**Changing theories about Mars**

**Levels:** 5-6  
**NoS achievement aims:** Understanding about science   
**Contextual strands:** Planet Earth and beyond   
**Topic:** Space

**Rationale**

Mars has the largest volcano in the solar system (Olympus Mons), and a huge canyon system (Valles Marineris), but no canals.

Once thought to be home to life forms that built canals, the current view is that Mars is unlikely to host life. Keeping open-minded about new information allows scientists to fully explore options. Open-mindedness is important to the culture of science.

**What you need**

* Access to resources about the surface of Mars, as well as books and Internet resources.
* Large sheet of paper or wall space for mapping out a timeline.

Note: Supporting activity resources are provided below.

**Focus**

* What stories do you know about life on Mars?
* Where do ideas about near-space objects, like Mars, come from?
* What do you think it is actually like on Mars?
* How do you decide which information to believe about Mars?
* Do all scientific discoveries lead to an improved understanding about Mars?

**Exploration**

1. Get students to share their ideas of what they have heard about the possibility of life on Mars.
2. Give them a copy of [*The story behind life on Mars*](https://scienceonline.tki.org.nz/Nature-of-science/Nature-of-science-teaching-activities/Changing-theories-about-Mars#Mars) .
3. As a class, devise a plan to develop the resource into a large timeline (for example, a wall chart), making sure the design allows room to add further information.
4. Get the students to pose questions about any further information they'd like to know about the surface of Mars, and/or the events on the timeline.
5. Some questions (see also Reflection) might be:
   * Where have the ideas about life on Mars come from? Why did people think there might be life on Mars? How did scientists check those ideas out?
   * What is the same/different about the surface of Mars and of Earth?
   * Does Mars have an atmosphere that might support life?
   * Have them research and investigate answers to their questions, using print, web resources, and the Mars versus Earth resource supplied, and add the results to the timeline.
   * Have them research and investigate answers to their questions, using print, web resources, and Mars versus Earth (page 2, [*The story behind life on Mars*](https://scienceonline.tki.org.nz/Nature-of-science/Nature-of-science-teaching-activities/Changing-theories-about-Mars#Mars) ), and add the results to the timeline.
6. Alternatively, or as an extension, get students to:
   * hold a debate for/against the existence of canals on Mars
   * develop a drama or role-play of the development of ideas about possible life on Mars.

**Reflection**

* What evidence helped open-minded scientists change their minds over the last 20–30 years about what is on the surface of Mars?
* How was that evidence gathered?
* How easy do you think it has been for scientists to remain open-minded enough to shift their theories about Mars, when there were so many stories around that captured the popular imagination?
* Why do scientists now think life on Mars is unlikely?
* What conditions would be needed to support life on Mars?
* How does research about life in extreme environments on Earth help us with our understanding of the likelihood of life on Mars?

**Activity resources**

Word icon. [The story behind life on Mars](https://scienceonline.tki.org.nz/content/download/1031/12138/version/1/file/The+story+behind+life+on+Mars.doc) (Word 32 KB)

* The various ideas about Mars mapped out in a timeline and a chart comparing Mars and Earth.

### The story behind life on Mars

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| --- | --- |
| 18th century | Astronomers use a telescope to observe dark markings and bright polar caps. They time the motions of the markings, and establish that a Martian day is about 24 hours. This leads to a belief that Mars is another Earth. |
| 1877 | Italian astronomer Schiaparelli believes he can see (through a small telescope) fine straight lines. He reports these as *canali* (channels). The word is mistranslated into English as ‘canals’. This leads to the belief that the canals are water courses built by an intelligent Martian race to carry water from the polar caps to the lower altitudes. |
| 1894 | Lowell (wealthy Boston founder of Lowell Observatory, used primarily for the study of Mars) maps hundreds of canals and publicises his results. |
| 1907 | The public is now convinced life exists on Mars, and generally agrees that the Martian race is older and wiser than humans. The belief of intelligent life on Mars is further strengthened by sightings of bright clouds and flashes of light on the planet. |
| 1912 | Novelist Edgar Rice Burroughs begins a series of 11 novels about the adventures of John Carter, an earthman lost on Mars. Burroughs’ Martian geography (with real and mythical Mediterranean names given by Schiaparelli) and green-skinned inhabitants become household words. |
| 1938 | A radio dramatisation of H.G. Wells’s book *The War of the Worlds* is broadcast on Halloween night. Listeners mistake it for a genuine news broadcast of the invasion of Earth by Martians. They flee their homes in panic. |
| 1965 | On July 15, the first spacecraft to fly past Mars (Mariner 4) sends photos to Earth that disprove the existence of canals and of Martians. Scientists now believe that the canals are optical illusions. |