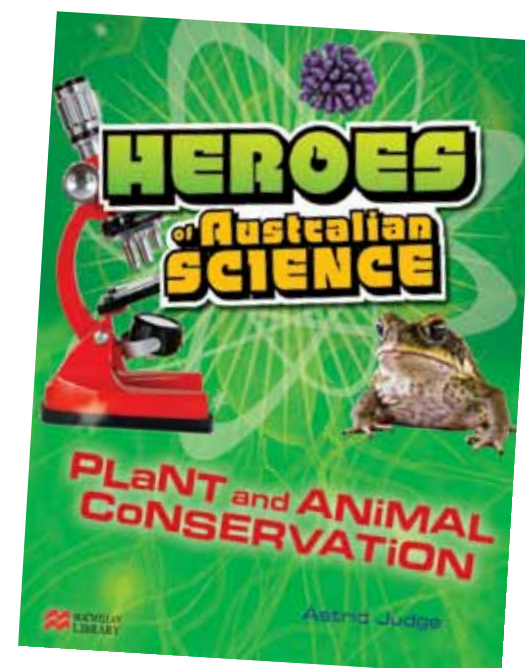
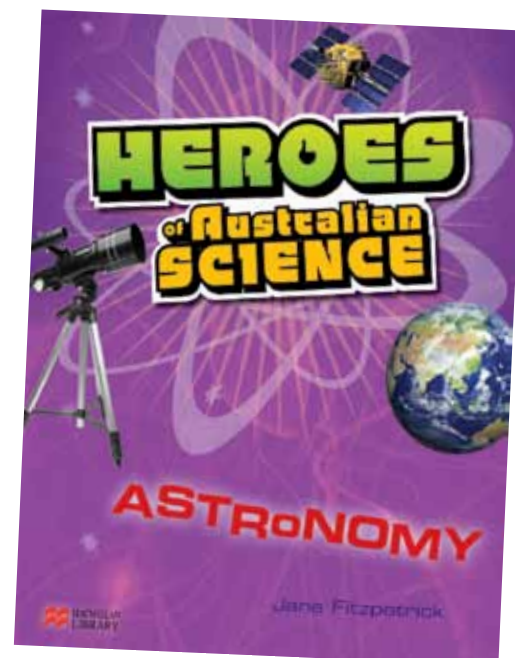
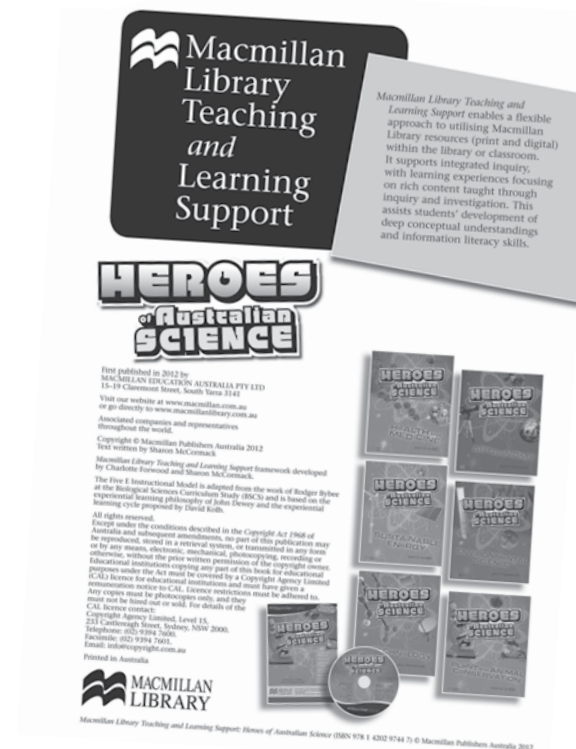
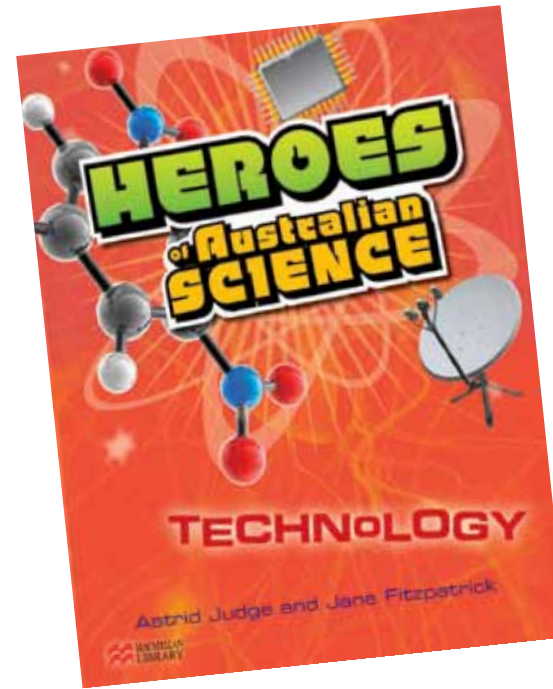


Heroes of Australian Science

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about the series

Heroes of Australian Science

profiles scientists that have made significant contributions to their field, even influencing changes in the ways we live. Each book in the series provides information about a particular science discipline and field of research.

The **Heroes of Australian Science** books use clear language to explain the science concepts behind each scientist's work in an interesting and comprehensive way. The series contains a variety of textual and visual features to engage readers and demonstrate how scientists are contributing significantly in different scientific fields in Australia.

Level: upper primary to lower secondary - 10-13 years

Curriculum/Topic areas: Science as a Human Endeavour



Key Features:

- **clear, simple language** explains complex scientific concepts and processes in an accessible, engaging way
- **'The science behind it'** text boxes provide a clear explanation of the fundamental scientific principles and theories that underpin the scientists' work
- **'Fact file'** boxes provide extra information about the scientists, outlining their key achievements, awards and life facts
- **'Science jargon'** provides on-page vocabulary support, explaining key scientific terms in context
- **'Web watch'** provides a website link to further information about the scientists and their work

contents pages

NB: Pages are reduced. Actual size of book not shown.

CONTENTS

Heroes of Australian astronomy 4
A timeline of Australian achievements in astronomy 6



BRIAN SCHMIDT 8
The future of the universe
Brian Schmidt received a Nobel Prize for a startling discovery – the universe is moving apart faster and faster!



BRYAN GAENSLER 14
Magnets in space
Bryan Gaensler revealed how magnetic fields push around the gas and dust that make up the universe.



RACHEL WEBSTER 20
Using natural telescopes
Rachel Webster investigated weird, distant structures called quasars, and is exploring the birth of the first stars.



MATTHEW COLLESS 26
Mapping the universe
Matthew Colless's team mapped more than 200 000 galaxies to show the shape of a piece of the universe.

Glossary 31
Index 32

When a word is printed in **bold**, you can look up its meaning in the Glossary on page 31.

Words that are printed like **this** are explained in the 'Science jargon' feature on the page.

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Heroes of Australian medical science 4
A timeline of Australian achievements in medical science 6



ELIZABETH BLACKBURN 8
Telomeres and the secret life of cells
The work of Elizabeth Blackburn, the first Australian woman to receive a Nobel Prize, opened up an exciting new field of research into human health.



SUZANNE CORY 14
Breakthroughs in cancer research
The importance of Suzanne Cory's research into cancer was recognised nationally and internationally.



MICHAEL GOOD 20
Towards a malaria vaccine
Michael Good spent more than 20 years researching and developing a vaccine for malaria, a disease that kills nearly a million people each year.



BARRY MARSHALL 26
A new treatment for stomach ulcers
Barry Marshall received a Nobel Prize for discovering the cause of most stomach ulcers, after experimenting on himself to prove his theory.

Glossary 31
Index 32

When a word is printed in **bold**, you can look up its meaning in the Glossary on page 31.

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Heroes of Australian science: sustainable energy 4
A timeline of Australian scientific achievements in sustainable energy 6



MARTIN GREEN 8
Breaking world records with solar cells
Solar cells developed by Martin Green work so well they have been installed on rooftops around the world.



ANNETTE COWIE 14
Benefits of bioenergy
Annette Cowie is an expert on bioenergy, energy that comes from plant matter or animal waste.



MICHAEL BOROWITZKA 20
Future fuels from algae
Michael Borowitzka is a pioneer of making fuel from living things called algae.



MARIA SKYLLAS-KAZACOS 26
A battery to store solar and wind energy
It is easier to store solar and wind energy since Maria Skyllas-Kazacos's invention of the vanadium redox battery.

Glossary 31
Index 32

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contents pages

NB: Pages are reduced. Actual size of book not shown.

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 KATH BOWMER Caring for waterways	8
Kath Bowmer explored the science behind keeping rivers healthy.	
 DAVID LINDENMAYER Conserving environments for native animals	14
David Lindenmayer discovered what some of our native animals need to survive and thrive.	
 JOHN CHURCH Sounding the alarm on rising sea levels	20
John Church revealed that global warming is making the oceans rise faster than before.	
 TIM FLANNERY Fighting for action on climate change	26
Tim Flannery discovered many new species and now warns people about the dangers of climate change.	
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When a word is printed in **bold**, you can look up its meaning in the Glossary on page 31.

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 CHRISTOPHER DICKMAN Looking out for little native mammals	8
Christopher Dickman's work helps protect Australia's lesser known furry animals.	
 TERENCE HUGHES Caring for coral reefs	14
Terry Hughes advises people all over the world on how to improve the health of coral reefs.	
 RICK SHINE Studying snakes and controlling cane toads	20
Rick Shine has spent his life studying snakes and lizards, and is an expert on one of Australia's most troublesome pest animals.	
 JUDY WEST Sorting and saving native plants	26
No one knows more about <i>Doodania</i> plants, called native hop bushes, than Judy West, the director of the Australian National Botanic Gardens.	
Glossary	31
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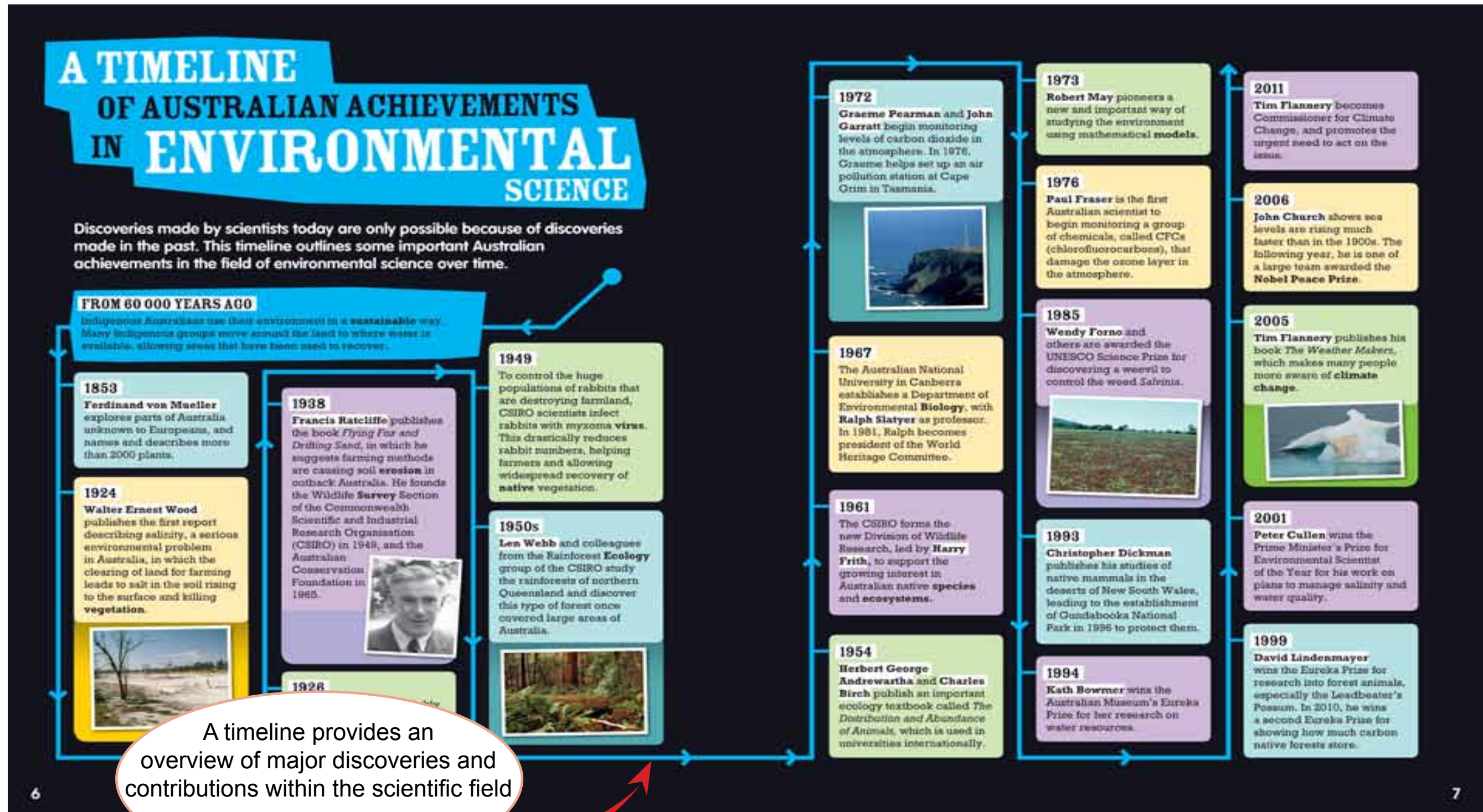
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Graeme Clark overcame huge challenges to bring hearing to thousands of deaf people.	
 MARCELA BILEK Improving the design of an important industrial instrument	16
Marcela Bilek made an electrical instrument called the cathodic arc even more useful to industry, contributing to improvements in computers and in medical care.	
 JOHN O'SULLIVAN Pioneer of wireless Internet	24
John O'Sullivan used ideas from radio astronomy to develop wireless networking between computers.	
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BRIAN SCHMIDT

The future of the universe

Brian Schmidt is an astronomer who received a **Nobel Prize** for his research into how the universe is changing. Astronomers have long known that everything that makes up the universe is moving further apart. However, no one expected Brian's discovery that the universe is moving apart faster and faster!

surrounded
ce, and chose
y when he got

fact file

Born: 24 February 1967
Schooling: (Helena, Montana, United States) Hawthorn Elementary; (Anchorage, Alaska, United States) Bartlett High School
Selected achievements:
Pawsey Medal, Australian Academy of Science, 2000
The Bulletin's Scientist of the Year, 2004
Shaw Prize in Astronomy (shared), 2006
Gruber Prize for Cosmology (shared), 2007
Nobel Prize for **Physics** (shared), 2011

Growing up with science

Brian Paul Schmidt was born and grew up in the United States. He became an Australian citizen in 1999. As a boy, Brian was interested in all types of science. His dad was a **biologist**, and Brian often helped him collect insects on field trips together. From the age of eight, Brian became keen on observing the night sky.

During high school in Anchorage, Alaska, Brian had great science teachers. They helped and encouraged him to do his best. At the end of high school, he got some good career advice: 'do something that you would like to do for free'. He realised that for him this meant studying astronomy.

Brian's PhD and move to Australia

Brian studied astronomy at the University of Arizona, graduating in 1989. Next, he went to Harvard University to study for his **PhD**. Brian used very sensitive telescopes to study exploding stars, called **supernovae**. While at Harvard, he met and married an Australian economist. Not long after Brian finished his PhD, they moved to Canberra and he began work at the Australian National University.

The big question: will our universe keep expanding?

In 1994, Brian began to consider whether he could use a particular type of supernovae, called Type Ia supernovae, to study the past and the future of the universe. He decided to compare the movement of distant supernovae with the movement of closer objects. He would find out whether objects were moving faster, the same, or slower in the past. Brian would use the results to answer a question astronomers had been asking for decades: will the universe keep moving apart forever?

Did you know?

Supernovae are very bright, so astronomers can observe them even when they are billions of **light years** away. Some supernovae are so bright they can be seen in daylight.

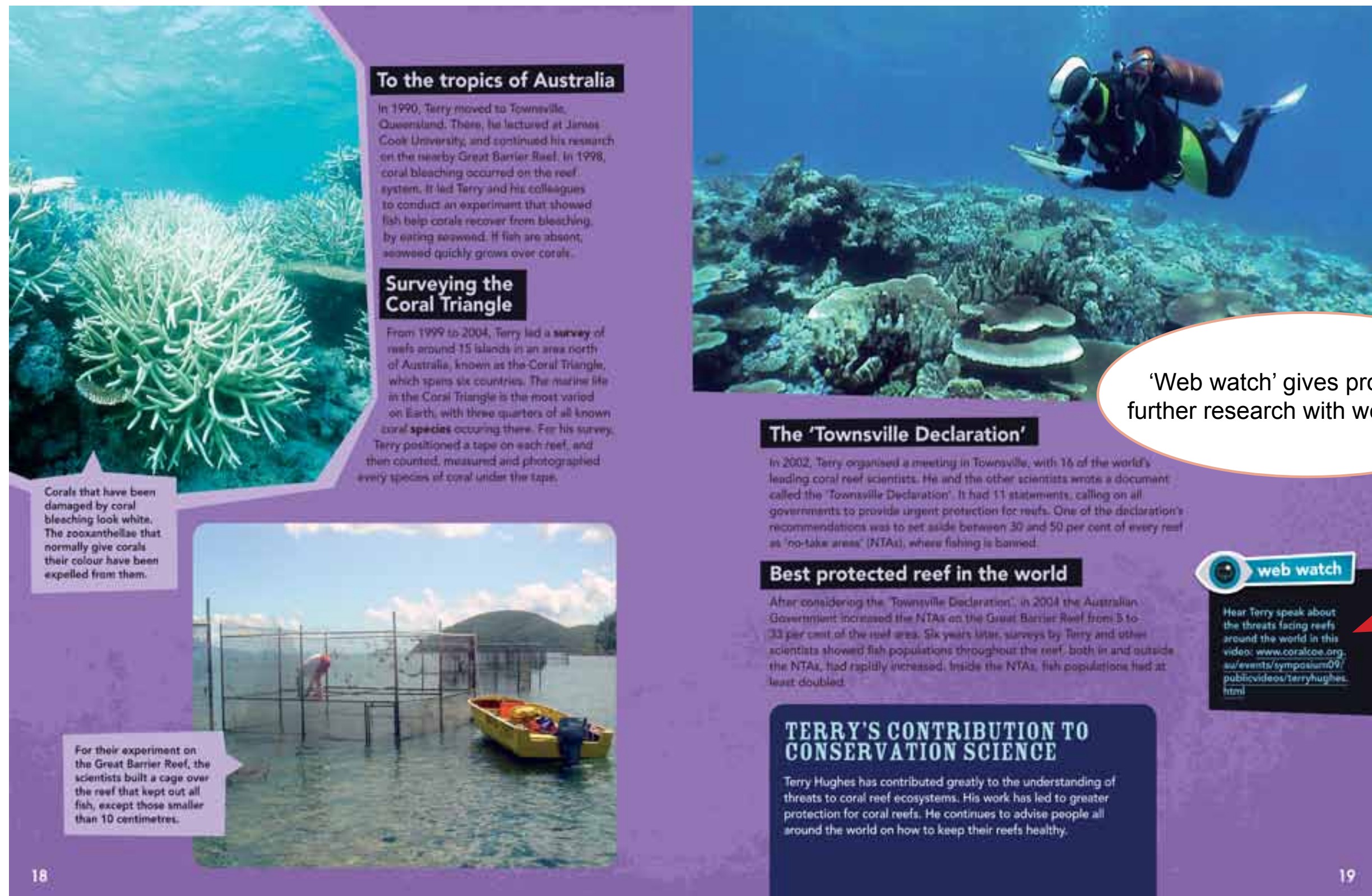
Most supernovae occur when a large star has burnt up its fuel. In this image, colours have been added to show the huge amounts of energy and matter released into space when a star explodes and becomes a supernova.

8

9

A 'fact file' on the featured scientist lists their key achievements, awards and life facts

'Did you know?' features quick scientific facts



'Web watch' gives prompts for further research with website links

sample spread

'Science jargon' provides on-page vocabulary support for scientific terms



Science jargon

gastroscopy procedure in which a doctor looks into the stomach using a tube with a camera on the end. Pincers on the end of the tube can remove a few millimetres of stomach lining, if required.



more about...

HELICOBACTER AND OUR HEALTH

Approximately every second person has *Helicobacter pylori* bacteria living in their stomach. However, only about one in ten people with the bacteria get ulcers. Scientists do not understand why this is so, but they think *Helicobacter* may actually keep some people healthy by regulating their **immune systems**. For instance, recent studies suggest *Helicobacter* may protect young people from asthma.

Exciting discovery

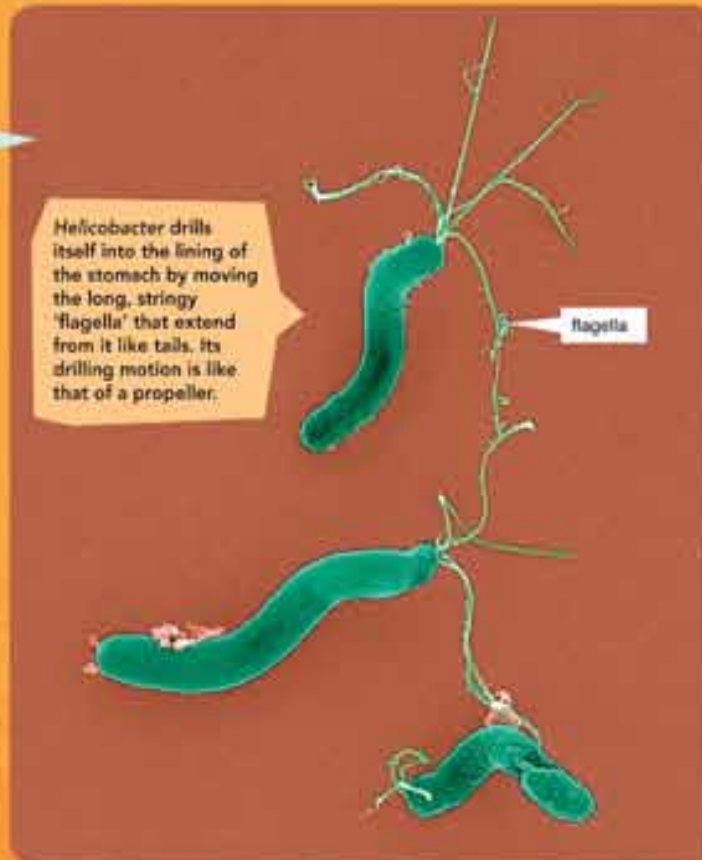
To learn more about *Helicobacter pylori*, Barry conducted an experiment. He sent **many** **more** samples from 100 patients admitted to the hospital for **gastroscopy**. The results were exciting. Robin saw bacteria on all the samples from patients who had **peptic ulcers** in the duodenum, and on about 80 per cent of the samples from patients who had peptic ulcers in the stomach.

Growing *Helicobacter* in the lab

Barry and Robin attempted to grow the bacteria they had discovered, called *Helicobacter pylori*, in the laboratory. They were unsuccessful until the Easter holiday of 1982. Then a laboratory assistant accidentally left the dishes they were using in their experiments out for five days, instead of the usual two, and bacteria were finally observed. *Helicobacter* had needed longer to grow! From then on they could grow *Helicobacter* and test the effects of different medicines on it.

Helicobacter drills itself into the lining of the stomach by moving the long, stringy 'flagella' that extend from it like tails. Its drilling motion is like that of a propeller.

flagella



Persuading other doctors proves difficult

Barry and Robin believed that *Helicobacter pylori* in the stomach was the real cause of peptic ulcers. They wrote letters and submitted reports to journals around the world, but other doctors were slow to accept their new evidence about ulcers. These doctors were convinced nothing could live in the stomach because it was too acidic. They said the bacteria Robin had observed in the stomach must be coincidental, not the cause of ulcers.

GASTROENTEROLOGICAL SOCIETY OF AUSTRALIA

145 Macquarie Street,
SYDNEY, 2000
Telephone: 27 3188
17th March, 1983

Dear Dr. Marshall,

I regret that your research paper was not accepted for presentation on the programme of the Annual Scientific Meeting of the Gastroenterological Society of Australia to be held in Perth in Nov, 1983.

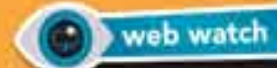
The number of abstracts we receive continues to increase and for this Meeting 67 were submitted and we were able to accept 55.

There were a large number of high quality abstracts which made it extremely difficult to choose those which should be accepted for presentation, and as you know, this is now done by a National Abstract Selection Committee which reviews the abstracts without knowledge of the Authors concerned.

The National Programme Committee would like to thank you for submitting your work, and would hope that this might be re-submitted in the future, perhaps following critical review from your colleagues.

My kindest regards,

Barry Marshall sent the Gastroenterological Society of Australia a report about his 100-person study, but the doctors in charge of the society refused to read the report at their conference or publish it in their journal. Their rejection letter was typical of how other doctors responded when they first heard about Barry's discoveries.



web watch

To learn more about Barry Marshall's life and work, see http://nobelprize.org/nobel_prizes/medicine/laureates/2005/

Barry experiments on himself

Barry and Robin had proved *Helicobacter* was present where ulcers occur, but they had not proved *Helicobacter* caused ulcers. After Barry moved to Fremantle Hospital in Western Australia in 1983, he tried to infect mice, rats and pigs with *Helicobacter* to study its effect, but he was unsuccessful. Realising it could be unsafe to infect other humans, Barry decided to experiment on himself.

First, a gastroscopy was performed on Barry, which showed he was free of *Helicobacter*. He then drank a dish containing *Helicobacter* grown in the lab. Five days later, he became ill, with bad breath and vomiting. A second gastroscopy showed *Helicobacter* had infected his stomach and was damaging it. Barry took a course of **antibiotics** to kill the bacteria and soon recovered.

Did you know?

The name 'Pepsi' cola comes from the word 'peptic', meaning 'related to digestion'. Pepsi cola was invented more than 100 years ago by a pharmacist who claimed it improved digestion.

Science concepts are discussed in more detail in 'More about...'

ABOUT THE AUTHORS: **ASTRID JUDGE AND JANE FITZPATRICK**

Astrid Judge works as a teacher, editor and writer. She has written several books for primary school children, including a series about Antarctica. She has also edited many books for secondary students, including science and math textbooks.

Jane Fitzpatrick grew up in country Victoria and studied science at the University of Melbourne, including a year working in a blowfly lab. She has always loved reading about scientists and their discoveries. She currently works in publishing.