

Supplemental Information

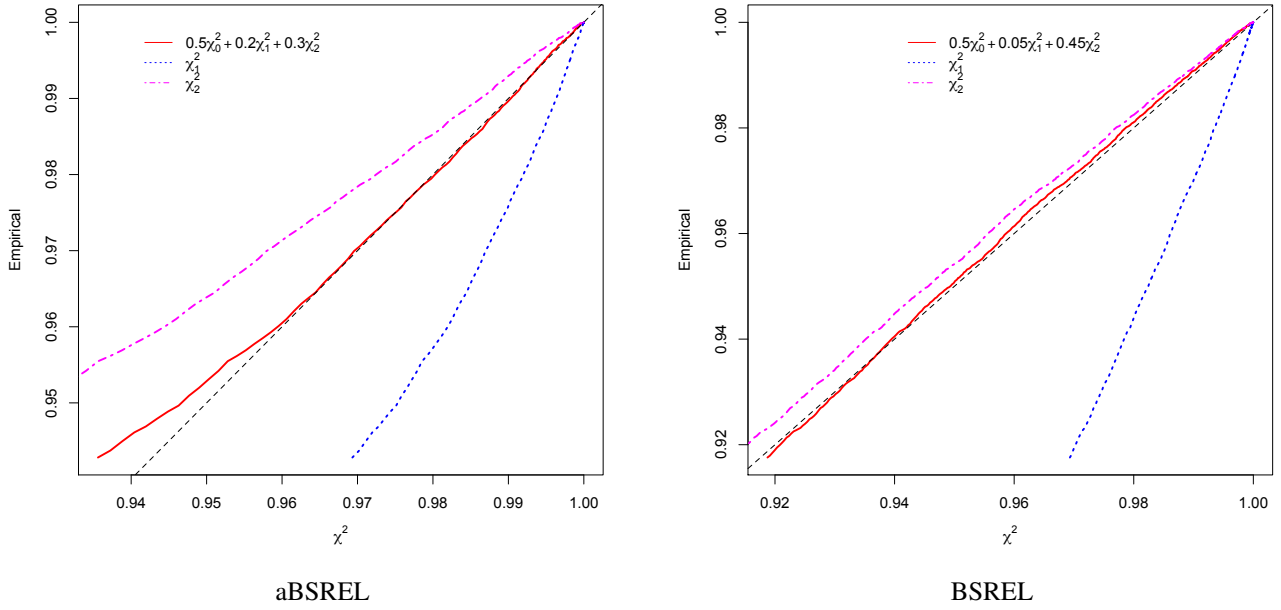


FIG. S1.—Q-Q plots (limited to the right tail) of the empirical distributions of aBSREL and BSREL LRT statistics under the strict null, compared to χ_1^2 (anticonservative, below the black dotted line of perfect agreement), χ_2^2 (conservative), and the approximate distribution, with mixing proportions fitted by maximum likelihood.

Table S1 The performance of aBSREL for inferring the correct number of rate classes on simulated data. The table shows the number of replicates (branches) for each pair of simulated (true) and inferred values of K^b .

		Inferred K^b		
		1	2	3
Simulated K^b	1	6420	178	0
	2	7752	5751	4
	3	15443	14419	33

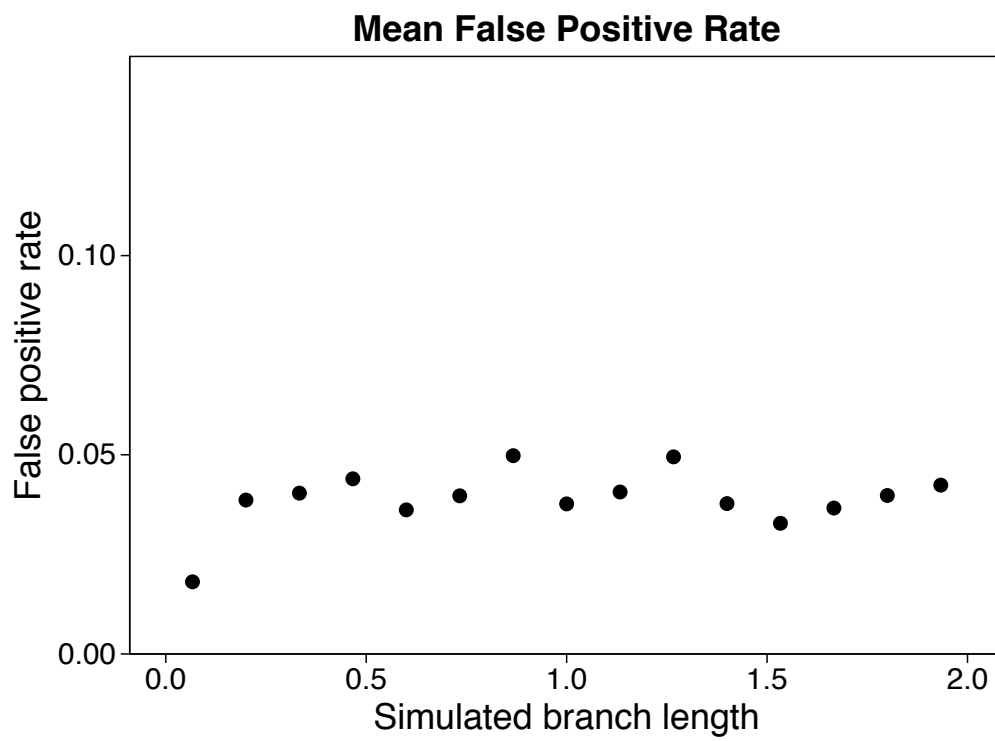


FIG. S2.—Four taxon simulations under uniform neutrality show an average false positive rate of 3.89% (at test level of $p = 0.05$ computed using the mixture asymptotic statistic), and no significant effect in of simulated branch lengths on the estimated rate of false positives.

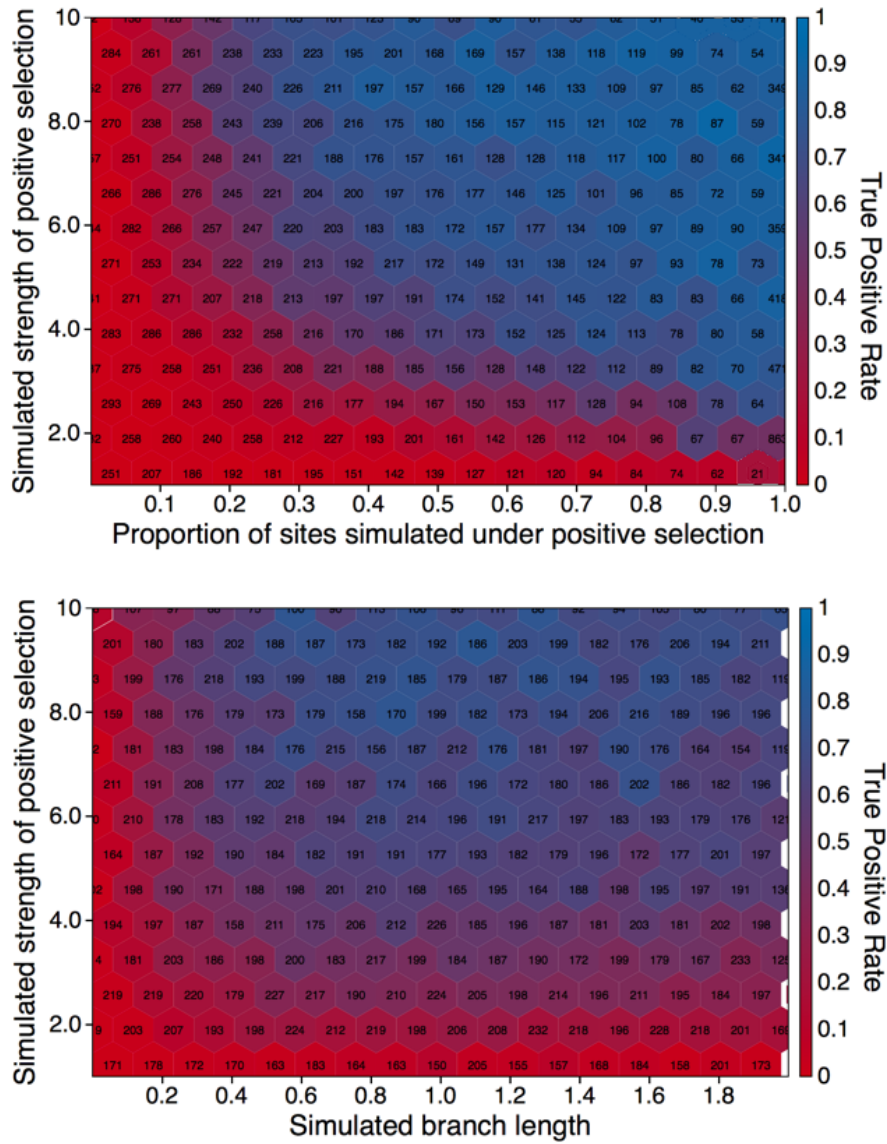


FIG. S3.—Parameter sampling density for the 4-taxon simulations; the number of simulated branches with parameters falling into the corresponding range are counted in each hexagon.