

Evolution and paleobiology of Precambrian eukaryotes-E Javaux

University of Liège, Belgium

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The origin of the domain Eucarya is not constrained. Most molecular clocks suggest that LECA (the last eukaryotic common ancestor of crown group eukaryotes) emerged during the Proterozoic Eon between 2 Ga and 0.8 Ga. Neither early nor late crown group emergence precludes the possibility of an earlier origin of FECA, the first eukaryotic common ancestor, and a record of stem group eukaryotes. To date, unambiguous eukaryotic microfossils appear around 1.8 Ga in the rock record, but their assignment to stem or crown groups is debated. Careful study of microfossil assemblages and their paleoenvironmental context from well-dated successions permits to improve our understanding of the timing of eukaryotic diversification. Comparative morphology, wall ultrastructure and microchemistry of microfossils allow the identification of early eukaryotes and occasionally their assignment to an extant clade, permitting to date their order of branching and to calibrate molecular phylogenies. The pattern and timing of eukaryotic diversification and biological innovations (with or regardless of taxonomy) can then be examined, as well as hypotheses regarding their possible biological, ecological, and environmental causes.