

Martian habitats in the classroom: testing *Artemia*

Activity 3 answer sheet

How do *Artemia nauplii* move and distribute themselves in the horizontal and vertical tube setups?

In both horizontal and vertical setups, the *Artemia nauplii* gathered closest to the illuminated end of the tube. Their consistent movement towards the light source indicates a positive phototactic response.

What can be inferred from *Artemia nauplii* distribution in horizontal and vertical tubes about their response to light?

This shows that *Artemia nauplii* detects the direction of light and can swim accordingly, allowing them to navigate both horizontally and vertically in their environment.

Why is it important to let the *Artemia nauplii* recover in normal light between trials?

Continuous exposure to strong directional light may stress the organisms or alter their behaviour. Allowing recovery ensures that results reflect natural phototactic responses, not fatigue or overstimulation.

How could understanding *Artemia*'s movement towards light help scientists design life-support systems for Martian aquaculture?

Understanding *Artemia* phototaxis could help scientists use directional lighting to manage their distribution in closed Martian aquaculture systems. Light sources could be positioned to keep *Artemia* evenly distributed or concentrated in specific areas for monitoring, feeding or harvesting, improving oxygen exchange, feeding efficiency and the stability of aquatic life-support systems.

How might the intensity or colour of the light influence the behaviour of *Artemia nauplii*?

Students may predict that stronger light intensities produce faster or more pronounced aggregation, while different wavelengths (e.g., red or blue light) could change the strength of the response, since many aquatic organisms sense light differently across the spectrum.

What limitations of this experiment should be considered when applying results to Mars?

The experiment is simplified and does not include other environmental factors such as microgravity, radiation, or long-term ecological interactions. On Mars, *Artemia* would be exposed to multiple simultaneous stressors, meaning that phototactic behaviour would need to be studied alongside other physiological and environmental constraints before practical application.