1. Sources of Food

Introduction

Imagine a day without food! How would you feel on that day? Why do people feel weak when they have to go without food? Why do people die of hunger? What role does food play in the lives of living organisms? We shall find answers to these questions in this chapter. You know that all living beings need food to live. Food is the source of energy and is thus required by all living organisms to survive. We need food to grow, develop and repair our body. Food gives our body energy and nutrients that we need in order to grow and develop to move, work, play, think and learn.

Sources of Food

Have you ever wondered, how living organisms get their food? Cows, dogs, human beings, trees and microorganisms like bacteria, all need food to survive and carry out their activities. Food is essential. But each living thing has a different way of deriving nutrients.

Fig. 1.1 *Producers*

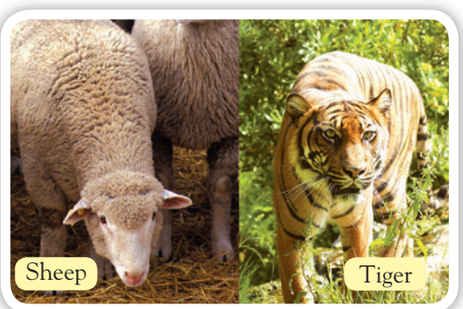


Fig. 1.2 *Consumers*

Some living things can make their own food. They are known as **producers**.

Some living things derive nutrition from others. They are known as **consumers**.

Some living things derive nutrients from dead and decayed matter. They are known as **decomposers** or **saprophytes**.

Fig. 1.3 *Decomposers*

Some plants or animals live on or inside other plants or animals in order to get food. They are known as **parasites**.

Fig. 1.4 *Parasites*

Producers

Plants can make their own food. Plants make food (glucose) with carbon dioxide (from air) and water (from soil) in the presence of chlorophyll using solar energy. This process is called **photosynthesis**. Oxygen is a by-product of this chemical process.

Consumers

Animals cannot make their own food. They depend on plants or other animals for food. Animals are called **consumers**. They need to consume (eat) plants and/or animals.

There are three kinds of consumers.

1. Animals that eat only plants are known as **herbivores**.
2. Animals that eat only animals are known as **carnivores**.
3. Animals that eat both plants and animals are known as **omnivores**.

Herbivores

Herbivores have well-developed molars and premolars for grinding and chewing plants. Some herbivores have many molars while some herbivores like the white-tailed deer, goat have tall molars with flat upper surfaces for chewing. Some herbivores, like cows, store semi-digested food in a portion of their stomach and bring it back to the mouth for a second chewing.

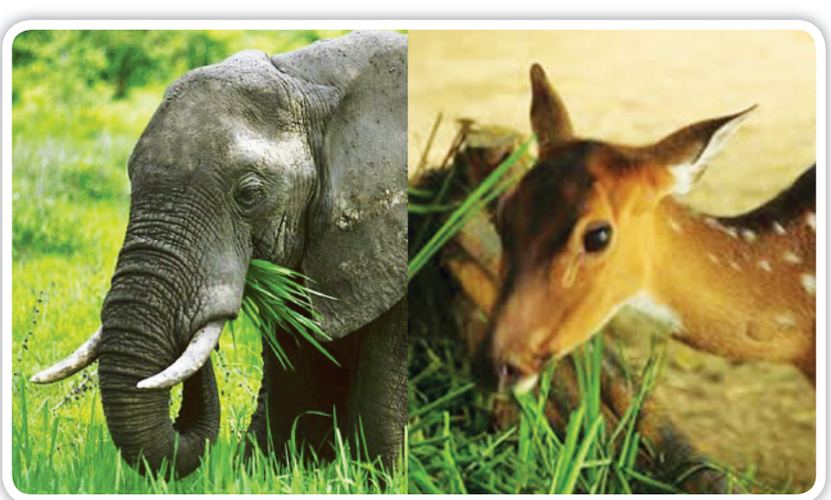


Fig. 1.5 *Herbivores*

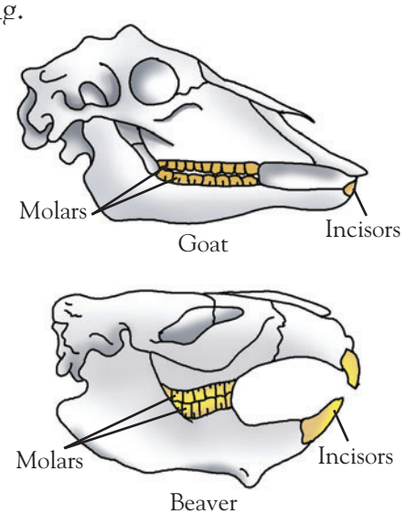
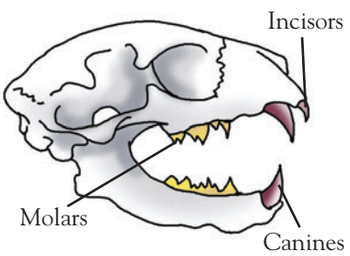


Fig. 1.6 *Skulls of goat and beaver showing molars*

Carnivores

Carnivores have sharp and pointed teeth to tear flesh. Their canines and incisors are very well-developed. Carnivores need canines to kill and tear meat. Some birds have clawed, pointed toes and sharp, pointed beaks to grab and stab the flesh of their prey.

Fig. 1.7 *Carnivores*



Leopard skull

Fig. 1.8 *A carnivore skull showing sharp canines*

Omnivores

Mammals like grizzly bears and human beings, and birds like crows and woodpeckers are omnivores. Omnivores survive well in many environments because they eat both plants and animals.

Many omnivorous animals have front teeth which help them rip into meat and bite into fruits and vegetables, and molars which help them grind up meat and chew fruits and vegetables.

Since the feeding habits of all living things are not the same, they show characteristics which help them derive energy from the food they eat.

Fig. 1.9 *Bear (Large omnivore)*

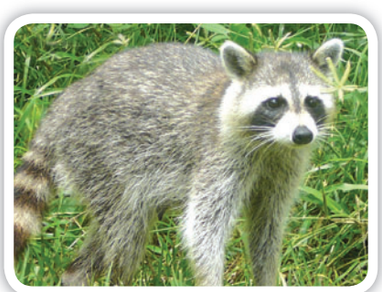


Fig. 1.10 *Raccoon (Medium omnivore)*

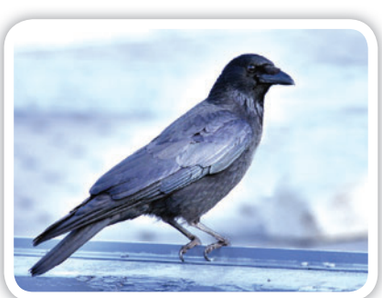


Fig. 1.11 *Crow (Small omnivore)*

Activity 1

Complete this table.

Animal	Food they eat
goat	
monkey	
kingfisher	
squirrel	
lion	

Are the food habits of all living things the same?

Decomposers

Bacteria and fungi are decomposers. They eat decaying matter—dead plants and animals, and in the process they break them down and decompose them. When that happens, they release nutrients and mineral salts back into the soil which are then used by plants.

Do You Know?

Mould, bacteria and some higher level organisms like beetles, centipedes and, of course, earthworms are all busy recyclers. By breaking down organic matter like dead plants, they create the valuable nutrients necessary for a rich and fertile soil.

Bacteria as recyclers

We have bacteria in our digestive tract that prevent the growth of disease causing organisms. Some animals like moose, sheep and deer have bacteria in their stomachs that help them digest plants. Bacteria help turn milk into cheese and curd, and fruits and vegetables into pickles. Other bacteria help decompose dead plants and animals.

Earthworms as recyclers

Earthworms eat dead plants and animals. When they eat, they also take in soil and tiny pebbles. They take in nutrients from microorganisms in the material they ingest. Earthworms then excrete wastes in the form of casts. Earthworm casts are rich in nutrients like nitrogen, phosphorus and potash. In addition to breaking down organic materials and adding nutrients to the soil, earthworms also help loosen the soil and aerate the soil. This helps plants grow.

Formative Assessment

1. What is the role of producers?
2. Define an omnivore. Give examples.
3. Give the characteristic features of a carnivore.
4. Fill in the blanks.
   a. The living world is grouped into _____ and _____ according to their mode of nutrition.
   b. The by-product of photosynthesis is _____.
   c. Well-developed premolars and molars are seen in _____ while canines and incisors are well-developed in _____.
   d. The process by which solar energy is converted and stored as food is called _____.
5. Group these according to their source of nutrition.
   mushroom, crow, sheep, deer tick, deer, wolf, spider

Plants as Sources of Food

Different parts of a plant are sources of food for living organisms (Fig. 1.12). We eat stems, roots, leaves and flowers of different plants. We get vegetables, fruits, pulses, cereals, spices and beverages

from plants. There are around 2,000 plant species which are cultivated for food.

Root

Have you eaten any of the vegetables shown in Figs. 1.13 and 1.14? Did you know that these are roots? In some plants, the roots or parts of the root system are enlarged in order to store large quantities of starch and other carbohydrates. A tuberous root or storage root is enlarged to function as a storage organ. Examples of plants with notable tuberous roots include sweet potato, carrot, cassava, turmeric and dahlia. Since they store nutrients, they are rich sources of energy.

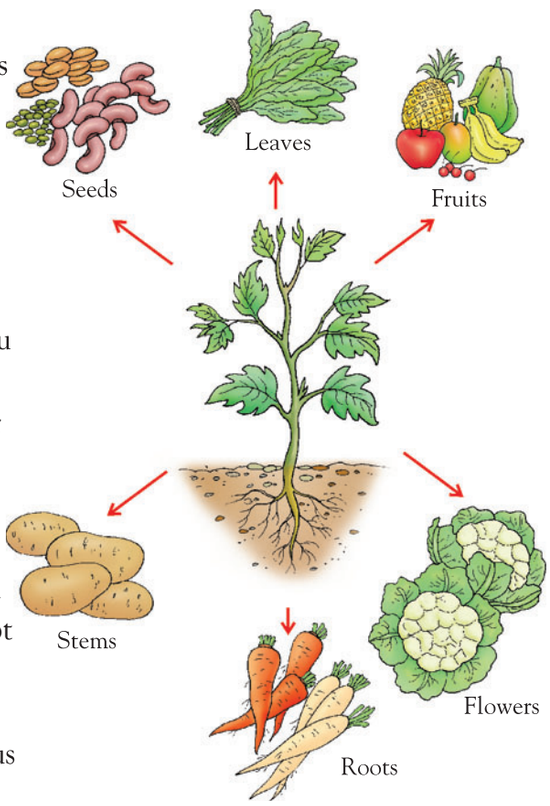
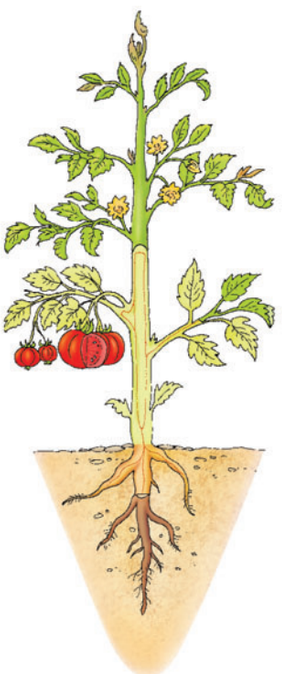


Fig. 1.12 *Different parts of a plant as source of food*

Activity 2

Label all the parts of the plant.



Stem

Many plants store carbohydrates or fats in their stems. Potato, garlic, cinnamon and sugar cane are few examples of edible stems.

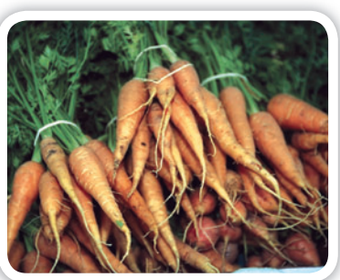


Fig. 1.13 *Carrots (root)*

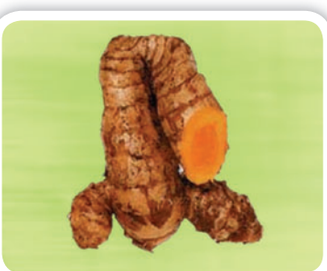


Fig. 1.14 *Turmeric (root)*

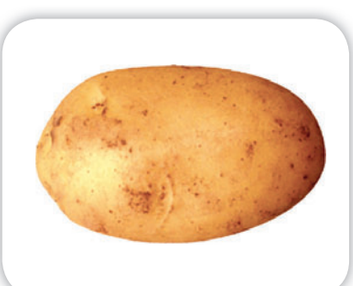


Fig. 1.15 *Potato (stem)*

Fig. 1.16 *Cinnamon (stem)*

Activity 3

Collect small amounts of various spices. Group them according to their sources or the parts of plants from where they are obtained. Find out the uses of the different spices that you collect.

Seed

Seeds of plants are a good source of food for animals, including human beings because they contain nutrients necessary for the plant's initial growth. In fact, a majority of foods consumed by human beings are seed-based foods. Edible seeds include cereals (such as maize, wheat and rice), legumes (such as beans, peas, and lentils) and nuts. Seeds of sunflower, rapeseed and sesame are often used to produce rich oils.

Fig. 1.17 *Nuts (seed)*

Food for Plants

Do you know why a plant stores food in its seeds? It does so for the baby plant present in the seed. When the baby plant starts growing, it uses the food stored in the seed until it can make its own food. The food is stored in the seed leaves called **cotyledons**.

The baby plant rests in the seed till it gets all the necessary conditions to start growing. The growth of a baby plant from a seed is called **germination**. A young growing plant is called a **seedling**.

Fig. 1.18 *Grains*

Let us see what the necessary conditions for germination are.

Put some cotton wool in four dishes. Keep about 3–4 bean seeds in each dish. Keep the dishes as follows.

1. Dish A – Wet the cotton; keep adding water if it dries and keep it in a warm place such as the kitchen.
2. Dish B – Wet the cotton; keep adding water if it dries and keep it in a cold place such as a refrigerator.
3. Dish C – Do not wet the cotton and keep it in a warm place.
4. Dish D – Put enough water to cover the seeds and keep it in a warm place.

Write what you observe in the four dishes. What do you think is the role of seeds and water in the germination of plants? What is the role of temperature? Give reasons why seeds do not germinate in the cold. What is the role of air in seed germination?

Fruit

Fruits of a plant usually have the seeds of the plant inside them. Many plants have evolved fruits that are attractive as a food source to animals, so that animals eat the fruits and excrete the seeds some distance away from the plant. Fruits, therefore, make up a significant part of the diets of many living things. Some fruits, such as tomatoes, pumpkins and eggplants, are eaten as vegetables.

Vegetable

Vegetables are another type of plant matter that is commonly eaten as food. These include root vegetables (such as radish and carrots), leaf vegetables (such as spinach and lettuce), stem vegetables (such as bamboo shoots and asparagus), and inflorescence vegetables (such as broccoli).

Fig. 1.19 *Different types of vegetables*

Fibre in Food

Dietary fibre is found in cereals, fruits and vegetables. Fibre is made up of the indigestible parts of plants which pass relatively unchanged through our stomach and intestines. The main role of fibre is to keep the digestive system healthy. They help in digestion of food. Other terms for dietary fibre are 'bulk' and 'roughage', which can be misleading since some forms of fibre are soluble in water and aren't bulky or rough at all!

Do You Know?

Fibre is largely a carbohydrate. Adults should consume approximately 30 grams of fibre every day. Children should eat 10 grams of fibre in a day plus an additional gram for every year of their age. For instance, a 10-year-old child should eat 15 to 20 grams of fibre per day. Disorders that can arise from a low fibre diet include:

1. constipation
2. heart disease
3. some cancers
4. irritable bowel syndrome

Formative Assessment

1. What is a tuber? Define with the help of two examples.
2. Why do plants store food in various parts of their body?
3. Give two examples of each of these parts of plants that we eat.
   a. seeds b. fruits c. leaves d. roots
4. Fill in the blanks with the correct option.
   a. _____ (Herbivores/Omnivores) only eat plants.
   b. Potato is an edible _____ (stem/seed).
   c. _____ (Seeds/Fruits) form a majority of food eaten by human beings.

d. Carrot and _____ (turnip/potato) are roots.

e. Spinach is a _____ (leafy/flowery) vegetable.

5. Match the correct answer.

a. tiger	i. fruit
b. elephant	ii. carnivore
c. human being	iii. herbivore
d. bacteria	iv. omnivore
e. egg plant	v. decomposer

Sources of Food from Animals

Animals are both direct as well as indirect sources of food.

Meat

The flesh of some animals is eaten as food. Poultry birds, fishes, goats and sheep provide meat. Some sea creatures such as shrimps, prawns, shell fishes and crabs are also eaten as rich sources of proteins.

Milk

Food products produced by animals include milk which is produced by mammals such as sheep, camels, goats, cows and buffaloes. Milk is drunk or processed into dairy products such as cheese or butter. Milk is a rich source of calcium. Animals which produce milk are called **milch animals**.

Eggs

In addition, birds and other animals lay eggs which are often eaten. Eggs are rich in nutrients such as proteins and vitamins.

Honey

Have you seen bees buzzing around flowers? Bees collect nectar from flowers and make honey from it. They store the honey in their hives. Human beings collect honey from beehives. Honey is a rich source of carbohydrates like sucrose, glucose, lactose, water and minerals.

Do You Know?

Bees use their long tongues, like straws, to suck nectar from flowers. They store the nectar in their 'honey stomachs'. Bees have two stomachs. They have a honey stomach, which they use to carry nectar in. They have another stomach, like everybody else, which they use to digest their food. The honey stomach holds almost 70 milligrams of nectar and when full, it weighs almost as much as the bee does. Honeybees visit between 100 and 1,500 flowers to fill their honey stomachs.

Dr Verghese Kurien (1921–2012)

Dr Verghese Kurien was born on 26 November, 1921 at Kozhikode, Kerala. He is said to have brought about the 'White Revolution' in India. He was the chairman of the Gujarat Co-operative Milk Marketing Federation Ltd. (GCMMF) which manages the Amul food brand. It is said that he designed 'Operation Flood', the largest dairy development programme in the world. 'Operation Flood' helped make India the largest milk producer in the world.

Indian Food

Diversity is the most striking feature of India's geography, culture and food. Indian cuisine varies from region to region, reflecting the different people who live in the subcontinent. Food is an important part of Indian culture, playing a role in everyday life as well as in festivals. In many families, everyday meals are usually eaten together and they consist of two to three main course dishes, varied accompaniments such as *chutneys* and pickles, carbohydrate staples such as rice and *roti*, as well as desserts. In many cases, food is deeply influenced by religious and social identity, with varying taboos and preferences. For example, a section of Jain community do not eat any roots or vegetables that grow below the ground.

Generally, Indian cuisine can be divided into four categories—North Indian, South Indian, East Indian and West Indian. Despite this diversity, Indian food has some common features. Uses of spices are an integral part of food preparation in India. Spices are used to enhance the flavour of a dish. Cuisine across India has also been influenced by various cultural groups that came to India throughout history, from countries of West Asia, Central Asia and Europe.

The staples of Indian food are rice, *atta* (wheat flour) and a variety of pulses like the *masoor* (red lentil), *chana* (bengal gram), *toor* (pigeon pea), *urad* (black gram) and *mung* (green gram). Pulses are cooked whole, dehusked or split. Some of the pulses like *chana* and *mung* are also processed into flour (*besan*).

Most Indian dishes are fried in vegetable oil. In North and West India, groundnut oil is traditionally more popular for frying, while in Eastern India, mustard oil is more commonly used. In South India, coconut oil and gingelly oil is used. *Desi ghee* (clarified butter) is also a popular cooking medium.

The most frequently used spices in Indian cuisine are chilli pepper, black mustard seed (*rai*), cumin (*jeera*), turmeric (*haldi*), fenugreek (*methi*), asafoetida (*hing*), ginger (*adrak*), and garlic (*lassan*). One of the popular spice mixes is *garam masala* which is usually a powder of five or more dried spices. It commonly comprises of cardamom, cinnamon and clove. Some leaves are commonly used like coriander leaf, fenugreek leaf and mint leaf. The use of curry leaves is typical of South Indian cuisine. In desserts, cardamom, nutmeg, saffron, and rose essence are used.

Indian food is very popular all over the world!

Points to Remember

- All living beings need food to live.
- Plants and animals are our sources of food.
- Herbivores eat only plants; carnivores eat the flesh of other animals; omnivores eat both plants and animals; parasites depend on other living animals for food.
- Food is the substance we eat to get energy and nutrients.
- Living organisms can be grouped into producers, consumers and decomposers.

- Plants are producers who can make their own food.
- Animals are consumers and depend on plants for nutrition.
- A few organisms derive nutrition from dead and decaying matter.
- Plant parts like roots, stems, leaves, fruits as well as seeds are the major sources of food.
- Animals like cows, buffaloes, goats and camels are sources of milk and are called milch animals.
- Animals like poultry birds, fishes, goats and sheep provide meat.
- We also get food products like eggs and honey from animals.

Important Definitions

- **Herbivore** an animal that eats plants only
- **Carnivore** an animal that eats flesh of other animals
- **Omnivore** an animal that eats both plants and animals
- **Producer** a green plant that produces its own food by photosynthesis
- **Consumer** living things which derive nutrition from others
- **Decomposer or saprophyte** living things which derive nutrients from dead and decayed matter
- **Parasites** plants or animals that live on or inside other plants or animals in order to get food

Exercises

Summative Assessment

A. Fill in the blanks.

1. Living things which can make their own food are known as _____.
2. Living things which derive nutrition from others are known as _____.
3. Living things which derive nutrients from dead and decayed matter are known as _____.
4. _____ is a herbivore.
5. _____ and _____ are our sources of food.
6. _____ and _____ are required by green plants to make glucose during photosynthesis and _____ is released in process.

B. Match the correct answer.

1. cows, goats	a. eat other animals
2. fibre	b. decomposers
3. carnivores	c. roughage
4. herbivores	d. milch animals
5. bacteria, *fungi*	e. eat plants and plant products