

1.1 An Invisible World

EXPLORE

In our world, we are surrounded by living things. Some living things are easy to see and identify, such as your classmates, the tree outside your window, or a bird perched on a nearby powerline. But life extends much further than what you can see. Everywhere around you, all over your desk, the walls, the floor, the ceiling, your clothes, and even your skin, you can find millions of tiny microscopic life forms. It is often easy to decide whether something is alive, but not always. So, how do we determine what is alive and what is not?

DEVELOP

Two Worldviews

According to the worldview of many First Nations and Métis peoples everything on Earth has Spirit flowing through it. Because of this Spirit, everything—people, animals, and even rocks—is considered to be alive. Many traditional Elders believe that all beings are connected by Spirit and therefore we are all related. Spirit is at the centre of life. Everything is interconnected through the natural cycles of the seasons and the cycles of people's lives. Everything is part of the cycle of life. This worldview is described as **holistic**; people understand the world through observing what is present, not through trying to break objects into smaller parts. Elders share knowledge that is enough to allow young people to observe and come to their own understanding of the world.

Through this worldview of connectedness, people naturally show respect for all life. Elders teach that all humanity has a responsibility to future generations to care for everything that is part of Mother Earth. Activities that are not in balance with natural cycles, such as the over-extraction and misuse of natural resources, hurt the Spirit that flows through all life.

Scientists define living things in a different way. The scientific worldview may be described as **reductionist**. Stated briefly, the scientific worldview breaks down complex structures or processes into smaller parts in order to better understand how the parts work together to produce the whole. Detailed results are shared and new understanding happens. This approach does not imply a lack of respect for the animals, plants, or processes being investigated.

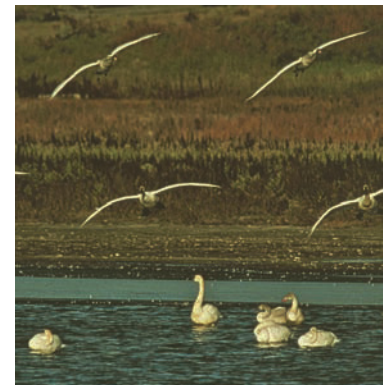
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What is your worldview?

A worldview is the way a person or a community views the world and the objects and people they meet during their life. It influences how the person lives and interacts with others on Earth.

A person's worldview affects his or her ideas of the things that are more important and those that are less important for life, happiness, and success.

- Different individuals may see the same scene differently depending on their personal worldviews.
- Think about what is most important to you, and try to describe your own worldview.



Many First Nations and Métis peoples believe that all things are related through Spirit flowing among them.

Contrasting Views

Danny Musqua, a Nakawē (Saulteaux) Elder, relates that the earliest description he knew of scientists “apitanēnigēwin,” translated as “people who take things apart to find the centre.”

He contrasts this with the First Nations and Métis view that Spirit arrives from the centre and all life begins and ends at the centre.

As a result of contributions from Robert Hooke, Antoni van Leeuwenhoek, and countless others, scientists have developed a list of characteristics to determine whether something is alive in the scientific worldview. These characteristics include the following:

Living things . . .

- Are made up of one or more cells
- Respire (breathe)
- Require energy to live
- Respond to stimuli in their environment
- Grow and develop
- Reproduce
- Excrete (get rid of wastes)

Scientific characteristics are useful, but they do not capture values such as the interdependence of living things or respect for all life. Therefore, we have something important to learn from both Indigenous peoples and scientists. (**Indigenous** is an international inclusive term for all first peoples worldwide.)

COMMUNICATE

- 1 How did Robert Hooke’s and Antoni van Leeuwenhoek’s discoveries change the way people understood life and living things?
- 2 According to scientists, all living things share certain characteristics. What are these characteristics?
- 3 How does the scientific definition of living things differ from the First Nations and Métis worldview of what is alive?

1.2 The Microscope Extends the Sense of Sight

EXPLORE

Where do microscopic life forms come from? How big are they? What do they look like? Do they share similarities with other living things? To find answers, you will have to be able to look at objects that are invisible to the unaided human eye.



How close can you get to an object and still see it clearly? Try it with a ruler and a coin.