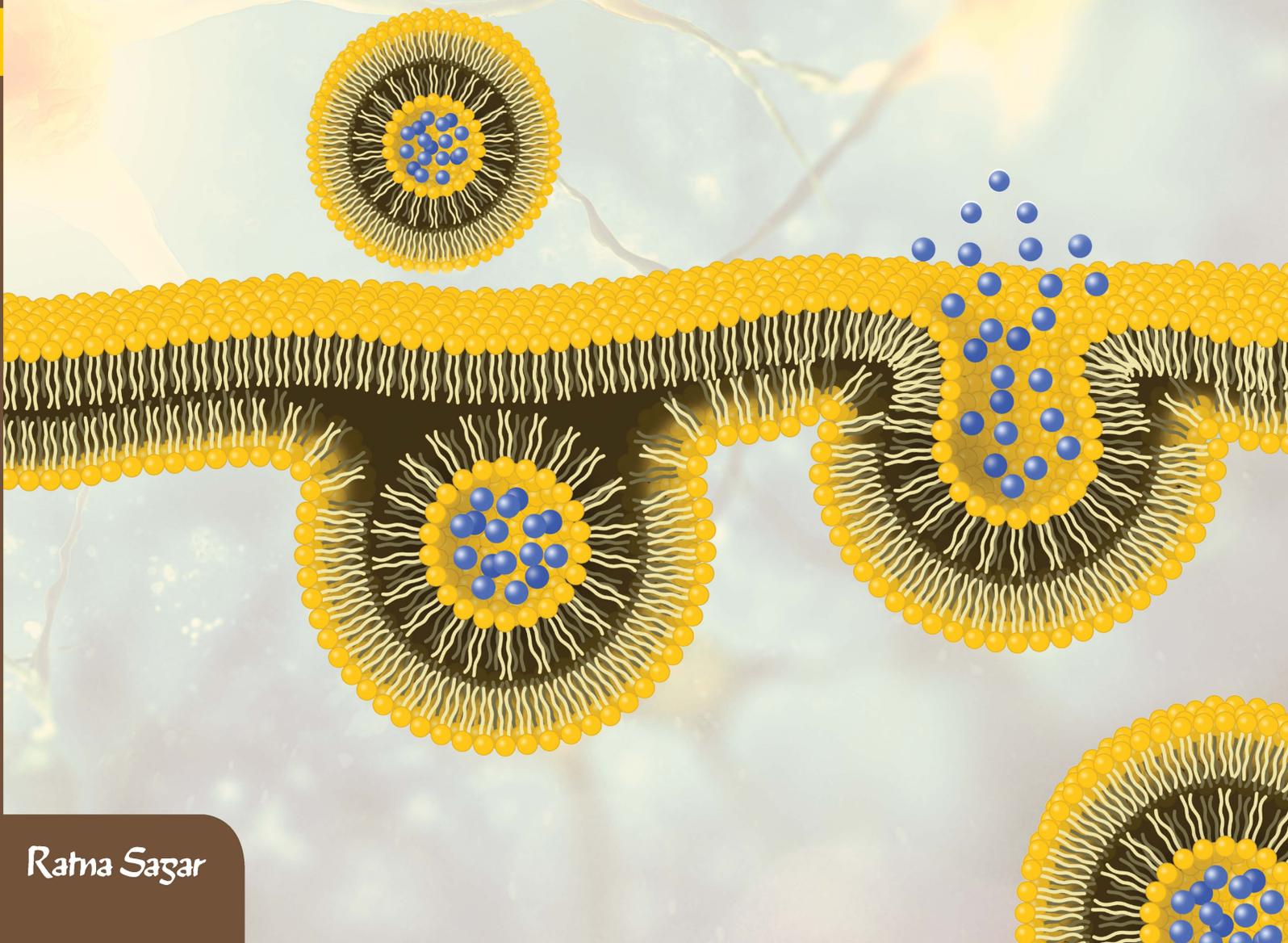


Based on the latest CBSE syllabus

10

# LIVING SCIENCE BIOLOGY

D K Rao • J J Kaur



Based on the latest syllabus and guidelines issued  
by the Central Board of Secondary Education (CBSE)

---

# LIVING SCIENCE **BIOLOGY**

10

D K Rao • J J Kaur



**Ratna Sagar**

---

## Photo Credits

---

COVER JAMILIA MARINI, ANDRII VODOLAZHSKIY/shutterstock.com Page 10 VALENTYN VOLKOV/shutterstock.com Page 12 MATTHIJS WETTERAUW/shutterstock.com, MOPIC/shutterstock.com, DR. MORLEY READ/shutterstock.com, DESIGNUA/shutterstock.com Page 20 BLAMB/shutterstock.com Page 36 YEVGENIY11/shutterstock.com Page 52 DESIGNUA/shutterstock.com Page 82 DESIGNUA/shutterstock.com Page 89 ALILA MEDICAL MEDIA/shutterstock.com, DESIGNUA/shutterstock.com Page 103 JIRI VACLAVEK/shutterstock.com, BECKY STARES/shutterstock.com Page 104 PHANNAPHA/shutterstock.com Page 129 VORONIN76/shutterstock.com, TATJANA ROMANOVA/shutterstock.com Page 144 STIHII/shutterstock.com Page 146 SCIENCEPICS/shutterstock.com, A454/shutterstock.com Page 155 NEELSKY/shutterstock.com, MORENO SOPPELSA/shutterstock.com Page 157 KONGSAK SUMANO/shutterstock.com Page 166 ALTERFALTER/shutterstock.com, PHOTKA/shutterstock.com

© D K Rao & J J Kaur, 2007

All right reserved

First Published 2007

First revised edition 2011

Second revised edition 2017

10 9 8 7 6 5 4 3 2 1

ISBN 978-93-85976-89-6



**Ratna Sagar P. Ltd.**

an ISO 9001:2015 and 14001:2015 company

VIRAT BHAVAN, COMMERCIAL COMPLEX, MUKHERJEE NAGAR, DELHI 110009

PHONE: (011) 47038000 ♦ FAX: (011) 47038099

rsagar@ratnasagar.com ♦ ratnasagar.com ♦ ratnasagar.co.in

SHOWROOM: 4808/24 BHARAT RAM ROAD, DARYA GANJ, NEW DELHI 110002

PHONE: (011) 43028000 ♦ FAX: (011) 45166099

BRANCHES: CHENNAI ♦ LUCKNOW

OFFICES: AGRA ♦ AHMADABAD ♦ BENGALURU ♦ BHOPAL ♦ COIMBATORE ♦ DEHRADUN

GUWAHATI ♦ HYDERABAD ♦ JAIPUR ♦ JALANDHAR ♦ KANPUR ♦ KOCHI ♦ KOLKATA

MADURAI ♦ MUMBAI ♦ PATNA ♦ RANCHI ♦ VARANASI

# Preface

Biology is about understanding how living organisms work. During the last couple of centuries, our knowledge of Biology has grown at a staggering rate. Living Science 'Biology' for Class X conforms to the latest CBSE syllabus. The book contains all the material which is a part of the core syllabus.

We have written this book to give you a thorough introduction to Biology at the Secondary level. We have presented the various scientific concepts as vital, compelling and meaningful which might otherwise seem dull. Each part of this book has been carefully planned to make it student-friendly and present Biology in an interesting, understandable and enjoyable manner. We have tried to stress the applications of what you are learning so that you can relate the facts to the living world.

## The 'Guided Tour'

Before you start using this book let us familiarize you with its major features.

### Course divided into Themes and Chapters

The book is divided into different chapters. The continuity from one chapter to another is step by step, clear and methodical.

Chapter 1: **Life Processes – Nutrition, Respiration, Transportation and Excretion**

Chapter 2: **Control and Coordination**

Chapter 3: **Reproduction in Plants and Animals**

Chapter 4: **Heredity and Evolution**

Chapter 5: **Management of Natural Resources**

Chapter 6: **Our Environment**

### Learning Objectives

Learning becomes easy and purposeful if one is aware of the goals and targets of study. Thus, 'Learning Objectives' have been given in the beginning of each chapter to guide the learner about the concepts to be studied step by step. The Learning Objectives also provide an overview of the entire chapter.

### The Text

Learning proceeds from concrete to abstract. One learns about the difficult unknown concepts from simple facts which are quite familiar to him/her. The main text introduces ideas from scratch. A lucid introduction to the chapter has been given to stimulate the interest of the learner in the respective topics. Informal and interactive style has been used throughout the text, which is divided into units and sub-units.

### Self-Test Assignments

Each section is followed by a self-test assignment in the form of 'Check your progress' to reinforce the concept. Each chapter contains several such assignments which students will find valuable to obtain feedback about their progress.

### Text and Illustration Coordination

A large number of figures have been used to enhance effectiveness of the text. Simple and clear illustrations have been designed keeping the needs of the reader in mind. The text and the illustrations together teach the content better and in an interesting manner.

### **Use of Tables, Graphs and Flowcharts**

The tables and graphs used in the text are capable of standing on their own (self-explanatory). In addition, important processes are explained in the form of flowcharts which are in coordination with the text.

### **Feature Boxes**

The feature boxes contain topics of special interest – practical techniques or modern applications of science. Interesting facts related to the topics have been included at appropriate places as box material. These boxes will give you an indepth knowledge to help you understand the concept better.

### **Summary**

The main text of each chapter has been summarized at the end of the chapter which lists the main points of the text. The summary is excellent for revision and to gain an overview of the topics covered in the chapters.

### **Terminal Exercises**

Terminal exercises at the end of each chapter focus on the application of the subject matter and contain questions which give the opportunity to practice key skills. These exercises provide a full dress rehearsal for examination. They include a variety of questions to facilitate the integration of different concepts taught and test the grasp of the complete chapter. These will be highly helpful for examination purpose and to identify strengths and weaknesses in understanding the concepts.

### **Glossary**

A glossary of technical terms has been provided at the end of the book for quick reference.

We sincerely hope that this book will meet the aspirations of the students as well as the teachers. Your valuable suggestions for further improvement of the book will be appreciated and gratefully acknowledged.

**D K Rao & J J Kaur**  
Delhi

# Syllabus

## THEME: MATERIALS

(30 Periods)

### UNIT I: CHEMICAL SUBSTANCES – NATURE AND BEHAVIOUR

**Chemical reactions:** Chemical equation, balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.

**Acids, bases and salts:** Their definitions in terms of furnishing of  $H^+$  and  $OH^-$  ions, general properties, examples and uses, concept of  $pH$  scale (Definition relating to logarithm not required), importance of  $pH$  in everyday life; preparation and uses of sodium hydroxide, bleaching powder, baking soda, washing soda and plaster of Paris.

**Metals and non-metals:** Properties of metals and non-metals; reactivity series, formation and properties of ionic compounds; basic metallurgical processes; corrosion and its prevention.

## THEME: THE WORLD OF THE LIVING

(20 Periods)

### UNIT II: WORLD OF LIVING

**Life processes:** 'Living being'. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

**Control and coordination in animals and plants:** Tropic movements in plants; Introduction to plant hormones; Control and coordination in animals: Nervous system; voluntary, involuntary and reflex action, Chemical coordination: animal hormones.

## THEME: HOW THINGS WORK

(32 Periods)

### UNIT IV: EFFECTS OF CURRENT

Electric current, potential difference and electric current. Ohm's law; resistance, resistivity, factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric Power, Interrelation between  $P$ ,  $V$ ,  $I$  and  $R$ .

**Magnetic effects of current:** Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule. Electromagnetic induction. Induced potential difference, induced current. Fleming's Right Hand Rule, direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

## THEME: NATURAL RESOURCES

(8 Periods)

### UNIT V: NATURAL RESOURCES

**Sources of energy:** Different forms of energy, conventional and non-conventional sources of energy: Fossil fuels, solar energy; biogas; wind, water and tidal energy; nuclear energy. Renewable versus non-renewable sources of energy.

## THEME: MATERIALS

(25 Periods)

### UNIT I: CHEMICAL SUBSTANCES – NATURE AND BEHAVIOUR

**Carbon compounds:** Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydrocarbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

**Periodic classification of elements:** Need for classification, Modern Periodic Table, gradation in properties, valency, atomic number, metallic and non-metallic properties.

## THEME: THE WORLD OF THE LIVING

(30 Periods)

### UNIT II: WORLD OF LIVING

**Reproduction:** Reproduction in animals and plants (asexual and sexual) reproductive health – need and methods of family planning. Safe sex vs HIV/AIDS. Child bearing and women's health.

**Heredity and Evolution:** Heredity; Mendel's contribution – Laws for inheritance of traits: Sex determination: brief introduction; Basic concepts of evolution.

## THEME: NATURAL PHENOMENA

(23 Periods)

### Unit III: NATURAL PHENOMENA

Reflection of light by curved surfaces, Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification.

Refraction; Laws of refraction, refractive index.

Refraction of light by spherical lens; image formed by spherical lenses; Lens Formula (Derivation not required); Magnification. Power of a lens; Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses.

Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life.

## THEME: NATURAL RESOURCES

(12 Periods)

### UNIT V: NATURAL RESOURCES

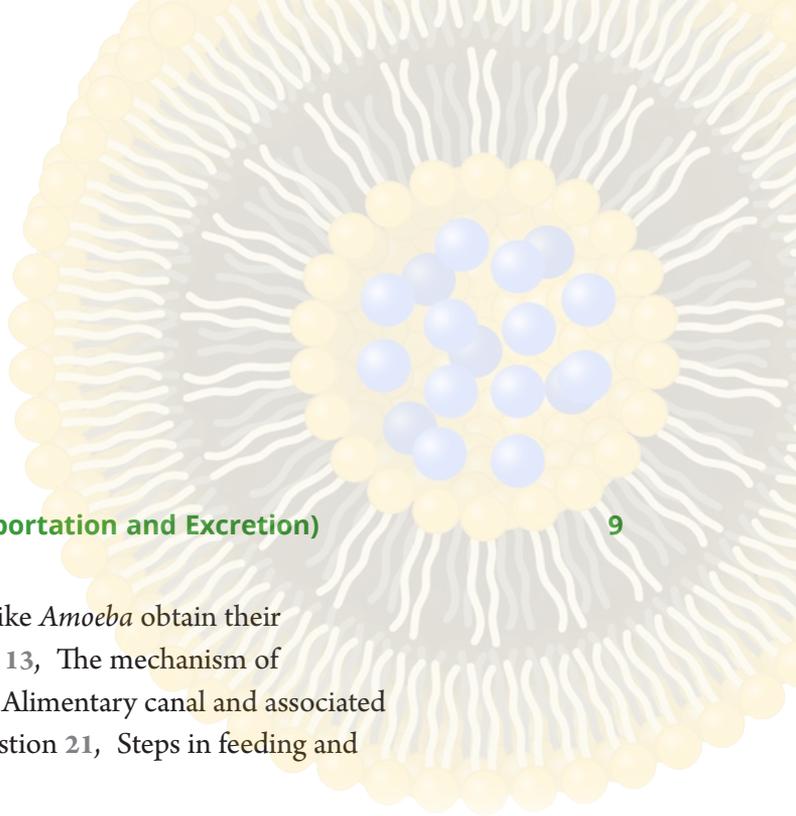
Conservation of natural resources.

Management of natural resources. Conservation and judicious use of natural resources. Forest and wildlife. Coal and petroleum conservation. Examples of people's participation for conservation of natural resources.

**Regional environment:** Big dams: advantages and limitations; alternatives if any. Water harvesting. Sustainability of natural resources.

**Our environment:** Eco-system, environmental problems, ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances.

# Contents



## 1. LIFE PROCESSES (Nutrition, Respiration, Transportation and Excretion) 9

### Unit I: Nutrition

Modes of nutrition 10, How do simple organisms like *Amoeba* obtain their nutrition? 13, Nutrition in plants – Photosynthesis 13, The mechanism of photosynthesis 17, Nutrition in human beings 18, Alimentary canal and associated digestive glands 18, Process and physiology of digestion 21, Steps in feeding and digestion 22

### Unit II: Respiration

What is respiration? 32, Types of respiration 32, Respiration in plants 34, Gaseous exchange in animals 35, Respiration in humans 37, Respiratory system in human beings 37, The breathing mechanism 39, Exchange of gases in lungs and tissues 40

### Unit III: Transportation

Transportation in plants 48, Transportation of materials and fluids in human beings 51, Human blood 52, Blood vessels 54, Heart in human beings 55, Cardiac cycle 56, Lymphatic system 58

### Unit IV: Excretion – Elimination of body wastes

Excretion 66, Excretion in plants 66, Excretion in animals 66, Nature of waste products in human beings 67, Excretion in human beings 67, Nephron – The functional unit of kidney 67, Physiology of urine formation 69, Haemodialysis 70

## 2. CONTROL AND COORDINATION 76

Stimuli and receptors 76, Control and coordination in plants 77, Tropic movements or tropism 77, Nastic movements or nasties 78, Plant hormones 79, Coordination in animals – Nervous system 80, Nervous system in lower animals 80, Control and coordination in humans 80, Nervous system in humans 80, Neurons – The unit of nervous system 80, Organs of nervous system in human beings 82, Central nervous system 83, Reflex action and reflex arc 85, Peripheral nervous system 86, Autonomic nervous system 86, Endocrine system in humans; What are hormones? 86, Endocrine glands 87, Thyroid gland 87, Adrenal glands 88, Pancreas 89, Pituitary – The master gland 89, Hormones secreted by gonads 90, Feedback mechanism of hormone secretion 91

<b>3. REPRODUCTION IN PLANTS AND ANIMALS</b>	<b>98</b>
What is reproduction? 98, Types of reproduction 99, Asexual reproduction 99, Types of asexual reproduction 99, Vegetative propagation 102, Vegetative propagation by natural methods 103, Vegetative propagation by artificial methods 104, Do organisms create exact copies of themselves in asexual reproduction? 107, Sexual reproduction 108, Sexual reproduction in flowering plants 109, Pollination 110, Fertilization and development of the seed 111, Reproduction in human beings 112, Reproductive system in human beings 112, Male reproductive system 113, Female reproductive system 114, What happens when the egg is not fertilized? 115, Fertilization, pregnancy and development of the embryo 116, Reproductive health 117, Birth control 117, Sexually transmitted diseases 119	
<b>4. HEREDITY AND EVOLUTION</b>	<b>128</b>
Heredity, genetics and variations 128, Accumulation of variation during reproduction 129, Inheritance of traits – Mendel’s contributions 130, Mendel’s experiments 131, Monohybrid cross 132, Dihybrid cross 134, Interpretation of Mendel’s observations 135, Mendel’s laws of inheritance 135, Transmission of traits 136, Sex determination in lower animals 137, Sex determination in human beings – Son or daughter? 137, Evolution 138, Acquired and inherited traits 140, Speciation 140, Evolution and classification 141, Tracing evolutionary relationships 143, Evolution by stages 145, Evolution of man 147	
<b>5. MANAGEMENT OF NATURAL RESOURCES</b>	<b>153</b>
What are natural resources? 153, Why should we manage our natural resources? 153, The Ganga action plan 154, Conservation of forests 155, Sustainable management of forests 156, Conservation of wildlife 157, Conservation of water 159, Water harvesting 160, Three R’s to save environment – Reduce, Reuse, Recycle 161, Coal and petroleum – The fossil fuels 161	
<b>6. OUR ENVIRONMENT</b>	<b>165</b>
How does waste material affect the environment? 166, Ecosystem 167, Food chain and food web 168, Trophic levels 170, Flow of energy in an ecosystem 171, How do our activities affect the ecosystem? 172, How do toxic chemicals enter our food chain? 173, Ozone layer depletion 173, Managing the garbage we produce 174	
<b>MULTIPLE-CHOICE QUESTIONS</b> (Based on Practical Skills in Science)	<b>180</b>
<b>SOME LINE DIAGRAMS FOR PRACTICE</b>	<b>184</b>
<b>GLOSSARY</b>	<b>187</b>

“The best and most efficient pharmacy is within your own system.”

— ROBERT C PEALE

## CHAPTER 1

# Life Processes (Nutrition, Respiration, Transportation and Excretion)

**H**ow do you differentiate a living thing from a non-living thing? Is it by shape, size, activities or anything else? **The most important criteria to decide whether something is living or not, is the movement.** Change in position of an organism or any of its body part on its own is called movement.

- ❖ All living things move by themselves without any external help. On the other hand, non-living things do not.
- ❖ Animals can move from one place to another while plants are fixed at one place.
- ❖ The plants can show movements in their body parts (like leaves, shoots, roots and flowers) only in response to stimuli.
- ❖ Another important thing is that living beings, both plants and animals are made up of very small living units called cells which are further made up of molecules. Even though **the movement of molecules is at a very small scale and not visible to naked eyes**, yet this molecular movement is essential for existence of life.
- ❖ There are certain other characteristics of living beings, such as they need food, air and water; show growth to some extent; respire and release energy from food; respond to changes around them, can excrete waste products, and reproduce and multiply. The body design and complexity of organisms increases from a single-celled organism to a complex multicellular organism. Similarly, the different body organ system of multicellular organisms specialize and become more complex to meet the requirements of all the cells.

### WHAT ARE LIFE PROCESSES?

If you look around, you will find that living beings differ in shape, structure and size. Yet they show some similarities in their life activities. To maintain their life they have to perform certain basic life processes.

**The activities by which living organisms take in food, derive energy, remove waste material from their body and respond to changes in the environment are called life processes.**

The first and foremost life process is nutrition which involves taking in food by the body and converting it into simpler molecules that can be absorbed by body. The food absorbed by the body has to be broken down to release energy, which is done by respiration. Through the process of transportation, a nutrient absorbed by the body or a hormone released by some organs is distributed to other parts of the body. Another process, excretion, helps in removing the waste materials produced in the body.

Since the organisms live in an environment, the process of control and coordination helps them to adapt to change in the environment in and around them. Finally, the process of reproduction helps in multiplication, so that they can produce more of their own kind. The living organisms need energy to perform all these life processes which they get from the food they consume.

In this chapter you will study about basic life processes as under:

1. nutrition,
2. respiration,
3. transportation of materials and fluids, and
4. excretion.

# (I) NUTRITION

## Learning Objectives

After completing this unit, you will be able to:

- ❖ define the term nutrition and describe various modes of nutrition in living beings;
- ❖ describe the importance of photosynthesis to the living world;
- ❖ state the generalized equation of photosynthesis and list the raw materials required for it;
- ❖ suggest suitable experiments to show the raw materials required and products formed as a result of photosynthesis;
- ❖ list various parts of the alimentary canal in humans;
- ❖ describe the process of ingestion, digestion, absorption and assimilation of food across various parts of alimentary canal in humans;
- ❖ explain the role of pancreas and liver in digestion.

All living organisms can be regarded as working machines which require a continuous supply of energy in order to keep working and stay alive. In order to perform various life processes, all living organisms need energy-providing and growth-promoting food.

The process of intake of food, its digestion, absorption, and distribution to different parts of the body for utilization is known as nutrition. In other words, nutrition is the process of acquiring energy and materials for growth. The source of energy and materials is the food we eat and utilize.

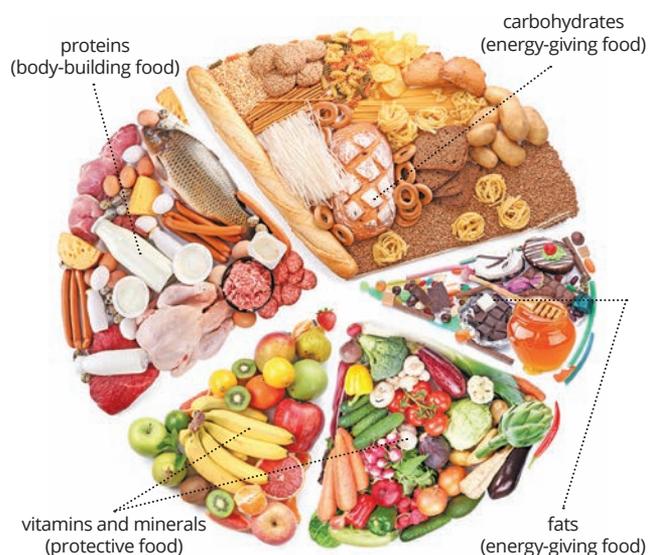


Fig. 1.1 Basic food groups

## Study Tip

Food is an organic substance. Simple sugar or glucose is the simplest food. Starch is a complex food which is made from glucose. Glucose and starch are carbohydrates. Carbohydrates are most common food for getting energy.

Food substances such as proteins, carbohydrates, fats, minerals, etc. which support the growth of organisms and provide raw materials for the biosynthesis of body constituents are called nutrients. Nutrients are broadly divided into three groups namely, 1. energy-yielding (carbohydrates and fats), 2. body-building (proteins), and 3. growth-regulating or protective (vitamins and minerals).

Organisms need food for:

- ❖ growth and to get energy for carrying out various life activities,
- ❖ repair of damaged cells and tissues,
- ❖ producing enzymes and hormones which are essential to carry out and maintain proper life activities, and develop resistance against diseases.

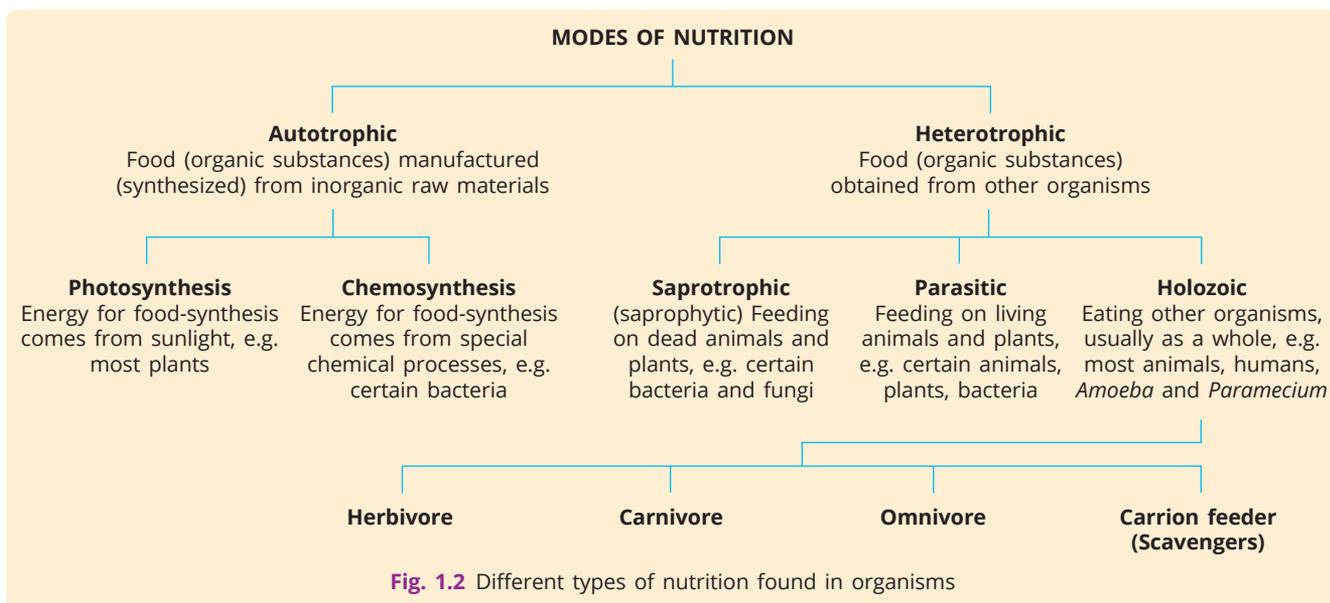
## MODES OF NUTRITION

Modes of nutrition means methods of procuring food or obtaining food by an organism. Organisms differ from each other in their modes of nutrition. On the basis of mode of obtaining food, organisms are classified into two types, namely autotrophs and heterotrophs. Thus, there are mainly two modes of nutrition:

1. autotrophic nutrition, and
2. heterotrophic nutrition.

### Autotrophic nutrition

The term autotrophic has been derived from two Greek words – *auto* meaning self and *trophe* meaning nutrition. Thus, autotrophic nutrition can be defined as a type of nutrition in which organisms synthesize organic material (i.e. food) from simple inorganic sources (i.e. carbon dioxide and water) with the help of sunlight. The autotrophic organisms or autotrophs are self-nourishing. Autotrophs are also



called **producers**. For example, **all green plants and some bacteria have autotrophic mode of nutrition**. On the basis of type of energy used, that is, light energy or chemical energy, autotrophic nutrition can be divided into photosynthetic or chemosynthetic. Green plants prepare their food using carbon dioxide and water as raw materials in the presence of light energy from sun, and chlorophyll present largely in the leaves, by the process of **photosynthesis**. Chlorophyll is also present in green parts of the plant exposed to light such as stem, branches and raw fruits. On the other hand, some non-green plants and few bacteria use chemical energy released during oxidation of inorganic compounds to prepare their food. This is called **chemosynthesis**.

### Heterotrophic nutrition

The word heterotrophic is derived from two Greek words – *hetero* meaning different and *trophe* meaning nutrition. Thus, **heterotrophic nutrition can be defined as a type of nutrition in which an organism cannot make or synthesize its own food from simple inorganic materials and energy**

#### Study Tip

Photosynthesis is the only process by which solar energy is converted into chemical energy. When we eat food grains, fruits, vegetables, the chemical energy in them is released in our body during respiration.

**is obtained from the intake and digestion of the organic substances derived from plants or animals.**

In this type of nutrition, the organic substances after their intake are broken down into simpler substances which are then utilized in various metabolic processes. **A heterotrophic organism cannot prepare its own food but depends upon other organisms for its**

**TABLE 1.1** Differences between Autotrophic and Heterotrophic nutrition

Characteristics	Autotrophic nutrition	Heterotrophic nutrition
occurrence	occurs in all green plants and some bacteria	occurs in all animals and fungi
raw material	food is manufactured from inorganic raw materials such as carbon dioxide and water in the presence of light and chlorophyll	food is obtained from other organisms (plants and animals)
source of energy	light	autotrophs or other animals
presence of chlorophyll	chlorophyll is necessary for photosynthesis	chlorophyll is not required
when does it take place	occurs generally during daytime	occurs at all times



a. Bacteria



b. *Agaricus* (mushroom)

**Fig. 1.3** Some examples of saprophytes

food. Thus, **heterotrophs are consumers as they are dependent directly or indirectly on producers.** All animals, most bacteria, fungi and some non-green flowering plants, are heterotrophs.

### Types of Heterotrophic nutrition

Heterotrophic nutrition can be of three types – **saprophytic nutrition, parasitic nutrition and holozoic nutrition.**

#### Saprophytic nutrition

The word saprophyte is derived from two Greek words – *sapro* meaning rotten and *phyto* meaning plants. Thus, **those organisms which get their food supply from dead or decaying organic matter are known as saprophytes and the mode of nutrition is known as saprophytic nutrition.** Saprophytic nutrition is also called saprotrophic nutrition.

You would have seen mushrooms growing on the soil or rotten hay and moulds growing on bread and pickles during rainy season. Some common examples of saprophytes are bacteria (Fig. 1.3a), fungi, yeast (a unicellular fungus), mushrooms (Fig. 1.3b) and moulds. Saprophytes produce digestive enzymes which break down insoluble decaying food matter into simpler soluble form outside their body which is then absorbed by them.

#### Parasitic nutrition

The word parasite is derived from two Greek words – *para* meaning other and *site* meaning grains. Thus, **parasite is an organism which lives outside or inside the body of another organism (called the host) and derives its nourishment from the host.** **The mode of nutrition by which parasites get their**



**Fig. 1.4** *Cuscuta* – a parasite on other plants

**food from the body of other living organisms (host) without killing them is known as parasitic nutrition.** Some common examples of parasites are microbes like certain disease-causing protozoans such as *Plasmodium*, *Trypanosoma*, *Leishmania* and some worms like roundworm, filarial worm and tapeworm. Fungi like *Puccinia* are parasites on wheat plants. Ticks, lice and leeches feed on the blood of other animals and derive nutrition. *Cuscuta* (*amarbel*) and *Viscum* are parasites on angiosperm plants.

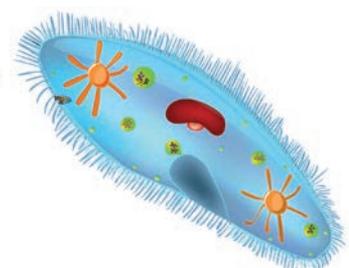
*Cuscuta* (Fig. 1.4) obtains its food by parasitic mode of nutrition. It lacks leaves and chlorophyll. Its roots are modified into **haustoria** which penetrate the stem tissues of the host plant and establish contact with host's vascular tissues to draw its nourishment.

#### Holozoic nutrition

The word holozoic is derived from two Greek words – *holos* meaning whole and *zoic* meaning animal. **The nutrition in which an organism takes in complex organic matter by the process of ingestion, which is subsequently digested and absorbed is called holozoic nutrition.** Organisms like *Amoeba*, *Paramecium*, frogs and human beings show this type of nutrition.



a. *Amoeba*



b. *Paramecium*

**Fig. 1.5** Some examples of holozoic organisms

On the basis of food habits, holozoic animals can be further classified into four types – **herbivores**, **carnivores**, **omnivores** and **carrion feeders** or **scavengers**.

### Herbivores

The word herbivore is derived from two words – *herba* meaning herbs and *vorate* meaning to eat. **Those animals, which feed only on plants and plant products are called herbivores.** For example, goat, cow, buffalo, elephant and sheep are all herbivores.

### Carnivores

The word carnivore is derived from two words – *carnis* meaning flesh and *vorate* meaning to eat. **Those animals, which eat the flesh of other animals are known as carnivores.** For example, lion, tiger and leopard are carnivores. They hunt and kill their prey and then feed on them.

### Omnivores

Two words, *omnis* meaning all and *vorate* meaning to eat, form the word omnivore. **Those animals, which feed on both plants as well as flesh of other animals are known as omnivores.** For example, man, bear, crow and cockroach are omnivores.

### Carrion feeders or Scavengers

The word carrion is derived from Latin word *caro* meaning flesh. Those animals, which feed on the body of dead animals are called **carrion feeders** or **scavengers**. For example, crow, vulture, hyena.

## HOW DO SIMPLE ORGANISMS LIKE AMOEBA OBTAIN THEIR NUTRITION?

Unicellular organisms like *Amoeba* feed on microscopic plants and animals present in water (such as algae and bacteria) and decaying food particles. Intracellular digestion (digestion within the cell) takes place in *Amoeba*. **The mode of nutrition in *Amoeba* is holozoic and the process of obtaining food by it is termed phagocytosis.**

The process of nutrition in *Amoeba* is as under:

- 1. Ingestion:** Food particles or prey, such as minute bacteria, are captured by **pseudopodia** (*pseudo* means false and *podia* means feet). The tips of

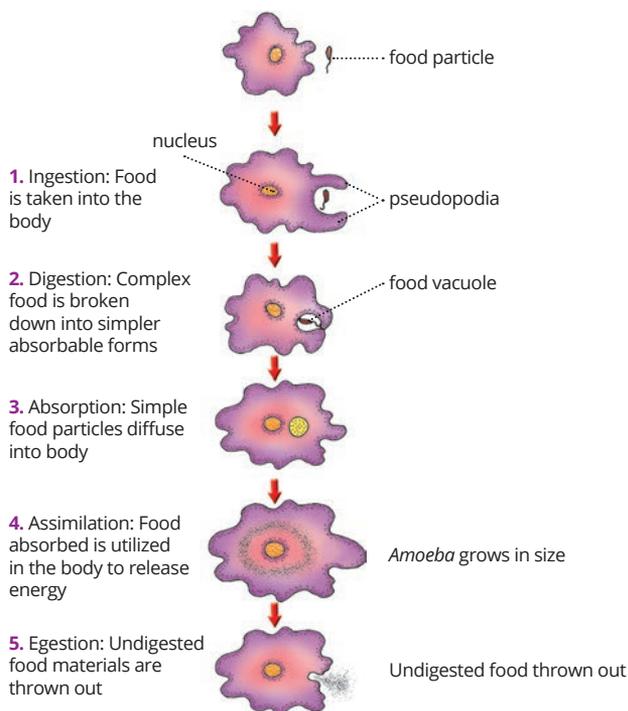


Fig. 1.6 Nutrition in *Amoeba*

pseudopodia encircling prey fuse with each other and a food vacuole is formed. **Food vacuoles are temporary structures.** Every time *Amoeba* feeds, a new food vacuole is formed. This process is called **ingestion**.

- 2. Digestion:** Enzymes from the cytoplasm are secreted into the food vacuole. This results in the breaking down of complex food into a simple form in the food vacuole. This process is called digestion. The digestion taking place in food vacuole in the cytoplasm is called **intracellular digestion**.
- 3. Absorption:** Digested food diffuses into the cytoplasm from food vacuole.
- 4. Assimilation:** The absorbed food is utilized as per requirement in the cytoplasm and *Amoeba* grows.
- 5. Egestion:** The undigested and unabsorbed food is thrown out when the food vacuole comes up on the cell surface and bursts open.

## NUTRITION IN PLANTS – PHOTOSYNTHESIS

The process by which inorganic substances in green plants are converted into organic substances is called photosynthesis (*photo* means light, *synthesis* means combination). Photosynthesis is an important activity that occurs in all green plants, whether flowering or non-flowering.

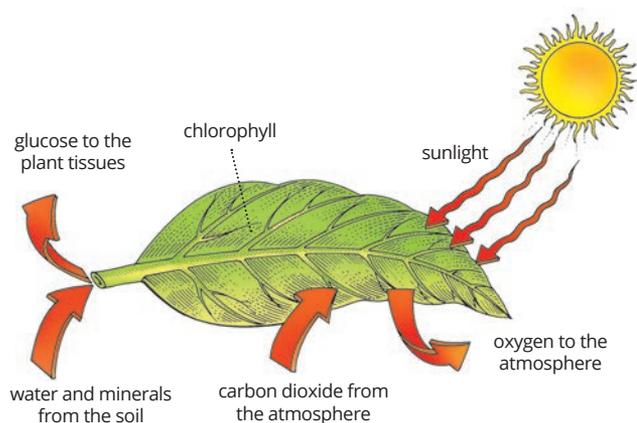
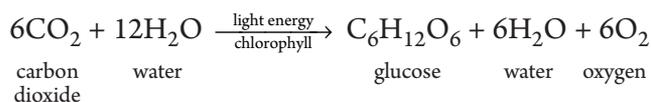


Fig. 1.7 Photosynthesis in green plants

Thus, photosynthesis may be defined as a **biochemical process by which plants manufacture their own food (glucose) using inorganic substances (carbon dioxide and water) as raw materials in the presence of sunlight and chlorophyll.** Oxygen is released as a by-product of photosynthesis.

The overall equation of photosynthesis is given here.



### Study Tip

- ❖ The food prepared during photosynthesis is glucose. The glucose is converted into starch and then stored in plant tissues as starch.
- ❖ Food prepared during photosynthesis provides all the energy to the plant.

### Did You Know?

Two main processes, photosynthesis and respiration, take place side by side but photosynthesis does not take place in the absence of light whereas respiration continues throughout the day as well as night.

## Raw materials for photosynthesis

**Carbon dioxide (CO<sub>2</sub>)** and **water (H<sub>2</sub>O)** are the raw materials for photosynthesis. **Light** serves as a source of energy. **The process of photosynthesis takes place in chloroplasts (containing chlorophyll).**

## Carbon dioxide and water

The main source of CO<sub>2</sub> for land plants is the atmosphere, which contains 0.03–0.04 per cent of this gas. Aquatic plants use CO<sub>2</sub> dissolved in water.

We have learnt that glucose is a product of photosynthesis which is stored in plant tissues as starch. The starch formation in a leaf is the basis of photosynthesis experiments. So, to confirm whether or not photosynthesis has taken place let us perform starch test.

### Activity 1

#### To test a leaf for the presence of starch

##### Procedure

- ❖ Detach a fresh green leaf and dip it in boiling water for 1 minute. This will kill the protoplasm and enzymes in it, so that no further chemical change takes place. Boiling will also make the cell more permeable to water.
- ❖ Now boil the leaf in a test tube containing methylated spirit in a water bath till it becomes colourless due to removal of chlorophyll.
- ❖ The leaf now becomes brittle and hard. Place it again in boiling water to make it soft.
- ❖ Spread the leaf flat on a white surface such as a glazed tile or a Petri dish and pour few drops of iodine solution (Iodine = 0.3 g; potassium iodide = 1.5 g and water = 100 mL) on the leaf surface. What do you observe?

##### Observation

- ❖ You will observe that some parts of the leaf become blue-black, while some show brown colour.

##### Conclusion

- ❖ The part of leaf that turns the colour of the iodine solution to blue-black contains starch.

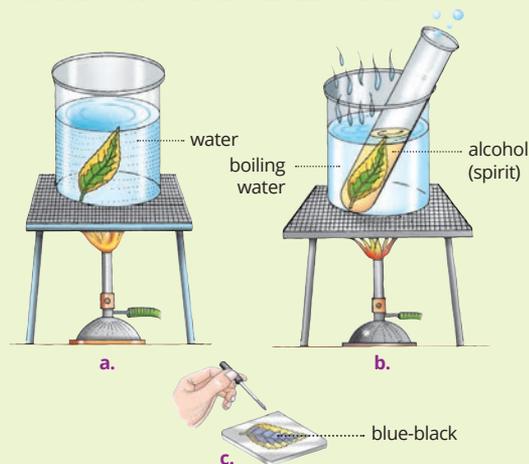
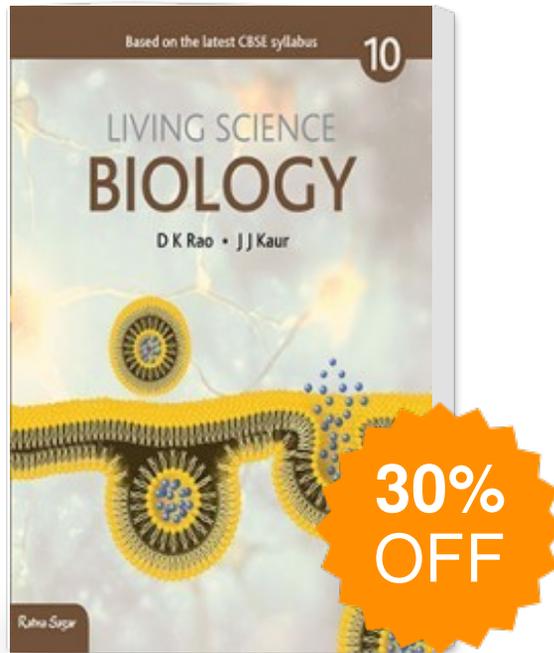


Fig. 1.8 Experimental set-up to test a leaf for the presence of starch

# CBSE Living Science Biology Class X



Publisher : Ratna Sagar

ISBN : 9789385976896

Author : D K Rao And J J Kaur

Type the URL : <http://www.kopykitab.com/product/10528>



Get this eBook