Protozoan classification

Four major groups of protozoa are recognised and often given the status of phylum* . Note, however, that in the animal kingdom proper (Metazoa*), phyla are distinguished on their different body plans and that no comparable body plans are found in Protozoa.

The groups are:

- flagellates (or Mastigophora)
- amoebae (or Sarcodina)
- sporozoans (or Sporozoa, Apicomplexa) and
- ciliates (or Ciliophora).

The above classification represents a convenient filing system. We now know from molecular data (especially *RIBOSOMAL RNA* gene sequencing) that the different groups of flagellates and amoebae are not closely related and that there may be much greater genetic distance between two groups of flagellates than between flowering plants and vertebrates.

The above classification is not therefore phylogenetic* (i.e. reflecting the course of evolution). It is at present premature to try to construct a phylogenetic classification of protists, and for purposes of identification the above traditional classification is a starting point.

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Evolution & the Fossil Record

One of the first criticisms levelled against Darwin's theory of evolution through natural selection was that many simple organisms have been observed to remain largely unchanged over long periods of geological time.

The Foraminfera* represent an important group of amoeboid* protozoa that live in shells that have been preserved in sedimentary rocks since the Cambrian* and indeed are a major constituent of chalk and limestone rocks. They are often cited as simple organisms that have not evolved. This citation however was the result of a fundamental misunderstanding of the nature of natural selection, which does not have to be in some direction or other. Foraminifera have remained unicells from their first appearance, but they have *EVOLVED* .

In particular, large foraminiferans appear to have evolved over and over again. The large living foraminifera appear to owe their size to symbiotic relationships with intracellular photosynthetic protists (unicellular algae or dinoflagellates) once again illustrating the importance of symbiosis in evolution.

The adaptive significance of most foram shell shapes is not understood and so possible reasons for convergent evolution in forams of different geological eras are hard to find!

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