

Question of the Animal-Plant-Fungal Divergence

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There has been a controversial issue in phylogenetic relationships among animals, fungi, and plants. Before Whittaker and Margulis (1) classified the fungi as a separate kingdom in their five-kingdom classification, fungi traditionally had been considered more closely related to plants than to animals. With the determination of the primary structures of small subunit rRNA and the proteins like actin and α -tubulin in various organisms, these sequences have been used to make molecular trees. Most of these studies show that fungi and animals are sister groups (2–4).

More recent investigations of the proteins involved in RNA metabolism, the mRNA capping apparatus, and several key components that regulate the cell cycle, suggest a close relationship between animals and plants, with fungi as more distant (5–7). Moreover, there are intriguing examples of gene families and domain structures shared exclusively by animals and plants (8–10), as referred by Stiller in this issue (11). Phylogenetic analyses of several additional proteins also show that there is a tree building signal that clusters animal and plant sequences (11). Based on the recent data, now Stiller (11) reviews new lines of evidence that show a close relationship between animals and plants, and points out that these lines of evidence have to be incorporated into models of eukaryotic evolution in the future. Certainly, recent bioinformatic, proteomic, and genomic data have great potential for helping to resolve ancient evolutionary relationships. These data will provide further understanding of the relationships among animals, fungi, and plants, like accumulations of the sequence data of rRNA and ubiquitous proteins had ever resulted in hypotheses, but now on the broader scales.

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