

**Figure S2** Proportion of shared incompatibilities as a function of relative internal branch length in a three-species tree under the linear and simple DM models. The proportion of shared incompatibilities is between the expected numbers of shared incompatibilities from the two most divergent lineages relative to the total number of incompatibilities between those two lineages. The relative internal branch length is the time between the two divergences relative to the total time since the first divergence in the tree. The estimated proportion of shared ancestral history in the house mouse complex using the SD and STEAC methods are shown as vertical lines.