Questions in science

How do you know what is alive?

Narrator:

The Planet Earth hosts an incredible diversity of life, with over 1.5 million classified species but possibly billions to trillions not yet identified. But how do we know what is alive?

Despite this exceptional diversity, all living things share key characteristics, the first of which is that they are made up of cells.

What is a cell? A cell resembles a rubber balloon filled with jelly, with its outer boundary known as the membrane. This thin but essential structure contains the cell contents, acting as a barrier to the environment. It also controls the movement of molecules in and out of the cell that are essential for the cell to function. Inside the cell is a gel-like substance called cytosol, along with other structures that help the cell to function.

All life on Earth is made of cells and all cells on Earth can be classified as one of two types - either Prokaryotic or Eukaryotic. Like the cell that has been shown, Eukaryotic cells have their internal contents packaged up in compartments. This includes the nucleus, which contains DNA.

Plants, fungi and humans are all made up of eukaryotic cells. On the other hand, prokaryotic cells do not have separate compartments – DNA is loose within the gel-like cytosol. Bacteria and archaea, single-celled and microscopic organisms that make up the majority of life on Earth, all have prokaryotic cells.

Despite these fundamental differences, all life shares some characteristics. These are:

The ability to grow and reproduce performing chemical reactions that generate or require energy sensing and responding to information from the environment.

Whilst the ways living things perform these fundamental processes may vary, it is the combination of these characteristics that lets us know what is alive.

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