New Revised Syllabus (CBCS Pattern) of
NORTH MAHARASHTRA UNIVERSITY
F.Y.B.Sc. : Semester-I

NMU

ZOO-101

ANIMAL DIVERSITY-I

Dr. KISHORE R. PAWAR Dr. ASHOK A. DESAI

NIRALI PRAKASHAN
ADVANCEMENT OF KNOWLEDGE

A TEXT BOOK OF

ANIMAL DIVERSITY - I

FOR

F.Y.B.Sc. Zoology, CBCS Pattern, Semester - I
Core Course A-I, ZOO-101

As Per New Revised Syllabus
of North Maharashtra University, Jalgaon

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Dr. KISHORE R. PAWAR
M.Sc., Ph.D.
Former Principal,
Karmveer Shantarambapu Kondaji Wavare,
Arts, Sci. & Com. College, CIDCO,
Nashik – 422008.

Dr. ASHOK E. DESAI
M.Sc., Ph.D.
Former Reader in Zoology
P.G. Deptt. of Zoology,
K.T.H.M. College,
Nashik – 422002.

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PREFACE

The authors are indeed very happy to present this book **'Animal Diversity - I'** for the students of B.Sc. Part I Zoology, Semester I of North Maharashtra University.

The book has been written according to the new revised CBCS syllabus.

There was a long felt need of the students as well as teachers community for a text book which covers the entire syllabus prescribed by Board of studies. The present book is an outcome of our sincere efforts. We tried our level best to present the subject matter in easy style and in a comprehensive manner. The text book is profusely illustrated with number of clear line drawings.

No doubt, there are several textbooks written by Indian and foreign authors on the subject, but they are costly and number of copies are very limited in the college libraries. The students can not get the matter on prescribed syllabus in one book and they also cannot afford the costly books. Therefore, we have presented all the topics in one book in a low price. We sincerely feel that this book will fulfill the requirements of students and teachers.

We are thankful to Shri. Dineshbhai Furia, Shri. Jignesh Furia, Mr. Malik Shaikh, Mrs. Roshan Khan, Mrs. Anjali Muley and the entire staff of Nirali Prakashan for taking keen interest in publishing this book and bringing out in time.

Constructive suggestions for improvement of the book are most welcome.

– **Authors**

SYLLABUS

ZOO 101 : ANIMAL DIVERSITY I

Unit 1. Kingdom Protista (4 Hours)

General characters and classification upto classes; Locomotory Organelles and Locomotion in Protozoa.

Unit 2. Phylum Porifera (3 Hours)

General characters and classification upto classes; Canal system in *Sycon*.

Unit 3. Phylym Cnidaria (3 Hours)

General characters and classification upto classes; Polymorphism in Hydrozoa.

Unit 4. Phylum Platyhelminthes (3 Hours)

General characters and classification upto classes; Life history of *Taenia solium* and its parasitic adaptations.

Unit 5. Phylum Nemathelminthes (4 Hours)

General characters and classification upto classes; Life history of *Ascaris lumbricoides* and its parasitic adaptations.

Unit 6. Phylum Annelida (3 Hours)

General characters and classification upto classes; Metamerism in Annelida.

Unit 7. Phylum Arthropoda (4 Hours)

General characters and classification upto classes; Vision in Arthropoda, Metamorphosis in Insects.

Unit 8. Phylum Mollusca (3 Hours)

General characters and classification upto classes; Torsion in Gastropods.

Unit 9. Phylum Echinodermata (3 Hours)

General characters and classification upto classes; Water-vascular system in Asteroidea.

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CONTENTS

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Unit 1...

Kingdom Protista

1.1 GENERAL ORGANISATION OF PROTISTA

The kingdom Protista includes diverse kinds of predominantly water dwelling, unicellular eukaryotic microorganisms. It includes protozoa, unicellular algae and slime moulds. Phylogenetically, it is the kingdom which links with prokaryotic monera and complex multicellular kingdoms of plants, fungi and animals. In the protistans, some are photosynthetic, others predatory or parasitic while still others are saprobic, living on decaying matter.

General Organisation:

The protists are unicellular organisms with cell membrane and organelles such as nucleus with chromosomes, mitochondria, chloroplast (if photosynthetic), golgi bodies, endoplasmic reticulum. Besides, protists may have flagella or cilia for locomotion. A cell wall is present in many photosynthetic forms. Some protozoans (predatory protists) may have elaborate organelles for the intake of food and elimination of waste.

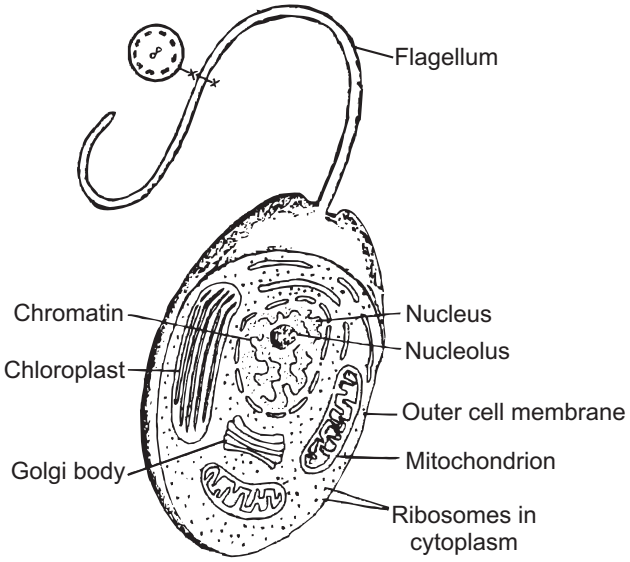


Fig. 1.1: Typical Photosynthetic Protist

Locomotion: Some protists move by pseudopodia, flagella or cilia. Others have no means of locomotion. *Euglena* like animal shows movement with the help of flagellum. *Amoeba* shows locomotion with the help of pseudopodia or false feet, while others like *Paramoecium* travel with the aid of hundreds of cilia all over the body. Cilia are short flagella which beat in a co-ordinated manner like many persons rowing a boat. This enables these protists to move rapidly, turn, tumble and even reverse. Ciliates are the fastest of the predatory protists.

Nutrition: Protists feed in many ways. Some are photosynthetic autotrophs which use the energy of sunlight to synthesize organic molecules from carbon dioxide and water.

Other are heterotrophs which may ingest food by endocytosis (ingestive heterotrophs) or absorb small molecules from their environment (absorptive heterotrophs). Many have more than one type of nutrition. They can change from photosynthesis to endocytosis to absorption.

Reproduction: Protist usually reproduce asexually by mitotic cell division. This may be binary (results in two cells) or multiple (many

cells). If favourable conditions exist, they reproduce by asexual method. This has adaptive advantages, as genetically identical individuals well adapted to prevailing conditions are produced. Under unfavourable conditions protists reproduce sexually. This permits genetic variation. Male and female gametes may be visibly different. Their formation involves meiosis. Fusion of gametes (syngamy) results in a diploid zygote. Ciliates have a special type of sexual reproduction called conjugation in which there is exchange of genetic material between two individuals.

Life cycles: Many protists are haploid, reproducing asexually in this state. During sexual reproduction, two gametes (1n) fuse to produce a zygote (2n). The zygote then divides by meiosis to form 1n individuals. Since, meiosis occurs in the zygote, this life cycle is called zygotic meiosis.

A second type of life cycle occurs in protists which are 2n or diploid. They reproduce asexually in this state to generate more diploid individuals. Prior to the sexual reproduction, the 2n individual produces four 1n gametes by meiosis. Such gametes fuse in pairs to form 2n zygote. The zygote divides by mitosis to form 2n individuals. In this life cycle, meiosis in 2n individuals leads to the formation of 1n gametes; so it is called Gametic meiosis.

Cyst formation: In adverse conditions, some protists form cysts. Once favourable conditions return, the cyst takes up water and the active organism emerges from the cyst. Many protozoal diseases like amoebic dysentery are spread by way of cysts.

Photosynthetic protista: There are several phyla of photo-synthetic protists. The dinoflagellates, diatoms and *Euglena* like flagellates are the photosynthetic protists, which fix more than 80% carbon dioxide in the biosphere.

Dinoflagellates: These are unicellular algae with cellulose wall divided into plates. The plates give them an armoured appearance. They have two flagella; one lies in a longitudinal direction. The other lies transversely in a furrow between the wall plates. The position and

appearance of these flagella is characteristic of this phylum. There are more than 1000 species which are marine. These organisms reproduce only asexually.

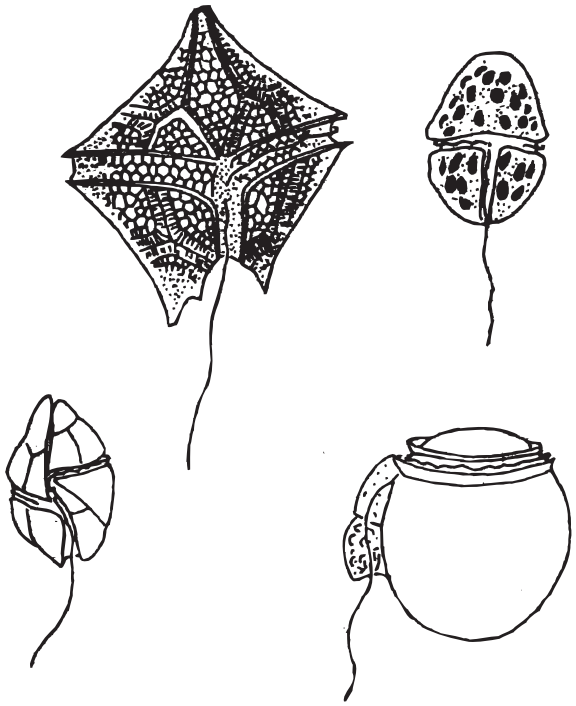


Fig. 1.2: Dinoflagellates

Diatoms: This phylum includes the diatoms and golden algae. These are one of the most successful groups of organisms. There are about 5,500 species, mainly marine. They have no flagella and float because of the light storage lipids in them. They constitute an important phytoplankton component of the oceans.

Diatoms have a cellulose cell wall impregnated with glass like silica. These have fine characteristic designs. Its wall always consists of two overlapping halves, like a soap box – a lid and lower half. During asexual reproduction, each daughter cell retains one-half of the old wall and synthesizes a new half. Diatoms are normally diploid and reproduce sexually by producing 1n gametes.

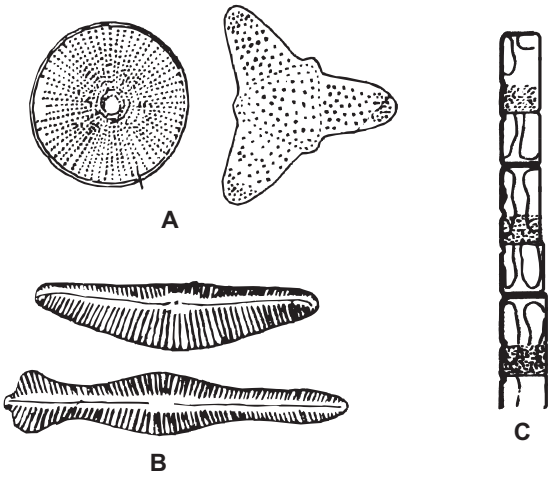


Fig. 1.3: Some forms of Diatoms (Phylum Chrysophyta).
A. Centric forms; B. Pinnate forms; C. Filamentous form

Because of the silica impregnations, the walls of the diatoms are nearly indestructible. So diatoms have left behind large amounts of fossil cell wall deposits called Diatomateous earth. Being rough and gritty, it is a useful material for polishing and filtration to clarity foils, syrups and so on.

Euglena like Flagellates:

Euglena like protists are interesting because several species lead plant like and animal like lives. Euglenoids are free living, found in fresh water ponds and ditches or in the damp soil. It possess flagellum. A light sensitive red eye-spot near the flagellum base senses the direction of light. This helps in regulating its movement to where light is optimal.

Euglenoids do not possess a cell wall, but have a flexible or elastic pellicle of protein. This allows their shape to change. Asexual reproduction is by longitudinal fission starting at the flagellar end. Flagellum is duplicated before the cell divides – a characteristic of most flagellates. When pools dry up, they form cysts, to tide over the dry period.

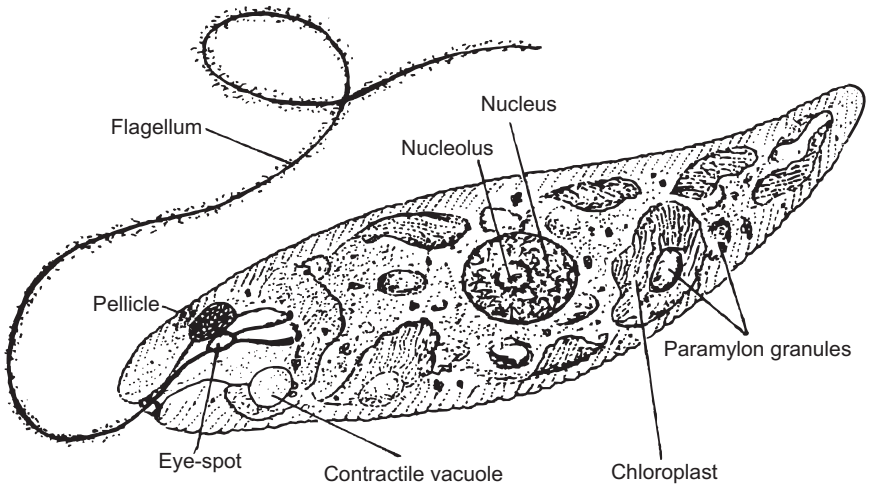


Fig. 1.4: *Euglena*

Slime moulds: These are consumer decomposer protists. Two separate types of slime moulds exists, the cellular and acellular forms.

The acellular slime mould; the *Physarum,* exists as a wallless mass of multinucleated protoplasm. It slowly streams or glides over decaying leaves or logs. This network of moving strands of protoplasm is called *plasmodium*. As it spreads, it engulfs food particles, bacteria and other organisms.

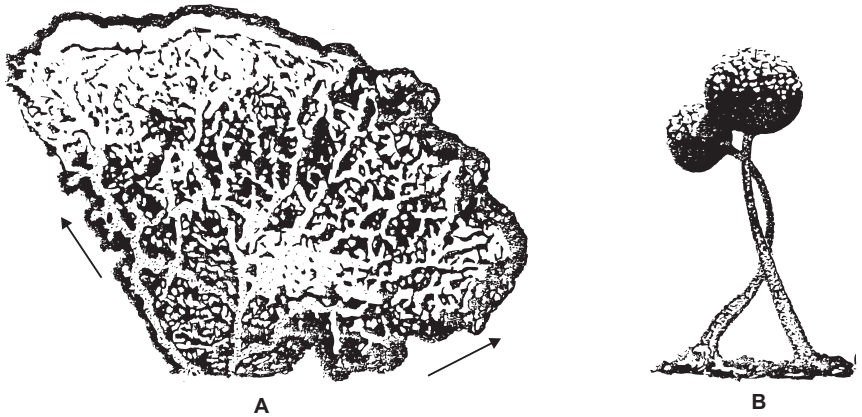


Fig. 1.5: Acellular Slime Mould, *Physarum*. A. Plasmodium – A network of moving strands of protoplasm advancing in the direction of the arrows. B. Sporangia on stalks developed from the plasmodium

In cellular slime mould like *Dictyostelium* numerous individual amoeboid cells aggregate and move together like a mass of protoplasm. Since, the individuals are not fused, this is not a real plasmodium but a pseudoplasmodium.

These fungus like protists are included under the phylum – Gymnomycota and classes – *Myxomycetes* (acellular) and *Acrasiomycetes* (cellular forms).

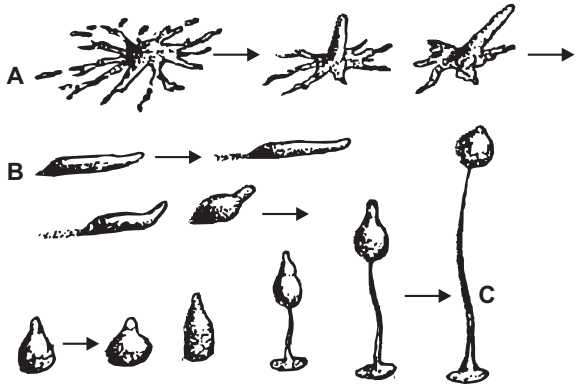


Fig. 1.6: Cellular Slime Mould *(Dictyostelium)*. Individual amoeboid cells aggregate, (A) to form a slug-shaped structure which migrates (B), halts, and finally forms a stalked sporangium, (C) Cells in the sporangium develop into spores and they are then disseminated

1.2 Protista: The Kingdom of Unicellular Eukaryotes

Diagnostic and Special Features:

(i) The protista (protiso - primary) includes diverse kinds of mostly unicellular and primarily aquatic eukaryotes (organisms with true nucleus in cells).

(ii) They contain typical eukaryotic cell organelles such as nucleus, mitochondria, endoplasmic reticulum, golgi bodies and plastids (photosynthetic).

(iii) They often bear flagella or cilia with 9 + 2 internal microtubular structure.

(iv) Protists display diverse ways of life. Many are photosynthetic: autotrophs and are the chief producers in oceans and in fresh water environments.

(v) They include coloured unicellular algae and diatoms are called phytoplanktons.

(vi) Some protists are predatory feeding on other protists. They are called protozoa (first animals).

(vii) Protozoa show holozoic or animal like nutrition.

(viii) Some protozoans are parasitic in other animals.

(ix) Some protozoans live in the digestive tract of other animals.

(x) Some help in decompostion of organic matter like cellulose of plant cell walls, as found in termites and wood eating cockroaches.

1.3 Classification of Protozoa

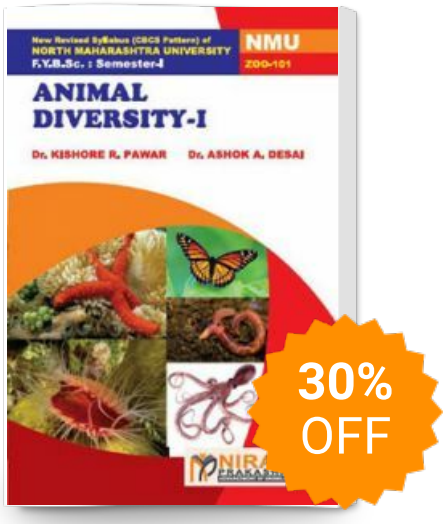
Introduction

- The name protozoa means 'first animals' and this name has been derived from Greek word 'Protos' = first and zoon = animal. Thus, they are regarded as most primitive animals, which appeared first in the evolutionary history.
- Protozoan consists of a single 'cell-like unit' or cell which is morphologically and functionally complete.
- These organisms exhibit all types of symmetry, a great range of complexicity and adaptations for all kinds of environmental conditions.
- Protozoa was first observed by **Leeuwenhock** (1677). The name protozoa was first given by **Goldfuss** in 1818. In the field of Protozology number of pioneers like **Joblott** (1718), **Linnaeus** (1758), **Hackle** (1862), **Ronald Ross** (1898), **Grassi** (1952), **Kudo** (1954) and **Allen** (1962) etc. have made the valuable contributions.

Definition

Protozoa may be defined as 'microscopic, unicellular organisms living singly or in colonies, without tissues and organs, having one or more nuclei. The colonial forms differ from Metazoa in having all the individuals alike except those engaged in reproduction.

Animal Diversity - I



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