

Appendix S9 Multiple regression analyses of relationships between epoch-specific lineage diversities based on 100 trees with randomly resolved polytomies and the abiotic characteristics of habitat types

This analysis is equivalent to that in Table 1 in the main body of the text, but it is based on averages of *stELDs* calculated across each of the 100 trees with randomly resolved polytomies (given in Table S6b). We note that most relationships between epoch-specific lineage diversities and environmental factors of habitat types are robust to resolving polytomies, i.e. phylogenetic uncertainty. The relationships are robust both in signs and significances of effects of individual variables, as in the individual relationships and in the explanatory power of the overall model. However, explanatory power decreased in the most recent epoch: $R^2 = 0.44$ instead of $R^2 = 0.64$ (Table S9 and Table 1, respectively) possibly due to noise introduced by randomly resolving polytomies.

Table S9 Relationships between diversities of lineages of habitat types dating back to a given epoch (standardized, ‘*stELD*’ parameter), and the abiotic characteristics of these habitat types: light availability, temperature, ground-water level, soil pH, and soil phosphorus availability (one of the main drivers of soil fertility). Diversity of lineages in a given habitat type and for a given epoch was calculated for each of the 100 trees with randomly resolved polytomies and was averaged within habitat-epoch (see Appendix S3 for resolving polytomies and Table S6b for averages). Numbers are t-values for each specific independent variable included into the model; ‘—’ indicates a variable has been excluded from the model. ‘ R^2 ’ is for multiple correlation coefficients. Levels of significance: $P < 0.1$ – #, $P < 0.05$ – *; $P < 0.01$ – **; $P < 0.001$ – ***. Significant ($P < 0.05$) associations are in bold.

Epoch (Ma)	Effect on diversities of lineages dating back to that epoch (t, P)					Total model R ² , P
	Light	Tempe- rature	Ground water level	Soil pH	Soil phos- phorus	
164 – 126	—	-1.23	4.55***	-1.05	4.08***	0.75***
126 – 100	—	1.40	-5.75***	—	-1.49	0.68***
100 – 66	2.36*	—	—	-2.29*	—	0.23*
66 – 33.9	-4.13***	—	4.87***	—	-4.52***	0.40***
33.9– 23	1.87#	—	-2.12*	2.90**	-1.63	0.58***
23 – 5.3	—	3.54**	-2.80**	1.91	—	0.61***
5.3 – 0	4.74***	-1.72	-2.70*	—	—	0.44***