6 SPIROGYRA - Stained (175x) PHYLUM CHAROPHYTA, KINGDOM PLANTAE

Spirogyra (SPY-row-JYE-ruh) is a common pond-dwelling algae which forms long filaments of single cells arranged in a row and looks similar to protists. This slide shows a stained specimen of one cell from the long strand. This protist has chlorophyll in chloroplasts (C) which spiral throughout the individual cells. In addition, each cell is filled with cytoplasm that is contained within a cell membrane (M). The cell itself is bound by a rigid cell wall (W).

Spirogyra reproduces both asexually and sexually. During asexual reproduction, the cells simply divide and make the strand longer. In the sexual phase, two strands align themselves side by side and form a tiny tube between individual cells. The cellular contents are fused together and a fertilized structure called a **zygote** (ZYE-goht) forms. This structure matures for a period of time and then is released into the water to form a new strand.

7 NOCTILUCA (63x) PHYLUM DINOFLAGELLATA, KINGDOM CHROMALVEOLATA

Dinoflagellates are all single cell or colonial marine organisms and have two distinctive flagella for locomotion and food gathering. The name Dinoflagellata ("terrible whip") was chosen because of the method of locomotion. These organisms all have a transverse flagellum that runs around the body in a groove and a longitudinal flagellum protruding from the end. One of the flagella can be seen at (F). They can photosynthesize because they contain chlorophyll in chloroplasts. Food is stored as starch or in tiny oil droplets. The reddish area in the center (A) is either a chromatophore or an oil droplet. Some types of dinoflagellates such as Noctiluca, glow like lightning bugs and were once classified in the phylum Pyrophyta or "fire plants."

Many of these organisms reach very high numbers during certain seasons of the year. These "blooms" are often called "red tides" because the high number of these tiny reddish organisms in the ocean color it red. Unfortunately, this vast number of dinoflagellates may release powerful poison which can kill marine organisms including fish and mollusks.

8 DIATOMS (50x) PHYLUM HETEROKONTOPHYTA, KINGDOM CHROMALVEOLATA

Among the most beautiful of the protists are **diatoms** (DYE-ah-tomz). Each species produces its own different tiny shell of silica. This slide shows a variety of diatom forms. All are single celled and contain chlorophyll. They reproduce in a unique manner. The top and bottom shells separate and the top grows a new bottom and the bottom a new top! Diatoms occur in moist environments almost everywhere. Some are found in the soil, but most float on the surface of the ocean, lakes, and ponds. Some species contain a tiny drop of oil which keeps them afloat. Scientists believe that the countless numbers of diatoms that have died and settled to the bottom of oceans have been the cause of some of today's oil deposits. Economically, diatoms are important when their tiny shells are found as diatomaceous earth, which is an excellent filtering and polishing agent.

Photomicrographs: 1, 3, 5-Dr. J. Metzner; 7-A.M. Siegelman

SET 222

THE KINGDOM PROTISTA

INTRODUCTION

In the historic classification of life into kingdoms, similar organisms were grouped into Monera (life that lacked cell nuclei), Plants, Animals, Fungi, and Protista. The Protista grouping was an odd assortment; the only general rule was that they were one-celled organisms. Because technology did not exist to separate these small life forms more appropriately, they were lumped together. Since then, genetic studies have allowed this group to be better organized using common ancestry and monophyletic grouping. The former kingdom Protista has been divided into four kingdoms: Amoebozoa, Chromalveolata, Rhizaria, and Excavata. Some of the other organisms that had been in Protista were reclassified as plants.

All protists have **eukaryotic** (you-carry-OTT-ick) cells, which means that they possess an organized nucleus, a complete set of internal membranes and typical cell organelles such as mitochrondria. In addition, all the protists are single cells or colonial single cells, and live associated with water.

Many of the members of this kingdom are still called protozoans or "first animals," and traditionally were studied with the more typical animals. The remaining protists are algae-like and were formerly considered to be plants. Some scientists have called these protophytans or "first plants."

The common pond organism known as the **euglena** (you-GLEEN-ah) has characteristics similar to both a plant and an animal. During the day, its green coloration enables it to make its own food by the process of photosynthesis. This is the same process used by every plant to produce sugars from sunlight. At night, the euglena is an active hunter moving rapidly with its whip-like tail to stalk its prey. This is just one example of the many organisms which does not fit well into any of the other established kingdoms. Euglena is one of the most studied protists and belongs to the new kingdom Excavata.

The magnification given, for example, Slide 1 (200x), means that the microscope lens was set at that power when the image was taken.

1 AMOEBA/ACTINOPHRYS (200x) - PHYLUM TUBULINEA, KINGDOM AMOEBOZOA/PHYLUM SARCODINA, KINGDOM CHROMALVEOLATA

This slide shows two of the most common protists. They were once classified together in the phylum sarcodina, which means "flesh form," because they represent the "simplest" of the eukaryotic cells, but genetic studies moved the amoeba to its own kingdom.

The **amoeba** (uh-MEE-bah) on the left is a typical member of its kingdom and is interesting because it has no definite shape. The **actinophrys** (ack-tin-OHF-rus) on the right is very similar to the amoeba, but has a shell of silica protecting it. Other protists, such as diffulgia (Amoebozoa), produce a protective coat of tiny sand grains, while the foraminifera (Rhizaria) resemble tiny snail shells.

One characteristic shared by these organisms is the presence of a **pseudopod** (SOO-doh-pod) or "false foot." These organisms move by extending their cellular material out into a "foot" which can be formed anywhere on their body. They then flow into the extension, thus moving in that direction. The pseudopods are also used for gathering food. If pseudopods (P1) and (P2) were to close around a smaller organism, they would trap it. The trapped organism would then be incorporated into the body of the protist by way of a food vacuole. Such a vacuole (V) can be seen within the actinophrys.

By William F. McComas