

This chapter deals with a diverse group of mostly microscopic single-celled eukaryotes known as Protista. The focus is primarily on the “animal like” (heterotrophic) protozoa. Because of their great diversity and small size the phylogeny of the protista is very muddled. Several phyla are recognized within the group but there is no consensus over how many and how the different phyla might be related. With that in mind we will not concern ourselves with the phylogeny of protists but focus mostly on general aspects of their form and function, their role in nature, as parasites and links in aquatic food webs, and their evolutionary connections with multicellular animals ( metazoans ).

1. On page 35 the author raises the issue of whether protozoans are monophyletic or polyphyletic. What does he mean by that terminology, and what is the answer to his question?

*It is unknown whether protista are all derived from a single common ancestor that evolved from prokaryotes. In other words the jump from prokaryotes to eukaryotic cell construction may have occurred more than once.*

2. According to the phylogenetic scheme in Figure 3.1.b. what does 18S ribosomal DNA nucleotide sequence analysis tell us about the ancestry of multicellular animals (Metazoa)?

(Note: we will learn to create and interpret such evolutionary trees, so don't be concerned if you have trouble understanding this one)

*Choanoflagellates are the sister group, and metazoans seem to be monophyletic.*

3. Contractile vacuoles are found in ciliates. How do these vacuoles work in osmoregulation and why are more active in ciliates living in freshwater than in those living in salt water?

*See figure 3.4 for an overview; you are not expected to memorize details of this process. In fresh waters, more water will be rushing into the ciliate cell so the vacuoles will have to be more active in their osmoregulatory role.*

4. If you haven't taken cell biology, in that class you'll learn a great deal about the structure of cilia and how they function at the molecular level. For our purposes a more interesting question is how cilia beat individually and as a group. Review Figure 3.11 and in a few words explain the point of this figure. And on the same topic, what is a **metachronal** wave?

*See figure 3.11 for an explanation of a metachronal wave*

5. In most vertebrates and other animals familiar to us, the gamete fusion and hence the recombination of genetic material occurs at the same time as reproduction. That is, recombination is part of reproduction. In protists and even some animals, reproduction and recombination can be separate processes, which means there can be recombination without reproduction and reproduction without recombination. Review the conjugation of Paramecium in Figure 3.17 . You DO NOT have to memorize the details of nuclear exchange, but be prepared to answer the following: Are reproduction and recombination part of the same process or uncoupled in Ciliates? Explain.

*In ciliates, exchange of micronuclei takes place during conjugation. This is equivalent or is essentially the same as sexual recombination. Reproduction by fission occurs later.*

6. Compare the structure of a flagellum to that of a cilium? How are they different? How would you distinguish flagella from cilia in an organism? To what extent is the presence of cilia or flagella a reliable character in distinguishing the evolutionary relationships of different protists? (there is no single answer to this question...I'd like you to think about this.)

*; Cilia and flagella are structurally very similar and all evidence points to them being homologous structures; the norm is to consider them two forms of the same general structure called an undulopodia.*

7. What is the cause of African sleeping sickness?

A disease caused by trypanosomes see pg. 64-65

8. Review the life cycle of malaria on pg. 56. What past measures were used to control malaria? Why aren't those measures effective now? What new techniques are being tested for the control of malaria?

See pg. 57 for descriptions of control measures. I might ask you why one or another control measure might work....you'd have to explain what aspect of the malarial life cycle would be targeted.

9. In figure 3.31 look specifically at the structure of Proterospongia? Why is this protist significant to our understanding of the origin of multicellular animals?

*Shows early stages of colony formation and its cells are identical to sponge choanocytes; choanoflagellates are the likely sister group of metazoans.*