

Written as per the revised syllabus prescribed by the Maharashtra State Board
of Secondary and Higher Secondary Education, Pune.

STD. XI Sci.

Precise Biology

Salient Features

- Concise coverage of syllabus in Question Answer Format.
- Covers answers to all Textual Questions.
- Quick Review for instant revision and summary of the chapter.
- Exercise, Multiple Choice Questions and Topic test at the end of each chapter for effective preparation.

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Preface

In the case of good books, the point is not how many of them you can get through, but rather how many can get through to you.

“Std. XI Sci. : **PRECISE BIOLOGY**” is a compact yet complete guide designed to boost students’ confidence and prepare them to face the conspicuous Std. XI final exam.

This book is specifically aimed at Maharashtra Board students. The content of the book is framed in accordance with Maharashtra State board syllabus and collates each and every important concept in question and answer format.

This book has been developed on certain key features as detailed below:

- **Question and Answer** format of the book provides students with appropriate answers for all textual questions.
- **Quick Review** section facilitates instant revision.
- **Exercise** helps the students to gain insight on the various levels of theory questions.
- **Multiple Choice Questions** and **Topic Test** assess the students on their range of preparation and the amount of knowledge of each topic.

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we’ve nearly missed something or want to applaud us for our triumphs, we’d love to hear from you.

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A book affects eternity; one can never tell where its influence stops.

Best of luck to all the aspirants!

Yours faithfully,
Publisher

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Note: All the Textual questions are represented by * mark.

All NCERT questions are represented by # mark.

01 Diversity in Organisms

Syllabus

1.0	Introduction	1.3	Five kingdom system of classification
1.1	Diversity in living organisms	1.4	Lichens
1.2	Systematics: Taxonomy, Taxonomic hierarchy and Binomial nomenclature	1.5	Viruses and Viroids

1.0 Introduction

Q.1. Explain the characteristics of living organisms.

Ans: Characteristics of living organisms are as follows:

i. Growth:

All living organisms exhibit growth.

In living organisms growth is from inside, whereas in non-living organisms growth occurs due to accumulation of material on the surface.

ii. Reproduction:

Organisms reproduce asexually or sexually and produce their own kind.

iii. Metabolism:

Various biochemical reactions occur inside all living organisms.

The sum total of all the reactions occurring in the body of an organism is called metabolism.

iv. Cellular organization:

Cell is the basic unit of life.

All living organisms show cellular organization.

v. Ability to sense and respond:

All living organisms have ability to respond to the stimulus.

Consciousness, is thus, one of the characteristics of living organisms.

1.1 Diversity in living organisms

#Q.2. Why are living organisms classified?

Ans: Living organisms are classified due to following reasons:

i. Study of fossils

ii. Study of organisms of different areas

iii. For easy identification

iv. Grouping based on the similarities and differences

v. Evolution of various taxon, etc.

1.2 Systematics: Taxonomy, Taxonomic hierarchy and Binomial nomenclature

Q.3. Define the terms:

i. Systematics

***ii. Taxonomy**

Ans: i. Systematics:

It is the scientific study of similarities and differences among different kinds of organisms and it also includes their identification, nomenclature and classification.

ii. Taxonomy:

It is a branch of biology which deals with the nomenclature, collection, identification, description and classification of plants and animals.

**Q.4. Define the term classification. Why is it necessary?**

Ans: Classification: It is the arrangement of organisms or groups of organisms in distinct categories in accordance with a particular and well established plan.

Need for classification:

- i. There are large number of organisms on the earth, with various shape, size, structure, habit, habitat, nutrition, etc. It becomes very difficult to study characteristics of all these organisms without arranging them in a proper group. Classification helps to explain unity in diversity.
- ii. Scientific names are given to all organisms in classification. These names are universal.
- iii. Classification reveals the relationship among various groups of organisms.
- iv. Classification places an organism along with those which have common characteristics.

Q.5. Which are the three domains of life?

Ans: Three domains of life are Archaea, Bacteria, Eukarya.

Q.6. Who developed the three domain system?

Ans: Carl Woese developed the three domain system.

Q.7. Define taxonomic hierarchy.

Ans: Taxonomic hierarchy:

The manner of scientific grouping of different taxonomic categories in a descending order on the basis of their ranks or positions in classification is called taxonomic hierarchy.

***Q.8. Define the terms:**

- i. **Taxon**
- ii. **Category**

Ans: i. Taxon: Taxon is a group of living organisms which is used to represent a concrete unit of classification.

ii. Category: Category is a rank or level in the hierarchical classification of organisms.

Q.9. Who coined the term taxon?

Ans: H.J. Lam (1948) coined the term taxon.

Q.10. Write a short note on concept of species.

Ans: Concept of species:

- i. Morphological concept of species was given by Carolus Linnaeus. According to him, species is the group of organisms which resemble each other in most of the morphological characters.
- ii. Biological concept of species was given by Darwin. According to him, species is a group of organisms that can interbreed under natural conditions.
- iii. Modern concept of biological species was given by Ernst Mayr. According to him, species is a group of actually or potentially interbreeding natural population of closely resembling organisms.

***Q.11. Describe the hierarchy of taxonomic categories.**

OR

Define the following terms:

- | | | | |
|--------------------------|--------------------|--------------------------------|-------------------|
| i. Species | #ii. Genus | #iii. Family | #iv. Order |
| v. Sub-class | #vi. Class | #vii. Division / Phylum | |
| viii. Sub kingdom | ix. Kingdom | | |

- Ans: i. Species:** It is the basic unit in the system of classification. Members of a species show all the similar characters and are able to breed among themselves. For example, all the plants of potato (*Solanum tuberosum*) are grouped under the species *tuberosum*.
- ii. Genus:** It is a group of closely related species, which resemble one another in certain characters. For e.g. *rosa sinensis*, *esculentus*, etc. are different species under the genus *Hibiscus*. A genus may be either monotypic (having single species) or polytypic (having many species).
- iii. Family:** A family represents a group of closely related genera. The genera like *Hibiscus*, *Malva*, *Sida*, *Gossypium*, *Abutilon*, etc. belong to the family Malvaceae.
- iv. Order:** It is a group of closely related families which resemble in major characters. For e.g. Families Malvaceae, Tiliaceae, Sterculiaceae, etc. belong to the order Malvales. They show axile placentation in ovary.
- v. Sub-class:** It is a group of closely related orders having certain similarities. For e.g. Order Malvales, Ranales, Parietales, etc. have free petals and hence grouped under the sub-class Polypetalae.



- vi. **Class:** It is a group of related sub-classes.
For e.g. Class Dicotyledonae includes sub-classes as Polypetalae and Gamopetalae.
- vii. **Division/ Phylum:** The division is a category composed of related classes.
For e.g. Division Angiospermae includes two classes: Dicotyledonae and Monocotyledonae.
In animal classification, instead of division, the category Phylum is used.
- viii. **Sub-kingdom:** It is composed of different divisions having certain similarities.
For e.g. The divisions Angiospermae and Gymnospermae forms the sub-kingdom Phanerogams or Spermatophyta (all seed producing plants).
- ix. **Kingdom:** It is the highest taxonomic category composed of different sub kingdoms.
For e.g. Sub-kingdom Phanerogams and Cryptogams, form the plant kingdom or Plantae which includes all the plants, while all animals are included in kingdom Animalia.

***Q.12. Define nomenclature.**

Ans: Nomenclature: The art of giving name to the organism is called nomenclature.

Q.13. Write the classification of: i. China Rose ii. Man iii. Cobra

Ans:

	China Rose	Man	Cobra
Kingdom	Plantae	Animalia	Animalia
Sub-kingdom	–	Eumetazoa	–
Division / Phylum	Angiospermae	Chordata	Chordata
Sub phylum	–	Vertebrata	–
Class	Dicotyledonae	Mammalia	Reptilia
Sub class	Polypetalae	Eutheria	Diapsida
Series	Thalamiflorae	–	–
Order	Malvales	Primates	Squamata
Family	Malvaceae	Hominidae	Elapidae
Genus	<i>Hibiscus</i>	<i>Homo</i>	<i>Naja</i>
Species	<i>rosa sinensis</i>	<i>sapiens</i>	<i>naja</i>

***Q.14. What is meant by vernacular name?**

Ans: Vernacular names are the names which are given to organisms in a particular region and language by local people.

***Q.15. Why it is said that vernacular names create confusion?**

- Ans:**
- Vernacular names are not universal.
 - Same organisms are known by different names in different states.
 - For example, *Ipomoea batatas* is recognised by various names like Sweet potato (in English); Shakarkand (in Hindi); Meetha Alu (in Assamese and Bengali); Kandmul (in Telugu); Ratalu (in Marathi) and Jenasu (in Kannada), etc.
 - Also, single vernacular names are used for several species.
 - The name 'lily' is used to describe many bulbous flowering plants like - waterlily, spider lily, etc. Thus, vernacular names create confusion.

***Q.16. What is binomial nomenclature? Explain it with a suitable example. Give its advantages.**

Ans: A system of nomenclature of plants and animals in which the scientific name consists of two words or parts or epithets is called binomial nomenclature.

This system of nomenclature was developed by Carolus Linnaeus.

Linnaeus gave certain principles for this nomenclature in his book "Species Plantarum".

He is regarded as the 'Father of Taxonomy'.

Rules of binomial nomenclature:

- The name of the plant or animal is composed of two Latin or Greek words.
- Generic name is a simple noun which should come first and always begin with a capital letter.
- Specific name is the descriptive adjective which should come later and begin with a small letter.
- The names should be based on some special characters of the organism.
- Usually the name of the author, who has named and described a plant or animal, is also written in full or abbreviated form after the scientific name. e.g *Mangifera indica* L, where L stands for Linnaeus.



- vi. The generic and specific name must be underlined separately if hand written or in italics when printed.
- vii. The generic as well as specific name should not have less than three letters and more than thirteen letters.
- viii. In order to avoid confusion, repetition of same generic name in different kingdoms is not allowed. However, the species name can be repeated. e.g. *Mangifera indica* (Mango), *Azadirachta indica* (Neem).

Advantages of binomial nomenclature:

- i. The binomials are simple, meaningful and precise.
- ii. They are standard since they do not change from place to place.
- iii. These names avoid confusion and uncertainty created by local or vernacular names.
- iv. The organisms are known by the same name throughout the world.
- v. The binomials are easy to understand and remember due to the rhyming.
- vi. It indicates phylogeny (evolutionary history) of organisms.
- vii. It helps to understand inter-relationship between organisms.

***Q.17. Who proposed binomial system of nomenclature?**

Ans: Swedish naturalist Carolus Linnaeus proposed binomial system of nomenclature.

Q.18. What is citation? Give one example.

Ans: Mention of author's name after the species name is called citation.

For e.g. *Mangifera indica* L. The letter 'L' in *Mangifera indica* indicates the name of author, i.e. Linnaeus.

1.3 Five kingdom system of classification

Q.19. Who introduced the two kingdom system of classification?

Ans: The two kingdom system of classification of organisms was introduced by Carl Linnaeus.

Q.20. Which two kingdoms of organisms did the two kingdom system of classification recognize?

Ans: According to two kingdom system of classification, there were two kingdoms of organisms – Plantae and Animalia.

Q.21. Who suggested the third kingdom Protista?

Ans: Haeckel suggested the third kingdom Protista.

Q.22. Who suggested five kingdom system of classification?

Ans: R.H. Whittaker suggested five kingdom system of classification.

Q.23. What are the criteria used by Whittaker for the five kingdom classification? Also, mention the five kingdoms.

Ans: Five kingdom system of classification shows the phylogenetic relationship among the organisms.

The criteria used by Whittaker for his system were:

- i. **Cell organization:** The organism is either prokaryotic or eukaryotic.
- ii. **Body organization:** The organism is either unicellular or multicellular.
- iii. **Mode of nutrition:** The organism is either autotrophic or heterotrophic.
- iv. **Life style:** The organism may be a producer, consumer or decomposer.

The five kingdoms are:

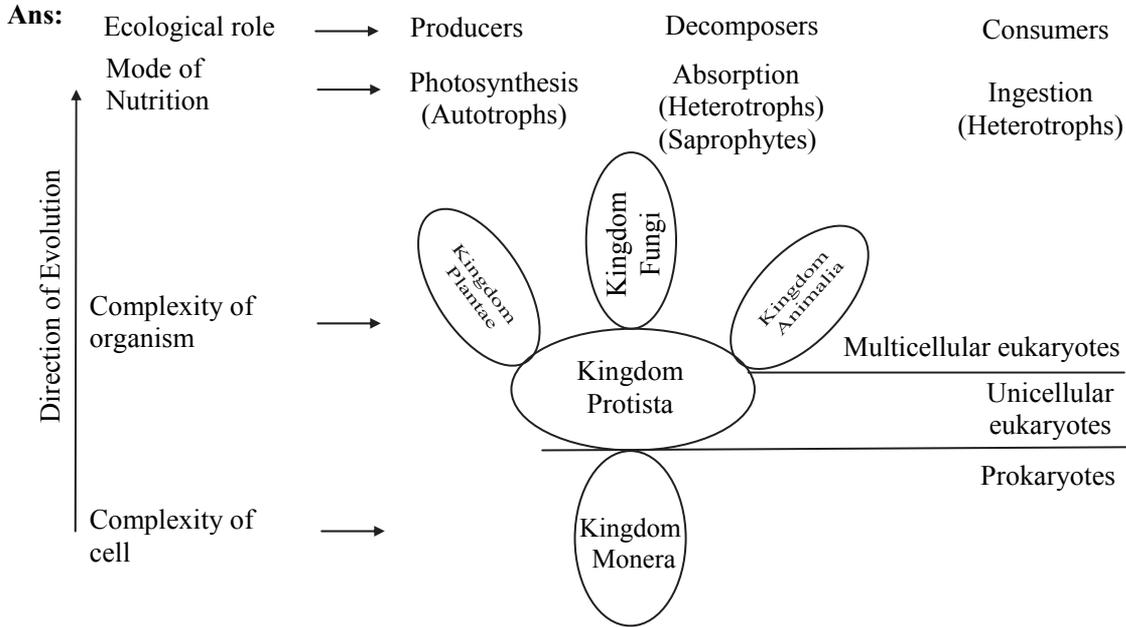
- | | |
|---------------------|---------------------|
| a. Kingdom Monera | b. Kingdom Protista |
| c. Kingdom Fungi | d. Kingdom Plantae |
| e. Kingdom Animalia | |

Q.24. Which organisms are called prokaryotic?

Ans: Organisms having a primitive type of nucleus (nucleoid) are called prokaryotic.



*Q.25. Give the diagrammatic representation of five kingdom system of classification.

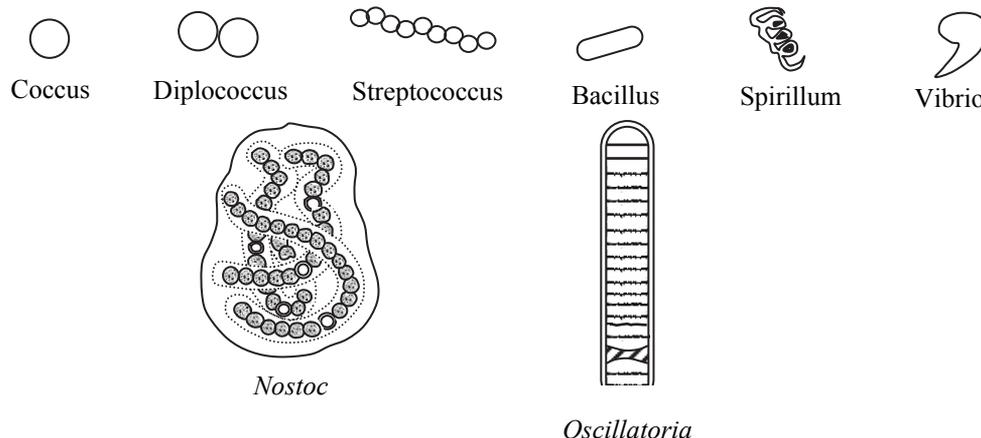


Diagrammatic representation of the five kingdom system of classification

*Q.26. Give the general characters of Kingdom Monera with examples.

Ans: General characteristics of Kingdom Monera:

- Size:** The organisms included in this kingdom are microscopic, unicellular and prokaryotic.
 - Nucleus:** The organisms possess a primitive (prokaryotic) type of nucleus, i.e. nucleus is without nuclear envelope, nucleolus, nucleoplasm, histone proteins and true chromosomes. Such nucleus is also called as nucleoid.
 - Cell wall:** The cell wall is composed of peptidoglycan.
 - Membrane bound cell organelles:** The cells do not possess membrane-bound cell organelles like chloroplasts, mitochondria, etc.
 - Locomotion:** The organisms are either motile or non-motile. The locomotion is due to gliding movements or due to flagella.
 - Nutrition:** The organisms may be autotrophic, heterotrophic, parasitic or saprophytic in nutrition. The autotrophs are either photoautotrophs or chemoautotrophs.
 - Reproduction:** The mode of reproduction in Monera is asexual, either by fission or budding.
- Examples:** Archaeobacteria. e.g. *Methanobacillus*, *Thiobacillus*, etc.
 Eubacteria. e.g. *Rhizobium*, *Clostridium*, etc.
 Cyanobacteria. e.g. *Nostoc*, *Anabaena*, etc.
 Actinomycetes. e.g. *Streptomyces*, *Mycobacterium*, etc.



Kingdom Monera (Eubacteria, Cyanobacteria)