

Marie Tharp: 'The valley will be coming up soon'. Bruce Heezen: 'What valley?' 'A woman scientist in a man's world' – what was it like?

The story is told of Bruce Heezen and Marie Tharp on a ship measuring one of the early echo sounding profiles of the Mid-Atlantic Ridge in the 1950s. Marie said: 'The valley will be coming up soon' and Bruce said: 'What valley?'

If this story is true, it shows that Marie Tharp was the first person to 'discover' an oceanic ridge rift valley. However, much of the credit was taken by Bruce Heezen because he was the 'scientist' and she was his assistant 'cartographer'; he was a man and she was a woman at a time when science was dominated by men.



Marie Tharp and Bruce Heezen.

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Whether or not this story is true, we now know that Marie Tharp was a really important scientist in her own right. The finding of oceanic rift valleys was a key piece of evidence for the newly-forming theory of plate tectonics. If plates were diverging at oceanic ridges, then you would expect there to be tension there – and tension would lead to rift valleys forming as plates moved apart. So Marie Tharp is one of the key figures not only of early oceanography but also in the development of plate tectonic theory.

Thinking like Marie Tharp (1920 – 2006)

Try to think like Marie Tharp at the time, by explaining what you might have thought when:

- you were part of a team that made a major scientific discovery, but much of the credit was taken by another member of the team, because he was a man and you were a woman.
- you and Bruce Heezen began working together in 1952, but he collected the echo sounding data on board ship and you drew the maps, because women were not allowed aboard ship.

- you used echo sounding profiles in 1953 to draw a map of the central Mid-Atlantic Ridge valley, which you thought was a rift valley and so supported the idea of 'continental drift' (as plate tectonic ideas were called then) but Bruce Heezen dismissed this idea as 'girl talk'.
- your work, and other work showing that earthquake epicentres also plotted the position of the rift valley, eventually persuaded Bruce Heezen to accept the theory of plate tectonics; then he and others published several major papers on plate tectonics, but your name did not appear on any of them.

What could be done then?

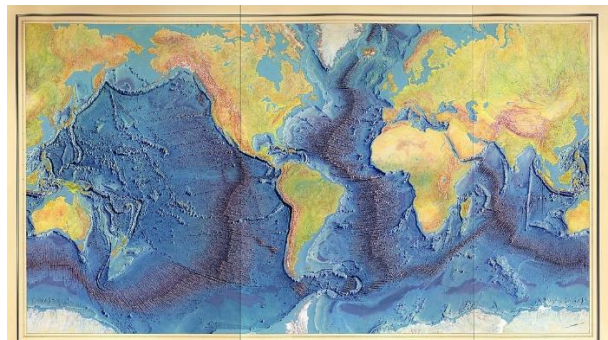
Use this background to discuss with your friends what Marie and woman scientists like her could do about these problems then. Write a list of what could be done.

What could be done now?

If this situation happened now, discuss with your friends and note down what could be done today.

Marie Tharp's progress

Marie Tharp continued her work and eventually plotted rift valleys in the Indian Ocean, Arabian Sea and Red Sea, showing that there was a global rift valley zone at the centre of the global oceanic ridge network. Tharp and Heezen worked with an artist, Heinrich Berann, to produce a map of the entire ocean floor. This was published by the *National Geographic* magazine in 1977 as 'The World Ocean Floor'. Most people who saw this were amazed, because, if they thought about the ocean floor at all, they assumed it must be flat. They had no idea that it contained the greatest, highest, widest and longest mountain range on Earth, deep ocean trenches and scattered seamounts as well as flat plains.



Painting of the world ocean floor by Heinrich Berann based on the echo sounding profiles of Tharp and Heezen (1977).

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July 2020 marks 100 years since the birth of Marie Tharp. Today she is recognised for her huge contribution to the development of the Earth sciences. Her ground-breaking work now inspires the scientists, particularly the female scientists, of the future.



Marie Tharp at the age of 80.

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The back up

Title: Marie Tharp: 'The valley will be coming up soon'. Bruce Heezen: 'What valley?'

Subtitle: 'A woman scientist in a man's world' – what was it like?

Topic: Helping pupils to think what it might have been like to be a female scientist at a time when science was dominated by men.

Age range of pupils: 14 years onwards

Time needed to complete activity: 15 minutes

Pupil learning outcomes: Pupils can:

- describe some of the scientific discoveries of Marie Tharp
- explain their feelings about what it might have been like to be a woman in a world of science dominated by men;
- list ideas of what could be done about discrimination against women scientists today.

Context:

In 1940 the geology department at the University of Michigan in the USA allowed women to join the department for the first time, and Marie was one of the first woman students to join. She graduated in 1945.

At the same time, Rosalind Franklin, the chemist who was later one of the discoverers of DNA, attended classes at Cambridge University in the UK, and passed all the exams very well, but was unable to graduate or take part in the graduation ceremony, because she was a woman. These examples show the difficult world in which women scientists had to work at the time.

What could be done then? – The answer to this is that very little could be done at the time, apart from to work hard and be patient. Marie did these things and her success was eventually understood and recognised.

What could be done now – Your pupils may suggest a range of ideas including:

- use social media to highlight the issues
- devise a logo or a banner
- contact senior scientists, employers and fund-providers, politicians and news media

Note for your pupils that discrimination against women, including women scientists, is still a major issue in many parts of the world.

This Earthlearningidea is one of four on mapping the ocean floor as shown in the table below.

Following up the activity:

Try one of the other seafloor mapping Earthlearningidea.

See the Earthlearningidea about Mary Anning at https://www.earthlearningidea.com/PDF/115_Mary_Anning.pdf - another 'woman in a man's world', but at the earlier times of the 1800s.

Underlying principles:

- Women scientists have been discriminated against in the past; in the 1950s their work was barely recognised.
- This discrimination continues in many countries today.

Thinking skill development:

'Thinking like Marie Tharp' requires an imaginative response based on fact. Deciding what to do about this requires construction of responses, and dealing with the views of others, where there may be cognitive conflict.

Resource list:

- none

Useful links:

The Earthlearningideas noted above.

See the Marie Tharp animation at: <https://www.youtube.com/watch?v=TqfYjS0OTWw>

Read a recent newspaper about Marie and her achievements at: [9d112bc-d767-11ea-9c3b-dfc394c03988_story.html](https://www.earthlearningidea.com/PDF/350_Sea_floor_mapping1.pdf)

Source: Chris King of the Earthlearningidea Team.

The Earthlearningidea ocean floor mapping activities	
Measuring the depths of seas and oceans: How is it done? A simple demonstration of how we measure sea floor depths and relief	https://www.earthlearningidea.com/PDF/350_Sea_floor_mapping1.pdf
Modelling seafloor mapping: How to simulate an echo sounder study of seafloor topography	https://www.earthlearningidea.com/PDF/351_Sea_floor_mapping2.pdf
Sounding the Pacific Ocean: An echo sounder traverse of the eastern Pacific	https://www.earthlearningidea.com/PDF/352_Sea_floor_mapping3.pdf

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https://www.earthlearningidea.com/PDF/353_Sea_floor_mapping4.pdf

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