SUPPORTING INFORMATION

Causal evidence between monsoon and evolution of rhizomyine rodents

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14 **Supplementary Figure 1 | Paleobiogeographic patterns in extant and fossil rhizomyine**

15 **rodents.** Each terminal taxon and every node is given a circled number. The area of

16 occurrence (from 1 to 4) is numbered beside each, where 1=Asia, 2=Indian subcontinent, 3=N

17 Africa, and 4=E Africa. Mapping the geographic states to the ancestral nodes using phases

18 one and two of Fitch[77] optimization suggests that there have been several events of range

19 expansion and contraction (denoted by D and V, respectively) during the evolutionary history

20 of the group (see text).

21

22 **Supplementary Table 1 | Rate calculations. Instantaneous per-capita and deterministic**

23 **rates calculated as described in the "Material and methods" section.** Raw observed

24 turnover data include only the observed stratigraphic ranges of species, while

25 phylogenetically constrained data incorporate ghost ranges. Rates are calculated from species

26 turnover data to the left of the rate columns. Δt is the temporal duration of the interval

27 determined from the 2013 chronostratigraphic chart[74]. NbL indicates the number of species

28 that cross the lower interval boundary, but become extinct during the interval, NFt indicates

29 the number of species that originate within the interval and traverse the upper interval

30 boundary, Nbt indicates the number of species that cross both the upper and lower interval

31 boundaries. N_0 indicates the number of species that are extant at the beginning of the interval

32 of time t_n, Nf indicates the number of species that survive the end of t_n, # sp indicates the

33 number of speciation events that occur during that interval, # ext indicates the number of

34 species that experience extinction during it.

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Supplementary Figure 1