CONCEPT 1

Traditional First Peoples medicines and treatments come from resources in nature.

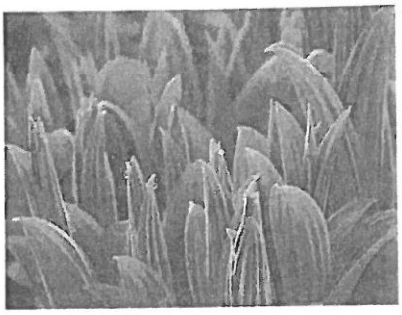
Activity

Ask an Elder or Medicine Person about Medicinal Plants

Which native plants are used as medicines in the place where you live? If possible, invite an Elder or medicine person from a local First Nation to speak to your class about the use of medicinal plants. Your teacher will help you follow the right protocol for when you invite and prepare for a First Nation visitor.

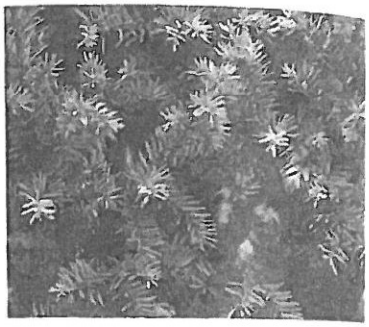
Whether it is using valerian root to help with sleep problems or boiled willow bark to treat an injury, First Peoples in British Columbia have a strong tradition of using resources from nature for medicinal purposes. For generations, First Peoples have relied on plants, animals, and even clay deposits to treat various illnesses and conditions. **Figure 1.23** shows some examples of medicinal plants used by First Peoples of British Columbia.

Figure 1.23 First Peoples have a long history of using plants for medicinal purposes.



Indian hellebore (*Veratrum viride*) can be found in open forests in much of the province. The plant is used by the Nuxalk Nation, for example, to treat skin and scalp conditions. When the plant is burned, the smoke is used as a decongestant.

Devil's club (*Opolopanax horridus*) grows along the coast, as well as in the interior, of British Columbia. Many First Peoples use this plant to treat breathing and digestive disorders, as well as arthritis and diabetes.



Pacific yew (*Taxus brevifolia*) is a small tree found along the coast of British Columbia. Many First People make tea from the needles and bar to treat pain and internal injuries. The tree also has a cancer-fighting chemical in its bark.

Before you leave this page . . .

1. Demonstrate an understanding of how nature can be used to heal.
2. Why might it be important to identify and preserve plants used for medicinal purposes?

CONCEPT 2

Vaccines can help us prevent infections.

Activity

What Do You Know About Vaccines?

Many babies get vaccines to protect them against diseases such as tetanus, whooping cough, measles, hepatitis B, and chicken pox. What do you know about vaccines? What questions do you have about vaccines? Discuss your ideas with your classmates.

vaccine a substance that causes a response in the body that protects it against a specific disease

A **vaccine** is a substance that is given to a person or animal to protect against a specific disease. Vaccines may be injected or taken orally. They are usually given to babies and children according to a schedule based on age.

Vaccines cause an immune response from the body, which results in the immune system "remembering" the exposure to the pathogen. If a person is exposed to that same pathogen after being vaccinated, the immune system recognizes it and immediately begins to defend the body against it. A vaccinated person does not get sick from exposure to the pathogen and is said to have immunity against the disease. **Table 1.5** describes several types of vaccines.

Table 1.5 Types of Vaccines

Type of Vaccine	How It Works	Example
Live, attenuated vaccine	The vaccine contains living microbes that have been weakened in a laboratory so that they cannot cause disease. The immune system responds as if the body has been infected, providing strong, often lifelong, immunity against the disease after only one or two doses.	Used against microbes that cause measles, mumps, chickenpox, and yellow fever are made this way.
Inactivated vaccines	The vaccine contains microbes that have been killed with heat, chemicals, or radiation. This vaccine results in a weaker response from the immune system. To keep immunity, a person has to get booster shots periodically.	Used against hepatitis A, rabies, and whooping cough.
Subunit vaccines	Only specific pieces of microbes are used to make the vaccine. These pieces are separated from the microbe or made in a laboratory. Immunity is provided after several doses.	Vaccines include those for hepatitis B and a flu vaccine called Hib.
Toxoid vaccines	The vaccine is made using toxins that some types of bacteria produce. The toxins are inactivated in a laboratory so they no longer cause disease. Booster shots are usually needed to keep immunity strong.	Vaccines include those for diphtheria and tetanus.

Vaccines and Public Health

Many health agencies in Canada and around the world make strong arguments in favour of people getting vaccines. There are several reasons. For example, vaccines help protect each person who receives them against deadly diseases and diseases that can cause permanent damage, such as blindness, muscle paralysis, heart damage, and infertility. Vaccines can also help stop the spread of disease. The more people who receive vaccines against an infectious disease, the less the disease can spread from person to person.

Connect to Investigation 1-G on page 78
Connect to Investigation 1-H on page 79

Vaccines can also help stop an outbreak from turning into an epidemic or pandemic. For example, throughout history, smallpox has been a devastating disease. However, after a worldwide vaccination effort in the 20th century, the disease was declared eradicated in 1980. The last known natural case of smallpox occurred in Somalia in 1977. Many organizations are working to eradicate other diseases, including polio and measles. Table 1.6 shows examples of vaccines that have been effective at preventing diseases.

Table 1.6 **Effectiveness of Certain Vaccines**

Disease	Number of Reported Cases, 1980	Number of Reported Cases, 2014	Percent Decrease in Cases
Diphtheria	97 774	7321	92.5
Measles	4 211 431	267 582	93.6
Polio	57 795	371	99.4
Tetanus	114 248	11 392	90.0
Whooping cough	1 982 384	220 504	88.9

Vaccines and Antibiotics

Before you leave this page . . .

1. In your own words, explain what a vaccine is.
2. ~~Make a graphic organizer of your choice to explain how vaccines help protect people against disease~~.

CONCEPT 3

Antibiotics can treat bacterial infections.

Activity

What Do You Know About Antibiotics?

Have you ever taken an antibiotic? Can you explain how it helped you? If not, how could you find the answer to this question? What other questions do you have about antibiotics?

antibiotic a substance that fights infections by interfering with the life processes of bacteria

Antibiotics are substances that fight infections by interfering with the life processes of bacteria. Either they kill bacteria or they prevent them from growing or reproducing. Each antibiotic is effective against specific types of bacteria. They are not useful against infections caused by viruses or other microbes.

Connect to Investigation 1-F on pages 76–77

Penicillin—The First Antibiotic Available on a Global Scale

As it sometimes happens in science, the discovery of penicillin was an accident. In 1928, a British scientist named Alexander Fleming returned to his laboratory from holiday to find several Petri dishes with *Staphylococcus* bacteria growing on them. One dish also had a large patch of mould growing on it. What caught Fleming's eye was that no bacteria were growing around the mould. The Petri dish Fleming found is shown in **Figure 1.24**. The mould had properties that stopped the bacteria from growing near it.

The scientific name of this mould is *Penicillium notatum*. Penicillin is the antibiotic that was derived from this mould. It was used to treat soldiers for bacterial infections during World War II. By 1950, it was widely available to the public, and the development of other antibiotics soon followed. You may have heard some of their names, such as erythromycin, amoxicillin, and tetracycline.

Figure 1.24 The area near the mould does not have bacteria growing around it. **What questions would you have asked if you had seen this Petri dish? Describe a controlled experiment that you would have carried out to answer these questions.**

The Development of Antibiotic-Resistant Bacteria

Millions of people have benefited from the use of antibiotics since their discovery. However, a serious problem has arisen from their overuse. Many types of bacteria have become resistant to antibiotics. Some diseases, such as tuberculosis, pneumonia, and meningitis, are now more difficult to treat as a result of antibiotic-resistant bacteria. **Figure 1.25** explains how a population of bacteria can become resistant to bacteria.

As time passes, the resistant bacteria will reproduce and become more common. As a result, the antibiotic is no longer effective against those bacteria. When this happens, a different antibiotic must be used to fight the infection. In recent years the term "superbugs" has been used to describe bacteria that are resistant to several types of antibiotics. One of the more common superbugs is methicillin-resistant *Staphylococcus aureus* (MRSA). Scientists are continuing to research new ways to treat infections caused by antibiotic-resistant bacteria.

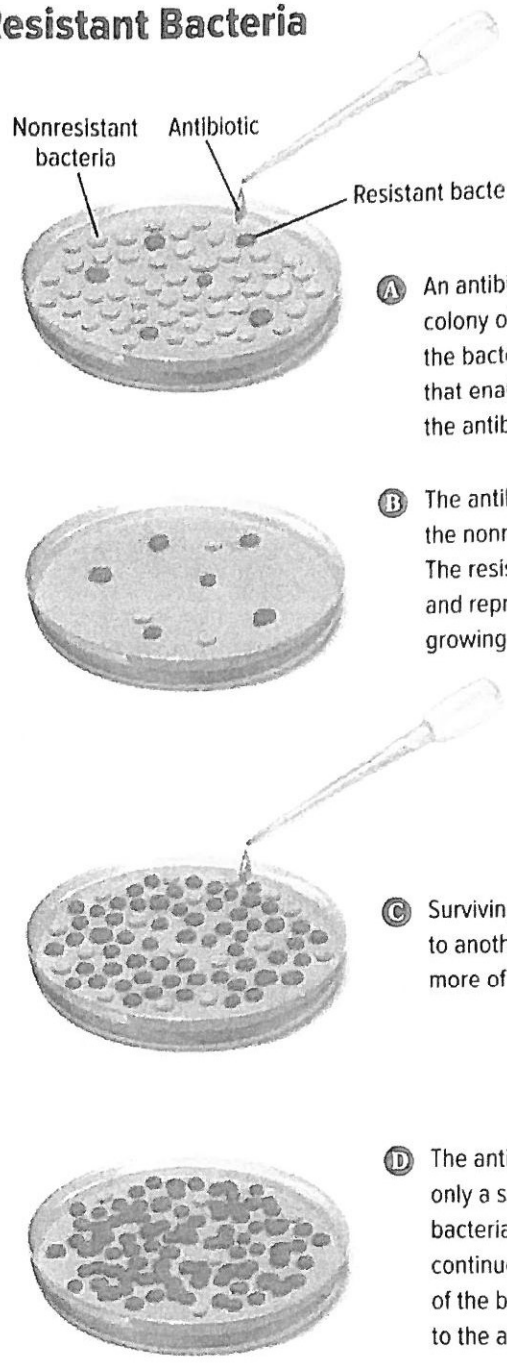


Figure 1.25 A population of bacteria can develop resistance to antibiotics after being exposed to them over time.

Before you leave this page . . .

1. What are antibiotics? How are they used?
2. ~~Suppose you had to describe to a grade 3 class how antibiotic-resistant bacteria develop. Create a brief presentation in the format of your choice to meet this goal.~~
3. ~~Why do you think the medical community is concerned about antibiotic-resistant bacteria?~~

(2) write a paragraph that explains "antibiotic-resistant bacteria".

3. * Compare and Contrast "vaccines" and "antibiotics" using a Venn diagram