

## Ambassador Space Science Master Badge

### Organism Cards

What do living things need to survive?

#### Vestimentiferan Tube Worms



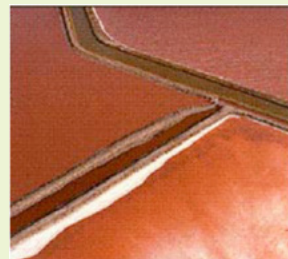
Credit: C. Van Dover, OAR/National Undersea Research Program (NURP)

**Description:** Juvenile worms are mobile and swim around. Adult tubeworms attach to one place and build a protective tube. The red plume at the top is only the exposed part of the organism.

**Environment:** Near geothermal vents along ocean floor ridges at water as hot as 110 degrees C. Internal temperature of the worms sometimes recorded at 40 degrees C.

**Food Source:** Bacteria within the tubeworm converts oxygen and sulfides into food that both bacteria and worm can use.

#### Halobacterium ("Salt Loving")



Credit: California Academy of Sciences

**Description:** Although the word bacterium is in the organism's name, it is not a bacterium. This organism is part of the Archaea kingdom – a group of small, single celled creatures, genetically different from bacteria.

**Environment:** Shallow ponds along the California coast with high salt concentrations.

**Food Source:** Use red wavelengths of light to conduct photosynthesis (that gives the halobacterium its reddish color), and provides chemical energy.

#### Methane Ice Worms



Credit: © Charles Fisher/Penn State

**Description:** 3-5 cm flat, pinkish worms with two rows of oar-like appendages they use for movement.

**Environment:** Deep ocean floor, Gulf of Mexico, living on methane ice seeps, which form naturally in the high pressure and low temperature of deep ocean.

**Food Source:** Most likely grazes on chemosynthetic bacteria (bacteria taking nutrients and energy directly from methane ice). Its food source is not dependent upon light.

#### Hot Spring Bacteria



Credit: M. Beard, SETI Institute

**Description:** Microscopic, rod-shaped bacteria.

**Environment:** Walls of boiling hot springs in Yellowstone National Park, Wyoming. Temperatures greater than 100 degrees C.

**Food Source:** Bacteria are chemosynthetic, obtaining energy by breaking bonds in small amounts of hydrogen sulfide found in the spring water.

Source: SETI Institute

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#### Ginkgo biloba



Credit: Jack Hopkins

**Description:** 10-meter-tall trees with fan-shaped leaves. Seeds and extracts are often used for food and medicine in Asia.

**Environment:** Temperate or Mediterranean climates – anywhere with temperatures above freezing for most of the year.

**Food Source:** Photosynthesis – creates its own food from sunlight, water, and CO<sub>2</sub>.

#### Roach



Credit: California Academy of Sciences

**Description:** 2-5 cm long. Exoskeleton. Six legs. Compound eyes with over 2,000 lenses.

**Environment:** Thrive in tropical environments (warm, wet). Can survive anywhere temperature is above freezing.

**Food Source:** Decaying organic material and tree sap. Needs oxygen in order to get energy from food.

#### Arctic Wolf



Credit: copyright free

**Description:** 1.5-1.75 m from head to tail, weight around 45 kg, four legs, covered in fur.

**Environment:** Northern Canada, Alaska, and Siberia. Cold winters, snow, ice. (Approximate temperature range -20 to +4 degrees C.)

**Food Source:** This carnivore prefers big game such as elk and moose, but will settle for berries, worms, or insects as necessary. Needs oxygen to get energy from food.

#### Homo sapiens



Credit: M. Beard, SETI Institute

**Description:** Bipedal, opposable thumb, large brain case, see mirror for more details.

**Environment:** Thrive in areas where temperature does not drop below freezing; however, tool-building capabilities allow this organism to make protective clothing and shelter, allowing it to live in almost any environment.

**Food Source:** This omnivore eats a variety of plants, animals, and fungi. Needs oxygen to get energy from food.

Source: SETI Institute