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The reconstructed evolutionary process with fossil record

Abstract
Using the fossil record yields more detailed reconstructions of the evolution process than what is obtained from contemporary lineages only.
In this work, we present a stochastic process modelling not only speciation and extinction, but also fossil finds.
Next, we derive an explicit formula for the likelihood of a reconstructed phylogeny with fossils, which can be used to estimate the speciation and extinction rates. Finally, we provide a comparative simulation-based evaluation of the accuracy of estimations of these rates from complete phylogenies (including extinct lineages), from reconstructions with contemporary lineages only and from reconstructions with both contemporary lineages and the fossil record.
Results show that taking the fossil record into account yields more accurate estimates of speciation and extinction rates than considering only contemporary lineages.