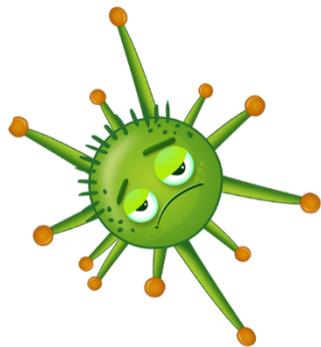


MICROBE MANIA! AN INTRODUCTION TO MARINE MICROORGANISMS



When you hear the word microbes, what comes to your mind? Something that we cannot see with the naked eye? Microscopic organisms that can hijack our healthy cells and make us sick? We have all heard about negative things that microbes can do – especially now as the world responds to the COVID-19 Pandemic. The dislike that humans generally feel toward microbes is strong and, in many cases, understandable. However, this does not mean that all microbes are all ‘bad’ It may sound strange, but most of the microbes that exist are actually very helpful. Many of the “good” microbes can be found in the ocean among other places.

Over 70% of Earth is covered by ocean. When we think of life in the ocean, we often think of fish, sharks, and whales – life that is visible to the naked eye, but you will be amazed to learn that most life in the ocean is microbial – the tiny, invisible organisms! In fact, over 90% of ocean biomass is made up of marine microbes (Biomass is defined as the total mass of all living organisms – including plants, animals, and microorganisms in a given area).

So, what are they? The term marine microbes collectively describes the ocean’s vast bacteria, viruses and algal lifeforms. They are the tiny invisible superheroes that keep our oceans healthy and habitable. They are also the most diverse and abundant organisms on earth. They are essential in the function of the ocean as they produce half the oxygen we breathe and are the foundation of our marine food web. Similar to the links between human health and the human microbiome, ocean health is largely controlled by its microbial inhabitants. because they are the foundation of our marine food-web and are critically important in preserving ecosystem functions and supporting fisheries production. These tiny marine microbes even influence our climate by driving the earth’s major chemical cycles.

Identifying Microbes

Micro-organisms, more commonly known as germs, bugs or microbes, are tiny living organisms too small to be seen with the naked eye. They are found almost everywhere on earth. Some microbes are beneficial, and others can be harmful to humans. Although extremely small, microbes come in many different shapes and sizes. There are three main groups of microbes:

Viruses

Viruses are the smallest of the microbes and are generally harmful to humans. Viruses cannot survive by themselves. They need a 'host' cell in order to survive and reproduce. Once inside the host cell, they rapidly multiply and destroy the cell in the process! Coronavirus for example is a family of viruses responsible for a range of respiratory infections in humans and other animals, and includes viruses such as the common cold and SARS-CoV-2 (COVID-19, which we are all familiar with, is

Fungi

Fungi are multicellular organisms (made up of more than one cell) that can be both beneficial and harmful to humans. Fungi obtain their food by either decomposing dead organic matter or by living as parasites on a host. Fungi can be harmful by causing infection or being poisonous to eat; others can be beneficial or harmless, e.g. *Penicillium* which produces the antibiotic penicillin. There are also fungi that are not microbes and some that can be eaten like *Agaricus*, commonly known as the button mushroom.

Bacteria

Bacteria are single-celled organisms that, under the right conditions, can multiply once every 20 minutes. During their normal growth, some produce substances (toxins) which are extremely harmful to humans and can cause disease (e.g. *Staphylococcus*); other bacteria are harmless to humans, and others can be extremely useful to us (e.g. *Lactobacillus* in our food). Some are even necessary for human life such as those involved in plant growth (e.g. *Rhizobacterium*). Harmless bacteria are called non-pathogenic, while harmful bacteria are known as pathogenic. Over 70% of bacteria are non-pathogenic.

Bacteria can be divided into three groups based on their shapes – cocci (balls), bacilli (rods) and spirals. Cocci can also be broken down into three groups by how the cocci are arranged: staphylococci (clusters), streptococci (chains) and diplococci (pairs). Scientists can use these shapes to tell which infection a patient has.



To think about:

Bacteria come in lots of different shapes and sizes – some are round like balls, some are like spirals and some are long like rods. Some even use tail like structures to help them swim and move!

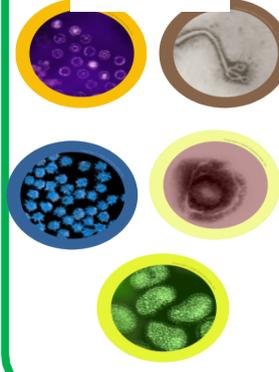
What are Microbes?

Microbes come in many different types and forms. Below are the three main groups of microbes found in our oceans.

Bacteria



Viruses



Fungi



Your task: Design a microbe of your choice, either a bacterium, a virus or a fungus using the information provided. Before you start, first decide if your microbe will be beneficial or harmful! Here are some pictures which might help with your design

Observations

1. Is it a harmful or beneficial microbe?
2. Explain your design. Does it have any special 'features' or adaptations?
3. Where does your microbe live?
4. Name your microbe

Draw your microbe here