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Relative-rate tests versus paleontological divergence data for diatoms and vertebrates

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Molecular divergence rates between taxa can be estimated through two independent methods, namely the relative-rate test and by using divergence dates derived from the fossil record. These two approaches are employed here to elucidate the existence of a regularly ticking ribosomal DNA clock in diatoms and in the vertebrate clade composed of the Actinistia and Tetrapoda. The results obtained from the relative-rate test and the paleontological information are
contradictory. The former suggests that the vertebrates diverged at a significantly higher molecular rate than diatoms while the latter indicates that the diatom lineages evolved at about a speed 4.5 fold higher than the Actinistia-Tetrapoda clade. Possible causes of this paradox are discussed. It is concluded that each of these two approaches suffers from weaknesses of its own and that the absolute divergence rates are more reliable than those derived from the relative-rate test.

Key words: molecular evolution, divergence time, relative-rate test, diatoms, Actinistia, Tetrapoda, ribosomal RNA.

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