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Title: Evaluation of Bayesian genealogy-based coalescent models for demographic inference
Abstract:
Coalescent processes are widely applied for inferring demographic histories, especially population sizes through time. From maximum likelihood estimation of a simple, constant process, more complex models were developed. These complex models include, for example, linear and exponential population size functions, the division into several intervals with their own function each, and allowing for different sampling points in time. We implemented various genealogy-based coalescent processes in the Bayesian software RevBayes. These cover a wide range from simple basic demographic models such as a constant, linear or exponential population size trajectory to user-defined trajectories with an individual number of intervals that can each have one of the basic models attached. Additionally, using skyline models, the user can choose between piecewise-constant or piecewise-linear models with a variety of possibilities on how to set the prior for the population sizes or on how the interval change points should be placed. Our implementation in RevBayes allows for extreme flexibility and includes the largest number of demographic models for inference within the same software. We applied several of the models to infer the demographic history of horses. Interestingly, the method of interval change point positioning and whether heterochronous or isochronous data were used had the highest impact on the resulting population size trajectories, yielding qualitatively different conclusions.