## Data model $\mathcal{M}_{Uniform}$ $\tau \sim U(0, 1.0 \, \text{MGA})$ $\tau \sim U(0, 2.5 \, \text{MGA})$ $\tau \sim U(0, 5.0 \, \text{MGA})$ $\tau \sim U(0, 1.5 \, \text{MGA})$ $\tau \sim U(0, 0.5 \, \text{MGA})$ $\tau \sim U(0, 2.0 \,\mathrm{MGA})$ $p(\hat{D_T} < D_T) = 1.0$ $p(\hat{D_T} < D_T) = 0.996$ $p(\hat{D_T} < D_T) = 0.997$ $p(\hat{D_T} < D_T) = 0.985$ $p(\hat{D_T} < D_T) = 0.858$ $p(\hat{D_T} < D_T) = 0.984$ 0.06 1.0 0.4 0.05 $M_{msBayes}$ 1.5 2.0 8.0 8.0 0.04 0.3 1.5 0.6 0.6 1.0 0.03 0.2 1.0 0.4 0.4 0.02 0.5 0.1 0.2 0.5 0.2 0.01 0.6 0.8 1.0 0.5 1.5 0.6 0.8 1.0 1.5 2.0 2.5 0.0 0.010.020.030.040.050.06 0.0 0.2 0.3 0.4 0.0 0.2 0.0 1.0 0.0 0.2 0.0 1.0 $\hat{D_T}$ $p(\hat{D_T} < D_T) = 0.924$ $p(\hat{D_T} < D_T) = 0.727$ $p(\hat{D_T} < D_T) = 0.648$ $p(\hat{D_T} < D_T) = 0.249$ $p(\hat{D_T} < D_T) = 0.97$ $p(\hat{D_T} < D_T) = 0.86$ Estimated variance of divergence times, 00 0.5 1.2 1.5 1.2 2.0 1.0 MUshaped0.4 1.0 2.0 1.5 Inference 8.0 1.0 8.0 0.3 1.5 0.6 1.0 0.6 0.2 1.0 0.4 0.4 0.5 0.5 0.1 0.5 0.2 0.2 0.5 1.0 1.5 2.0 2.5 0.1 0.2 0.3 0.4 0.5 0.2 0.6 0.0 0.5 1.0 1.5 2.0 2.5 3.0 1.0 0.6 1.0 1.4 0.0 0.0 0.5 1.0 Muniform $p(\hat{D_T} < D_T) = 0.0$ $p(\hat{D_T} < D_T) = 0.001$ $p(\hat{D_T} < D_T) = 0.004$ $p(\hat{D_T} < D_T) = 0.018$ $p(\hat{D_T} < D_T) = 0.021$ $p(\hat{D_T} < D_T) = 0.034$ 1.5 2.0 2.5 2.0 2.5 1.5 2.0 1.5 1.5 1.0 2.0 1.5 1.0 1.0 1.0 1.5 1.0 0.5 1.0 0.5 0.5 0.5 0.5 0.0 0.0 2.0 0.5 2.0 0.0 0.5 1.0 1.5 2.0 2.5 0.5 1.0 0.5 1.0 1.5 2.0 2.5 3.0 1.5 1.0 1.5 0.5 1.0 1.5 1.5 0.0 0.5 1.0 0.0 0.0 $p(\hat{D_T} < D_T) = 0.369$ $p(\hat{D_T} < D_T) = 0.295$ $p(\hat{D_T} < D_T) = 0.205$ $p(\hat{D_T} < D_T) = 0.119$ $p(\hat{D_T} < D_T) = 0.01$ $p(\hat{D_T} < D_T) = 0.229$ 1.5 -2.5 2.0 1.5 1.5 2.0 1.5 2.0 1.0 1.5 1.0 1.0 1.5 1.0 1.0 0.5 1.0 0.5 0.5 0.5 0.5 0.0 0.5 1.5 0.0 0.5 1.5 0.0 0.5 2.0 2.5 0.0 2.0 0.5 1.0 1.5 2.0 2.5 3.0 0.0 1.0 1.0 1.5

True variance of divergence times,  $D_T$