

On its creation, Nobel said that his invention dynamite would “sooner lead to peace than a thousand world conventions. As soon as men find that in one instant, whole armies can be utterly destroyed, they surely will abide by golden peace.”

By the end of his life, he realised that this was not the case, and when one French newspaper prematurely reported his death with the headline ‘The Merchant of Death is Dead’, he was supposed to be moved to ensure that his name would be remembered for good.

On his death in 1896, his will contained the following request: The whole of my remaining estate shall be...annually distributed in the form of prizes to those who, during the preceding year, shall have conferred the greatest benefit on mankind [sic]...It is my express wish that in awarding the prizes no consideration whatever shall be given to the nationality of the candidates, so that the most worthy shall receive the prize, whether he be Scandinavian or not.

In the film, Australian Nobel Laureate Prof. Peter Doherty says “Everyone in science stands on the shoulders of someone else.” Alfred Nobel’s work built on Italian chemist Asciano Sobrero’s 1846 invention, nitroglycerine. These questions and tasks may either be discussed as a class, in small groups, or completed as individual writing tasks.

- How did Nobel take one invention and produce another from it? How many inventions did Nobel produce from nitroglycerine?
- Individual or group activity: Take an object from your everyday life and invent some way to improve on it. What makes it better? What makes the invention ‘yours’? How would you market your new invention?
- What impact did Alfred Nobel’s inventions of dynamite and gelignite have on humankind? What uses could these inventions be put to? Would you consider his inventions ‘good’ or ‘bad’ and why?
- There is a saying about guns that says “Guns don’t kill people. People kill people.” This statement implies that the gun itself is an inanimate object and it is only its use that makes it an object of harm. As a group activity or individual writing exercise, apply this argument to the inventions of Alfred Nobel.
- Why would his obituary read ‘The Merchant of Death is Dead’? Does his invention of dynamite make him a ‘bad’ person? Does his invention make him personally responsible for any deaths it caused?
- Further viewing: Feature films such as *Dr Strangelove* and *Fat Man and Little Boy*, and documentaries such as *Trinity and Beyond* and *Dr Teller’s Very Large Bomb* deal with the creation and use of the hydrogen bomb. What parallels and differences can you draw between the creation of dynamite and the H-Bomb? How did both inventions change humankind?
- ‘One man’s trash is another man’s treasure’. For many of the inventions we enjoy as part of our everyday life there are positive and negative benefits for society. Draw up a list of positives and negatives that relate to: television; the automobile; the mobile telephone; the dishwasher; the personal computer; the internet.
- Has the establishment of the Nobel Prize redeemed the Nobel name?
- To protect his inventions, Alfred Nobel patented them, which gave him exclusive rights to sell and manufacture them. Look up patent in the dictionary. It can be used as a noun, a verb and an adjective—how are these three uses of the word different? Can patenting an idea or an object stop others from using it? Can a person own an idea? What is the difference between patent and copyright?

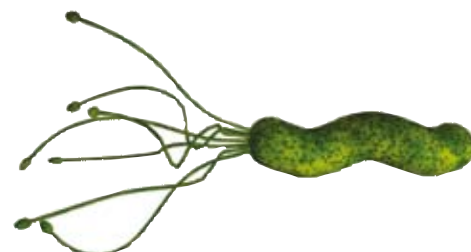
PAST WINNERS AND THEIR ACHIEVEMENTS

Those honoured with the Nobel Prize are known as Nobel Laureates.

- Where does the term ‘laureate’ come from?

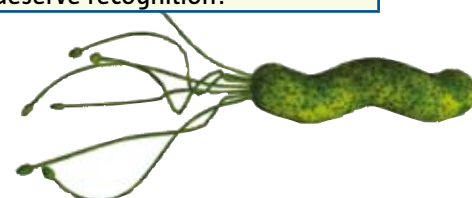
ALFRED NOBEL – A TIMELINE

- 1833
Born in Stockholm, Sweden
- 1850-1852
Studies in Paris and travels to Italy, Germany and the USA
- 1853-1856
Works for his father’s factory producing arms for the Crimean War
- 1860
Begins experiments with nitroglycerine
- 1863
Invents the blasting cap
- 1864
Alfred’s brother Emil is killed while handling nitroglycerine
- 1866
Invents dynamite
- 1870-1871
Creates first of many companies to produce dynamite
- 1875
Invents blasting gelatine (gelignite)
- 1891
After a fight with the French government, leaves his home of 30 years for Italy
- 1895
Signs his will at the Swedish-Norwegian Club in Paris
- 1896
Dies in his home in San Remo, Italy



Some of the most famous names in history have been awarded the Nobel Prize.

Nobel Prize	Past winners include	Activities
Nobel Prize in Physics—awarded to “the person who shall have made the most important discovery or invention within the field of physics”	Marie and Pierre Curie (1903), Max Planck (1918), Albert Einstein (1921), Niels Bohr (1922)	Even today, the work of Pierre and Marie Curie and of Albert Einstein is more famous and written about than any contemporary scientists. What makes them and their work so enduring? Compare their discoveries to some of the recent Nobel winners.
Nobel Prize in Chemistry—awarded to “the person who shall have made the most important chemical discovery or improvement”	Henri Moissan for the discovery of Fluorine and the invention of the electric oven (1906), Marie Curie for the Isolation of Pure Radium (1911), Theodore William Richards for determining the weight of a large number of chemical elements (1914)	The element Nobelium was named for Alfred Nobel. Which of the other elements are named after famous thinkers and inventors?
Nobel Prize in Physiology or Medicine—awarded to “the person who shall have made the most important discovery within the domain of physiology or medicine”	Barry Marshall and Robin Warren join a long list of people whose names aren’t widely known, but whose work is, including Frederick Banting and John Macleod for the discovery of insulin (1923); Karl Landsteiner for discovering human blood types (1930); Australian Howard Florey’s discovery of penicillin (1945); Willem Einthoven, inventor of the electrocardiogram (1924); Max Theiler’s cure for yellow fever (1951) and John Enders, Thomas Weller and Fred Robbins for their cure for polio (1954).	What is the difference between physiology and medicine? Of all the winning discoveries listed to the left, which do you think has had the greatest impact on humankind and why?
Nobel Prize in Literature—awarded to “the person who shall have produced in the field of literature the most outstanding work of an idealistic tendency”	William Golding (1983), Gabriel Garcia Marquez (1982), Rudyard Kipling (1907), George Bernard Shaw (1925), TS Elliot (1948), Winston Churchill (1953), Ernest Hemingway (1954) and Australian Patrick White (1973).	The Literature Prize is usually awarded to recognise a lifetime body of work rather than a single achievement. Select a few of these Nobel Laureates and read about their lives and their writing. What are the similarities in theme that makes their writing Nobel-worthy?
Nobel Prize in Peace—awarded to “the person who shall have done the most or the best work for fraternity among nations, for the abolition or reduction of standing armies and for the holding and promotion of peace congresses”	Nelson Mandela & FW de Klerk (1993), Mikhail Gorbachev (1990), The 14th Dalai Lama (1989), Lech Walesa (1983), Mother Teresa (1979), Martin Luther King (1964), George C Marshall (1953), Woodrow Wilson (1919).	Prizes in Peace are often awarded within a few years of the events they recognise. What major events preceded these people winning a Nobel? What were their contributions?
Nobel Prize in Economics—added to the awards in 1969; given in accordance with the same principles as those for the other five Nobel Prizes.	Milton Friedman (1976), John Harsanyi, John Nash Jr & Reinhard Selten (1994), Amartya Sen (1998)	Why might a Nobel Prize for Economics have been created? What other fields or disciplines aren’t recognised by awards that you think deserve such recognition. Come up with the names for some new awards. Why do the people who work in these fields deserve recognition?



AUSTRALIAN NOBEL WINNERS AND THEIR ACHIEVEMENTS

Barry Marshall and Robin Warren join a short but distinguished list of Nobel Laureates, many of whom also succeeded in the field of Medicine and Physiology. According to *Australia's Nobel Laureates: Adventures in Innovation* (see references) the full list (prior to Marshall and Williams) comprises:

- 1915: Lawrence Bragg and William Bragg "for services in the analysis of crystal structure by means of X-rays" (Physics)
- 1945: Howard Florey "for the discovery of penicillin and its curative effect in various infectious diseases" (Medicine or Physiology)
- 1960: Frank Macfarlane Burnet "for discovery of acquired immunological tolerance" (Medicine or Physiology)
- 1963: John Eccles "for discoveries concerning the ionic mechanisms involved in excitation and inhibition in the peripheral and central portions of the nerve cell membrane" (Medicine or Physiology)
- 1964: Aleksandr M. Prokhorov "for fundamental work in the field of quantum electronics, which has led to the construction of oscillators and amplifiers based on the maser-laser principle" (Physics)
- 1970: Bernard Katz "for discoveries concerning the humoral transmitters in the nerve terminals and the mechanism for their storage, release and inactivation" (Medicine or Physiology)
- 1973: Patrick White "for an epic and psychological narrative art which has introduced a new continent into literature" (Literature)
- 1975: John Cornforth "for his work on the stereochemistry of enzyme-catalyzed reactions" (Chemistry)
- 1996: Peter C. Doherty "for discoveries concerning the specificity of the cell mediated immune defence" (Medicine or Physiology)

What has the work of Howard Florey, Frank Macfarlane Burnet, John Eccles and Peter Doherty contributed to our daily life?

What other world-class science and medical breakthroughs have originated in Australia?

ABOUT HELICOBACTER PYLORI

Helicobacter pylori is a spiral shaped bacterium that lives in the stomach and duodenum (section of intestine just below stomach). The gastric juice in our stomach is composed of digestive enzymes and concentrated hydrochloric acid, which can readily tear apart the toughest food or microorganism.

The stomach is protected from its own gastric juice by a thick layer of mucus that covers the stomach lining. *H. pylori* takes advantage of this protection by living in the mucus lining, and produces an enzyme called urease to fight off stomach acid.

Urease converts urea, of which there is an abundant supply in the stomach (from saliva and gastric juices), into bicarbonate and ammonia, which are strong bases. This creates a cloud of acid neutralizing chemicals around the *H. pylori*, protecting it from the acid in the stomach.

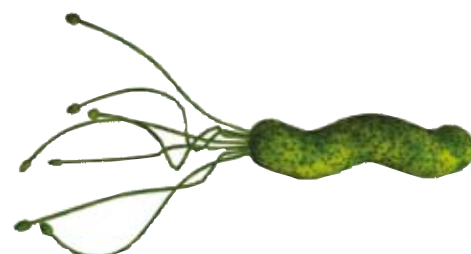
The body's natural defenses cannot reach the bacterium in the mucus lining of the stomach, and so when the immune system responds to an *H. pylori* infection by sending white cells, killer T cells, and other infection fighting agents, they build up, spilling their destructive compounds (superoxide radicals) on stomach lining cells.

Extra nutrients are sent to reinforce the white cells, and within a few days, gastritis and perhaps eventually a peptic ulcer results. It may not be *H. pylori* itself which causes peptic ulcer, but the inflammation of the stomach lining.

The diseases caused by *Helicobacter pylori* can be treated with antibiotics.

H. pylori is the type species of the genus *Helicobacter*. Helicobacters belong to the family Helicobacteraceae which are all members of the subdivision Proteobacteria.

(SOURCE: THE HELICOBACTER FOUNDATION – SEE REFERENCES)



“When you speak as a Nobel Laureate, people listen...
but this wasn’t always the way.”

—Barry Marshall

When philosopher, astronomer and mathematician Galileo challenged conventional wisdom and said that the Earth revolved around the sun and not, as was widely believed, the other way around, he was outcast by his church, and by society, and was lucky to keep his head on his shoulders.

The path for scientists challenging accepted beliefs has always been difficult.

The heroes of *The Winners’ Guide to the Nobel Prize* face apparently insurmountable odds...two men versus the entire medical profession.

“Doctors are very conservative,” Robin Warren says in the film. “Although they’re prepared to take on new ideas when they’re really only a variation on old ideas, I was bringing in something which wasn’t a variation on old ideas. It was actually totally against the old ideas.”

The “existing dogma” that Warren and colleague Barry Marshall would take 15 years of slow work to challenge and change was that bacteria could not grow in the stomach due to the high levels of acid.

In the early 1980s, Warren, a pathologist at the Royal Perth Hospital, observed small curved bacteria colonising the stomach in many patients from which biopsies had been taken, and noted that the surrounding tissue was always inflamed.

Marshall, a young clinical fellow, was interested in the findings and together they studied biopsies from 100 patients. After several attempts, Marshall succeeded in cultivating the then unknown bacterial species.

The idea of ownership of ideas comes up again and again in the film. While Robin Warren has made a discovery he knows to be important, he is willing to share his findings with Barry Marshall.

While Marshall has a paper ready for publication on his findings, he says he “put it aside because it looked as if I could get a better paper, with Barry’s help.”

It is this teamwork, and willingness to set personal ambition aside for the sake of producing better science, that is the true success of this impressive pair.

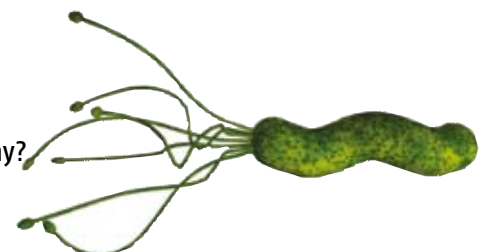
Marshall himself later shows his own passionate commitment to the research, placing his own health on the line as a human guinea-pig to test their theories by swallowing a sample of the cultured bacteria.

“It seemed to be the only way to solve the problem,” he says, “and when I was writing up the paper, I realised the experiment explained practically everything we knew about ulcers.”

The notoriety that came from this action (the story was picked up by *The New York Times*) could be what brought the pair to the attention of the Nobel Committee, and while Marshall doesn’t recommend the process to other aspiring Aussie scientists, he does recommend people find “passion in their work”.

Their discovery means that peptic ulcer disease is no longer a chronic, disabling condition, but a curable disease.

- How did Robin Warren first associate the bacteria with the inflammation?
- How did Barry Marshall go about infecting himself with the *Helicobacter* virus? What symptoms did he display? Are these typical of a *H. pylori* infection, and why/why not? What was the cure devised for infection?
- What is the meaning of heresy? How is it used in the film in the context of Warren and Marshall’s discovery?
- Barry Marshall was a young doctor at the beginning of his career when the team published their first papers on *H. pylori*. One interviewee recalls him being called a “pretentious whipper-snapper” by a member of the medical profession. What role do you think his (young) age played in people’s non-acceptance of their new theories?
- Marshall says there weren’t enough people in Australia with the experience to review their theories, and so he accepted a job in America. Discuss this idea among your class. How many Australians have to leave the country to find success? Is this still true today? The idea suggests two phrases: ‘brain drain’ and ‘catch-22’. What do these phrases mean and how are they relevant to this story?
- Marshall quotes Louis Pasteur when he says “Chance favours the prepared mind”. What does this statement mean? What discovery is Pasteur most famous for?
- What role did teamwork play in the *H. pylori* discovery? What role did luck play?



THE BENCHMARK OF HUMAN PROGRESS

“Some people at some particular time are lucky enough to make a breakthrough,” says 1996 Nobel Laureate Peter Doherty. “And it’s those breakthroughs, that change in thinking, that change in understanding, that leads to a Nobel Prize.”

Of the many hundreds of medical advances over the previous years, what was it about Barry Marshall and Robin Warren’s discovery that conferred the greatest benefit on humankind?

Early in the film, Robin Warren jokes they should have won the Prize for Economics because of the financial savings their discovery has made, but the weight of numbers supports its importance.

Millions of lives have been improved by the discovery of treatments for gastritis and peptic ulcer disease, thanks to their refusal to stop believing in their own ideas, despite popular opinion to the contrary.

As a class activity, imagine you are the committee deciding on the award for Medicine or Physiology. Examine the evidence presented in the film, including the medical, social and economic, and debate the worthiness of the *Helicobacter* discovery.

Break into groups to research and then debate the merits of some of the world’s more influential discoveries and inventions. Which is more important and which has contributed the most to humankind? wheel vs fire; aeroplane vs automobile; steam engine vs sail; Newton’s laws of motion vs Einstein’s theory of relativity. Can you come up with other ‘big question’ topics for your class to debate?

What are the qualities of a successful scientist? What makes a discovery or an invention great?

In his speech, Marshall quotes Laureate Frank Macfarlane Burnet when he says “I think that this occasion has a rather special significance for my own country, a middling small country a little bigger than Sweden, but only now beginning to create an image of itself in the eyes of the world. Some day I hope we will take our place along with Sweden as one of the centres where knowledge can go along with social progress to the good life that we all seek.” Has Australia lived up to Burnet’s hope? How has Australia’s role on the world stage changed in the 46 years since his 1960 acceptance speech? What great events, inventions, discoveries and people have helped to shape our national identity in this time?

What makes Robin Warren and Barry Marshall special as Australians?

“When you become a Nobel Laureate, you do become an ambassador for science and medicine.”
—Barry Marshall

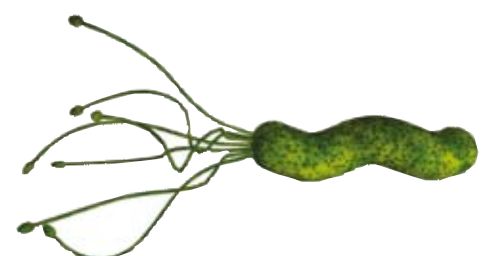
At the beginning of the film, Marshall and Warren are given the keys to the city of Perth by its mayor, and we see how by becoming Nobel Laureates, they are expected to fulfil diplomatic duties not only on behalf of science and medicine, but on behalf of their country. Once in Sweden, the Nobel Committee even assigns them a personal attaché to help them through their schedule of parties, lectures and media conferences.

- What function does an ambassador serve? In what way are the Laureates ambassadors for science and medicine?
- What is the meaning of ‘protocol’? What are some of the do’s and don’ts of appearing before royalty?
- In what way would you say Barry Marshall takes a scientific approach to Nobel award protocol?
- In the film, Barry uses balloons to demonstrate the bacteria to a class of students. How would these ‘props’ help to tell his story? Imagine you are teaching a class about *Helicobacter pylori*. What visual images or games might you use to help you explain the bacteria and its role in developing stomach ulcers?
- Research the story of a disease and the discovery of its cure. Prepare a presentation for your class. Think about how to best tell the story for dramatic or comic effect. People learn best when they are involved in a lesson, so try to come up with ways to involve as many of your class members in your presentation as possible...perhaps write a small play that tells your story...or get people up to act out roles.

“If you’re a pop star or an actor, you’re likely to get this early in your life...but for a scientist...it’s a very big change and that can be a little hard to deal with.”

—Robin Warren

- Discuss the different ways the two men have of dealing with the fame and attention. How do they share the roles and duties expected of them?
- What does the film tell you about their friendship?



- Why is fame so rare for our 'heroes' of science and medicine? Why are sporting and artistic achievers given a higher profile in our society?

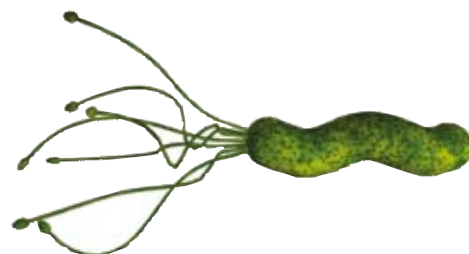
READING THE FILM

For 38 days, including 10 days in Sweden, director Mark Gould and his crew followed and filmed the Laureates and their families, shooting 100 hours of footage on two cameras.

"Our vision was for a 'behind the scenes' observational film," says Gould, "which took an audience through the subjective experience of winning a Nobel Prize."

The resulting film, *The Winners' Guide to the Nobel Prize*, is a mix of genres—part historical and science documentary, part road movie and detective thriller, drawing on interviews, contemporary observational and archival footage, and re-enactments accompanied by voice-over and music soundtrack.

- A narrative is a story told in a particular way. How have the filmmakers constructed the story? How might changing the order or the chronology of the scenes affect the film? How might you construct the film differently?
- A number of people are interviewed throughout the film. What is their relationship to Robin and Barry and why would they have been chosen as interview subjects?
- How do the filmmakers introduce dramatic tension in the film? Where does the drama come from? What additional elements lift or add to the drama?
- What parallels exist between the contemporary (award ceremony) storyline and the historical storyline?
- What techniques do the filmmakers use to convey time and place?
- What do the title cards tell us about the scenes that follow?
- Barry refers to himself and Robin as 'The Odd Couple', referring to the 1968 movie based on the original hit play (1965) by Neil Simon. "Robin would have been the obsessional one, like Jack Lemmon, and I would be Walter Matthau, with a lot of flighty ideas." How do Barry and Robin go about representing themselves on camera? How do the filmmakers convey their characters?
- While the film portrays a successful partnership between the two scientists, it also tells us about the role the gentlemen's other partners, their wives, have played in their successes. Even though she has passed away, Robin's wife Win has as big a role in the film (as does Barry's wife Adrienne). How do the filmmakers draw this character, despite her physical absence? How does this character contribute to the mood and tone of the film?
- Imagine that you are responsible for marketing *The Winners' Guide to the Nobel Prize* to an audience. The film will appeal to scientists, history enthusiasts, film buffs and students. Write various advertisements to appeal to each of these audiences.



REFERENCES AND FURTHER RESOURCES

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Dov Greenberg 'The Man who Changed His Life After Reading His Obituary'
www.chabad.org/library/article.asp?AID=271383

Barry Marshall (ed), *Helicobacter Pioneers: Firsthand Accounts from the Scientists Who Discovered Helicobacters 1892-1982*, Blackwell Science Asia, Melbourne, 2002

The Nobel Prize Foundation www.nobelprize.org

Office of the Nobel Laureates in Western Australia www.helicobacter.com

Helicobacter Foundation www.helico.com

Contains the latest information about *Helicobacter pylori*, its diagnosis, treatment and clinical correlations

Helicobacter Pylori Research Laboratory www.hpylori.com.au

Background information on *Helicobacter pylori*

The Ig Nobel Prize www.improb.com

Scientific Method www.biology4kids.com/files/studies_scimethod.html

The Oxford English Dictionary online <http://dictionary.oed.com>

The Internet Movie Database www.imdb.com

Film Education online www.filmeducation.org

The Winners' Guide to the Nobel Prize

A Film Australia and Electric Pictures Production in association with ScreenWest and LotteryWest. Produced with the assistance of ScreenWest and LotteryWest and developed and produced in association with the Australian Broadcasting Corporation.

Writers: Mark Gould, Paul Payne

Producer: Andrew Ogilvie

Director: Mark Gould

Executive Producers: Rod Freedman, Mark Hamlyn, Andrew Ogilvie

Narrator: Sacha Horler

Duration: 56 minutes

Year: 2006

Teachers notes written by Cris Kennedy © NFSA Photographs by Frances Andrijich, Luke Marshall and filmmakers

For further information or to order this program, contact:

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