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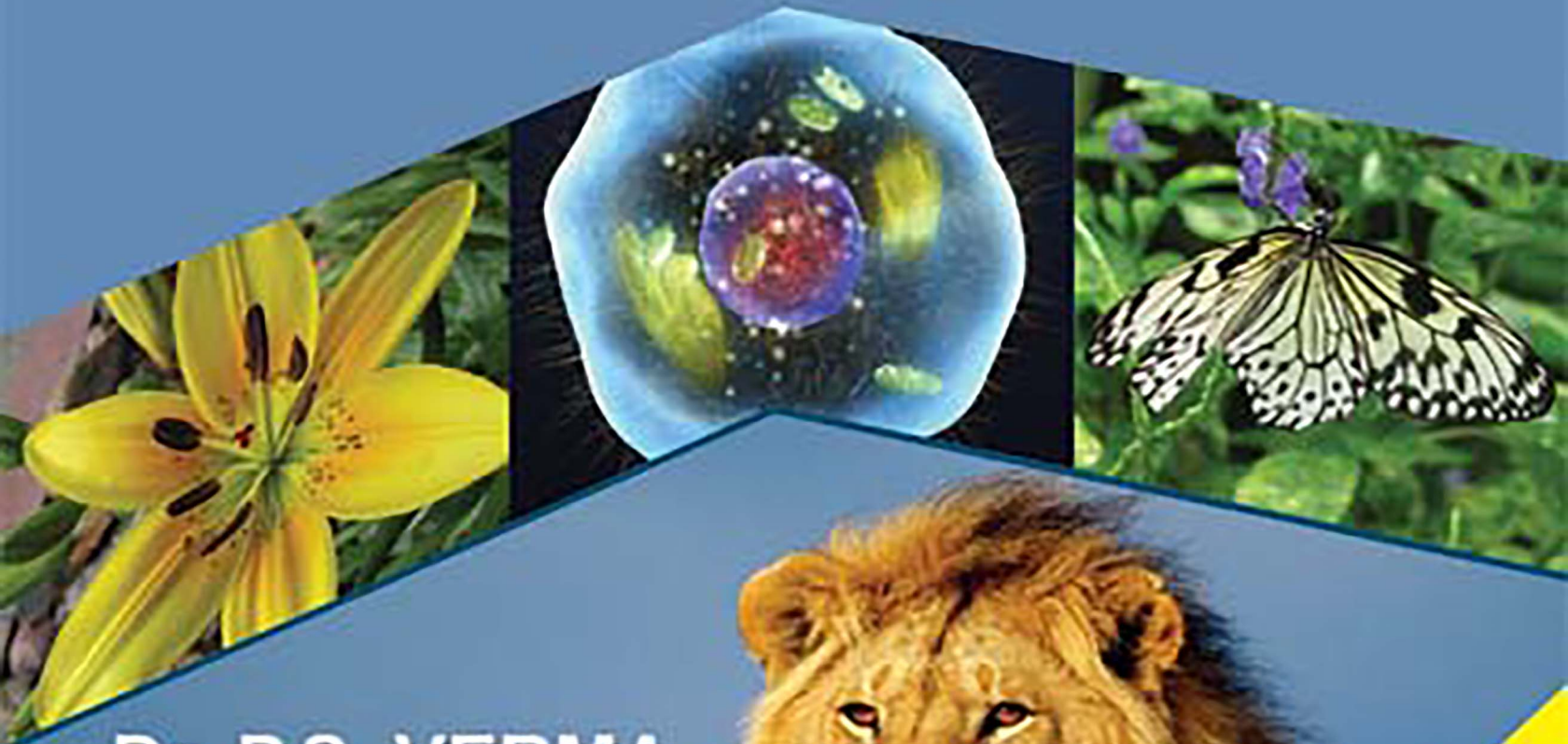
FOR CLASS XI



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BIOLOGY

FOR CLASS XI

(As per New Common Core Syllabus)

As per New Common Core Syllabus (NCERT) Adopted by CBSE
& Some Other State Boards of India

MULTICOLOUR EDITION

S. Chand's
BIOLOGY

FOR CLASS XI

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Preface to the Revised Edition

This textbook **S. Chand's Biology for Class XI** students has been thoroughly revised according to the latest syllabus of Biology [As per New Common Core Syllabus (NCERT) Adopted by CBSE & Some Other State Boards of India]. It not only gives an insight about the subject to the students but also meets the requirements of competition oriented students.

Although the text is organised into five units (as before), yet all the new syllabi topics have been incorporated. A remarkable addition in that of a chapter on Biodiversity (in unit one) that takes the tally of total chapters from 25 to 26, requisite content has been added in the form of the following matter :

(i) Biodiversity
(ii) Three domain of life
(iii) Angiosperms-classification upto class, characteristic features and examples
(iv) Photosynthesis as a means of autotrophic nutrition
(v) Seed germination and dormancy
(vi) Sense organs
(vii) Diabetes Insipidus
(viii) Exophthamic goitre
(ix) Addison's disease
(x) Acromegaly
(xi) Flagellar Movement
(xii) Blood vessels
(xiii) Artificial kidney
(xiv) PEM
(xv) Calorific value of Protein, Carbohydrate and Fat (only as box item)

The authors thank the management team of S. Chand & Co. Ltd. for their interest in publishing this revised edition in record time. The subsequent editions shall witness the incorporation of suggestions for further improvement of this textbook.

Dr. P.S. Verma
Dr. B.P. Pandey

Preface to the Previous Edition

There are more than two million different kinds of living things on this Earth. Each kind of living thing is called an **organism**, which is suited to live in its own special place. However, the Earth contains countless places to live, and therefore, a great diversity of life is observed all over. The living organisms possess distinct characteristics, which entail a mechanism of origin and evolution of diversities and maintain a balancing relations with nature. All these aspects of life come under the science of **Biology**. In modern days, the development of research techniques, sophisticated equipment and information technology have enriched the biological sciences with numerous inventions and new discoveries. For example, biologists have completed the deciphering of the human genome, which may determine capabilities and predispositions in modern medical sciences to certain forms of behaviour and ailments.

The text is organised into five units containing twenty five chapters. **Unit-1** contains chapters which deal with meaning of being alive and biological classification. **Unit-2** contains chapters on Animal Tissues and Morphology of Flowering Plants and animals. **Unit-3** contains four chapters which deal with the detailed study of cell and cell division. **Unit-4** contains four chapters which deal with Transport and Nutrition, Growth and Development and also Photosynthesis and Respiration in Plants. **Unit-5** comprises chapters which deals with human physiology such as Digestion, Respiration and Breathing, Circulation, Excretory Products and their elimination, Nervous coordination & Integration, Chemical Coordination, Locomotion & Movement.

This Textbook of Biology has been rewritten strictly according to the latest syllabus of **Biology as per the new CBSE Course structure and new NCERT guidelines for class XI (2006-07).**

The highlights of the present edition are : (*i*) Summary of every chapter (Important points), (*ii*) Terms to remember (Glossary of important words used in every chapter), (*iii*) Addition of seven types of revision questions such as very short answer, long answer, true and false, fill in the blanks, multiple choice questions (MCQs) or objective type questions given after every chapter and mixed objective type questions given after every unit. (Quite useful for the Competitive Examinations).

The text of the present edition is entirely reorganised as per the requirements of the present day competition oriented students. It has been made examination oriented and for giving the full insight into the subject.

P.S. Verma expresses his sincere thanks to Dr. Prashant Solanki and Dr. Ms. Shalini Solanki, for the immense pains they have taken in compiling intricate details wherever required in writing and preparation of this book and to Shri R.V. Singh Sishodia, M.Sc., B.Ed., Principal, Kendriya Vidyalaya, Ambala Cantt., for the help in the selection of various types of questions.

The authors wish to express their sincere thanks to Shri **Ravindra Kumar Gupta, Managing Director**, and Shri Himanshu Gupta, Director, S. Chand & Company Ltd. New Delhi for their keen interest in the publication of the book in multicolour. Thanks are also due to Shri Navin Joshi, General Manager (S & M), S. Chand & Company Ltd., for encouragement and help at various levels. Thanks are also due to Shri R.S. Saxena, Advisor, S. Chand & Company Ltd., for the good printing and bringing out the book in a very short period and in an excellent get up.

Suggestions for further improvement of the book would be welcomed and incorporated in the subsequent editions.

Dr. P.S. VERMA
Dr. B.P. PANDEY

SYLLABUS

CLASS–XI (THEORY)

(TOTAL PERIOD = 180)

1. DIVERSITY IN LIVING WORLD *(Period 25)*

- What is living?; Biodiversity; Need for classification; **Three domain of life;** Taxonomy and Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy–Museums, Zoos, Herbaria, Botanical gardens.
- Five kingdom classification; Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.
- Salient features and classification of plants into major groups–Algae, Bryophytes, Pteridophytes, Gymnosperm and Angiosperm (three to five salient and distinguishing features and at least two examples of each category); **Angiosperms–classification up to class, characteristic features and examples.**
- Salient features and classification of animals–non chordate up to phyla level and chordate up to classes level (three to five salient features and at least two examples).

2. STRUCTURAL ORGANISATION IN ANIMALS AND PLANTS *(Period 25)*

- Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence–cymose and recemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus).
- Animal tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only).

3. CELL : STRUCTURE AND FUNCTION *(Period 40)*

- Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles–structure and function; Endomembrane system–endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; Cytokeleton, cilia, flagella, centrioles (ultra structure and function); Nucleus–nuclear membrane, chromatin, nucleolus.
- Chemical constituents of living cells; Biomolecules–structure and function of proteins, carbohydrates, lipid, nucleic acids; Enzymes–types, properties, enzyme action.
- Cell division : Cell cycle, mitosis, meiosis and their significance.

4. PLANT PHYSIOLOGY *(Period 40)*

- Transport in plants : Movement of water, gases and nutrients; Cell to cell transport–Diffusion, facilitated diffusion, active transport; Plant–water relations–Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water–Absorption, apoplast, symplast, transpiration pull, root pressure and guttation; Transpiration–Opening and closing of stomata; Uptake and translocation of mineral nutrients–

Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (brief mention).

- Mineral nutrition: Essential minerals, macro and micronutrients and their role; Deficiency symptoms; Mineral toxicity; Elementary idea of Hydroponics as a method to study mineral nutrition; Nitrogen metabolism–Nitrogen cycle, biological nitrogen fixation.
- Photosynthesis: **Photosynthesis as a means of Autotrophic nutrition;** Where does photosynthesis take place; How many pigments are involved in Photosynthesis (Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and non cyclic photophosphorylation; Chemiosmotic hypothesis; Photorespiration; C_3 and C_4 pathways; Factors affecting photosynthesis.
- Respiration: Exchange of gases; Cellular respiration–glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relations–Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.
- Plant growth and development: Seed germination; Phases of plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation; Sequence of development process in a plant cell; Growth regulators–auxin, gibberellin, cytokinin, ethylene, ABA; **Seed dormancy;** Vernalisation; Photoperiodism.

5. HUMAN PHYSIOLOGY *(Period 45)*

- Digestion and absorption: Alimentary canal and digestive gland; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; **Calorific value of proteins, carbohydrates and fats (for box item not to be evaluated);** Egestion; Nutritional and digestive disorders–**PEM,** indigestion, constipation, vomiting, jaundice, diarrhea.
- Breathing and Respiration: Respiratory organs in animals (recall only); Respiratory system in humans; Mechanism of breathing and its regulation in humans–Exchange of gases, transport of gases and regulation of respiration, Respiratory volumes; Disorders related to respiration–Asthma, Emphysema, Occupational respiratory disorders.
- Body fluids and circulation: Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system–Structure of human heart and **blood vessels;** Cardiac cycle, cardiac output, ECG; Double circulation; Regulation of cardiac activity; Disorders of circulatory system–Hypertension, Coronary artery disease, Angina pectoris, Heart failure.
- Excretory products and their elimination: Modes of excretion–Ammonotelism, ureotelism, uricotelism; Human excretory system–structure and function; Urine formation, Osmoregulation; Regulation of kidney function–Renin-angiotensin, Atrial Natriuretic Factor, **ADH and Diabetes insipidus**; Role of other organs in excretion; Disorders–Uraemia, Renal failure, Renal calculi, Nephritis; Dailysis and **artificial kidney.**
- Locomotion and Movement: Type of **movement**–ciliary, **flagellar,** muscular; Skeletal muscle–contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical syllabus); Joints; Disorders of muscular and skeletal system–Myasthenia gravis, Tetany, Muscular dystrophy, Angina pectoris, Heart failure.
- Neural control and coordination: Neuron and nerves; Nerveous system in humans–central nervous system, peripheral nervous system and **visceral nervous system;**

Generation and conduction of nerve impulse; Reflex action; Sensory perception; **Sense organs;** Elementary structure and function of eye and ear.

- Chemical coordination and regulation: Endocrine glands and hormones; Human endocrine system–Hypothalamus, Pitutary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulators, Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, **Acromegaly,** Cretinism, goiter, **exopthalmic goiter,** diabetes, **Addison's disease).**
- Imp: Diseases related to all the human physiology systems to be taught in brief.

PRACTICALS

A. List of experiments

1. Study and describe three locally available common flowering plants from each of the following families (Solanaceae, Fabaceae and Liliaceae) including dissection and display of floral whorls and anther and ovary to show number of chambers. Types of root (Tap and Adventitious); Stem (Herbaceous and woody); Leaf (arrangement, shape, venation, simple and compound).
2. Preparation and study of T.S. of dicot and monocot roots and stems (primary).
3. Study of osmosis by potato osmometer.
4. Study of plasmolysis in epidermal peels (e.g. Rhoeo leves)
5. Study of distribution of stomata in the upper and lower surface of leaves.
6. Comparative study of the rates of transpiration in the upper and lower surface of leaves.
7. Test for the presence of sugar, starch, proteins and fats. To detect them in suitable plant and animal materials.
8. Separation of plant pigments through paper chromatography.
9. To study the rate of respiration in flower buds/leaf tissue and germinating seeds.
10. To test the presence of urea in unine.
11. To detect the presence of sugar in urine/blood sample.
12. To detect the presence of albumin in urine.
13. To detect the presence of bile salts in urine.

B. Study/observation of the following (spotting)

1. Study parts of compound microscope.
2. Study of the specimens and identification with reasons–Bacteria, Oscillatoria, Spirogyra, Rhizopus, mushroom, yeast, liverwort, moss, fern, pine, one monocotyledonous plant and one dicotyledonous plant and one lichen.
3. Study of specimens and identification with reasons–Amoeba, Hydra, Liverfluke, Ascaris, leech, earthworm, prawn, silkworm, honeybee, snail, starfish, shark, rohu, frog, lizard, pigeon and rabbit.
4. Study of tissues and diversity in shapes and sizes of plant and animal cells (e.g. palisade cells guard cells parenchyma, collenchyma, sclerenchyma, xylem, phloem,

squamous epithelium, muscle fibres and mammalian blood smear) through temporary/permanent slides.

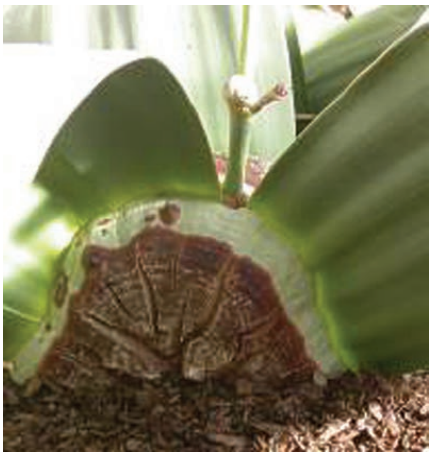
5. Study of mitosis in onion root tips cells and animals cells (grasshopper) from permanent slides.
6. Study of different modifications in root, stem and leaves.
7. Study and identification of different types of inflorescence.
8. Study of imbibition in seeds/raisins.
9. Observation and comments on the experimental ste for showing:
   (a) Anaerobic respiration
   (b) Phototropism
   (c) Apical bud removal
   (d) Suction due to transpiration
10. Study of human skeleton and different types of joints.
11. Study of external morphology of cockroach through models.

CONTENTS

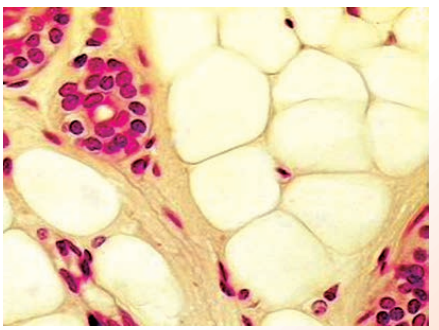
UNIT ONE

DIVERSITY IN LIVING WORLD

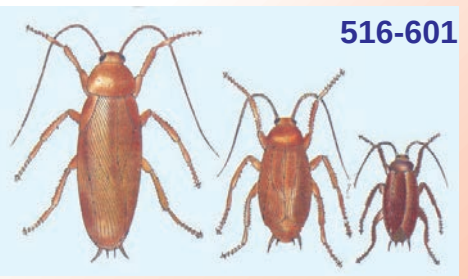
8. ANATOMY OF FLOWERING PLANTS : ANGIOSPERMS



9. ANIMAL TISSUES



10. MORPHOLOGY OF ANIMALS



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