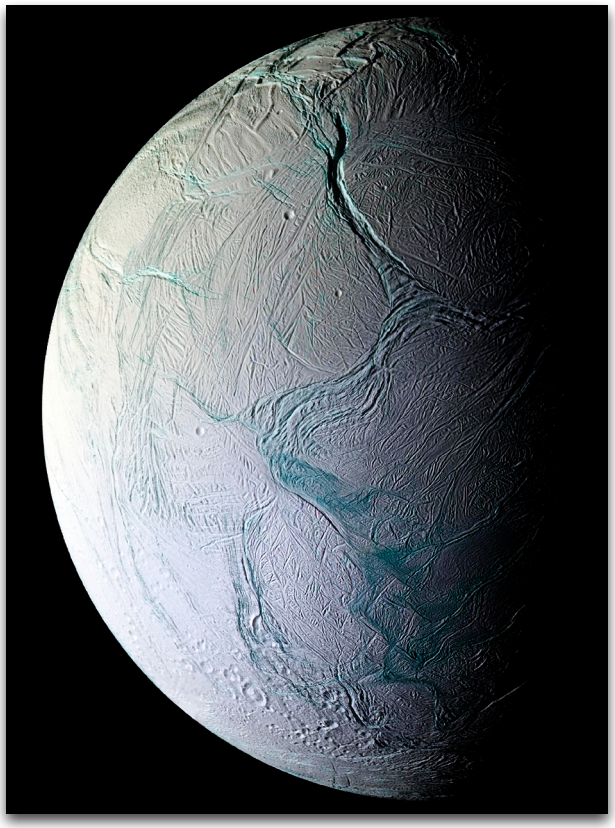
Astrobiology: Meet the Researchers

Are we alone in the Universe?

AstrobiologyOU's researchers work together to answer this question, with each member of the group bringing a different way of doing this.

Some are microbiologists, some are geologists, or even space scientists and members of space exploration mission teams. We also bring together researchers who study law and others who develop ways of working with people in different countries on Earth.

Together, we want to find whether there is life beyond the Earth. We investigate where that life might be, or might have been, and how it might survive even in very different conditions to those on Earth.



Enceladus

Image Credit: Guillermo Ferla on Unsplash

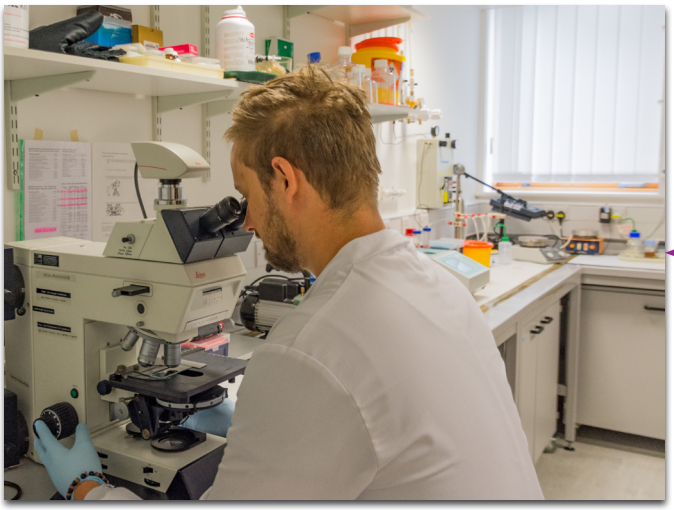
Meet our researchers…

Finding evidence of life beyond Earth
When you're looking for evidence of life, it's important to know where to look and what to look for.

Some of our researchers use the information that comes back from space missions to look for habitable environments on other planets. 'Habitable' means we think the conditions there could support life.

Water is important for life on Earth, so our researchers are interested in places beyond the Earth where water might be found, such as on Mars or the moons of other planets. The surfaces of Europa (one of Jupiter's moons) and Enceladus (one of Saturn's moons) are covered in ice but underneath there are oceans.

Could there be life in the oceans of these icy moons?



Microbiologists study microorganisms, where they live and how they can survive.

Space scientists design spacecraft and the instruments they carry. They also analyse the information sent back to Earth from the spacecraft.

Geologists study rocks and minerals, their history and what this can tell us about where they formed.

Using Earth to understand space

Evidence from space missions shows us that conditions on other planets and moons are very different to those on Earth.

Life is found almost everywhere on Earth, including places that are very hot, very dry, very salty or very cold.

These are called 'extreme environments'.

Acidic hot springs in North East Iceland
Image credit: Vic Pearson

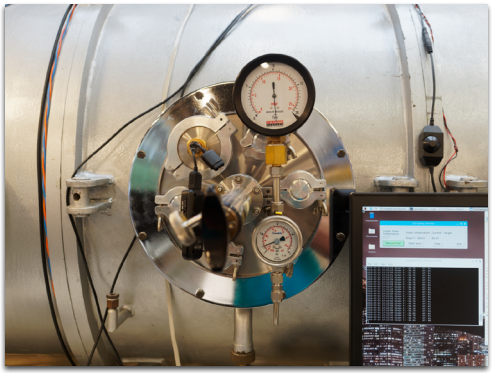
Acidic hot springs in North East Iceland
Image credit: Alex Pritz - Europlanet

Understanding how life grows and survives in extreme environments will help us to understand how life beyond the Earth might survive.
Some of our researchers travel to extreme environments on Earth to study them.

Our researchers collect rocks, water and organisms from extreme environments so that they can study them in the laboratory.

Our researchers also conduct experiments at the Open University that recreate the conditions found in space.

Taking rock samples in Botswana



Laboratory equipment in AstrobiologyOU

One of our goals is to recognise the signs of life elsewhere in space. These signs are called 'biosignatures' and they tell us whether life exists now or even in the past.

So how do we know something is alive now?

Activity - is it alive?

Here is an experiment you can do at home to look for the signs that show something is alive, even when we cannot see it move.

For this experiment you will use yeast; the type that is used to make bread, which you can buy in the supermarket.

Yeast is a tiny living organism made from only one cell. If you could put 1000 yeast cells next to each other, they would only measure 1 cm across! This makes it hard to see if yeast is alive or not.

You will need:
- 1 teaspoon (5 ml) of dried yeast
- 1 teaspoon (5 ml) of white sugar
- 150 ml warm tap water
- 1 small plastic sandwich bag

Method - what to do:
1. Put the yeast and sugar in the sandwich bag and then carefully add the water.
2. Give the bag a gentle shake to mix up the contents and then seal it or tie a knot in the top.
3. Put the bag somewhere nice and warm and check it every five minutes for about half an hour. It is important to keep your eye on the bag and if it looks like it might pop, carefully open the seal or knot.
4. Write down what you see (observations) every five minutes for 30 minutes.

You could record your observations in a table.

Time (mins)	Observations
5	
10	
15	
20	
25	
30	
35	

Results - what you saw:
You might see the contents become foamy and the bag expand like a balloon.

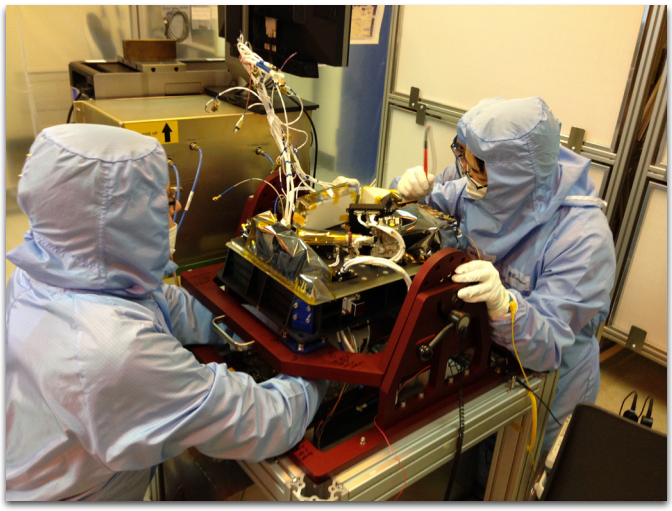
Conclusions - what this means:
The bag expands because the gas, carbon dioxide, is produced by the yeast as it digests the sugar. **The yeast is alive!**

Protecting the planets

Although we don't know whether there is life beyond Earth, it is important that we don't cause harm to any environments where life might exist. If exploration missions find evidence of life on other planets, we want to be sure it is life that comes from that planet and not something carried there from Earth.

We also have a responsibility to protect the Earth from anything that might be carried back from space.

This is known as 'planetary protection'.



Wearing protective clothing to work on a spacecraft

Our researchers study the laws, rules and guidelines for space exploration. They also study how any signs of life might be detected by instruments on board space missions, to understand what has come from Earth and what might be from space.

The United Nations' Outer Space Treaty is an international agreement to use space only for peaceful purposes.

Statue of the cosmonaut Yuri Gagarin at the United Nations

Planetary Protection regulations are based on The Outer Space Treaty and are used as a reference for all space activities, including the life detection missions involving our researchers.

AstrobiologyOU in the community

AstrobiologyOU is finding ways to share our research and knowledge to produce the best possible benefits for society.

When working in remote places around the world, our researchers work closely with local people and communities. Our researchers also study how space technologies can be used in these communities.

AstrobiologyOU also works with teachers, students and communities around the world to create resources and find ways to support businesses and industry on Earth.

Activity - What should you know before you go?

Imagine you are a member of AstrobiologyOU planning to visit a hot spring in a remote part of Ethiopia. There are no towns in the area and local people live in lots of small settlements.

What might you want to find out about the area before you go there?

Hot springs in Ethiopia
Image credit: A.Savin via Wikimedia Commons

Where to find out more about astrobiology:

15 minutes on Mars: find out more about Mars and the possibility of life there.

The OpenLearn Astrobiology Hub has lots of other resources for you to find out more about what you have read here.

To find out more about our researchers and the things they do, visit our website.

Taking it further…

In the yeast experiment, the changes that you saw were evidence that the yeast is alive. A good researcher would make sure their observations definitely come from the yeast digesting the sugar.

How could you change the experiment to check this?

You could try:

- not adding the yeast or the sugar or the water
- adding more yeast or more sugar
- changing the temperature of the water – try ice-cold water or very hot water (ask an adult to help you with this)
- swapping the sugar for other food, such as honey or salt

Remember to record your observations!

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