



**FIGURE 15.8.** (A) A typical genealogy relating 20 genes sampled from a population of constant size  $N_e$ . Note that most coalescence events occur in the recent past, so that for most of the history of the sample, there are just a few ancestral lineages. In this example, unique mutations (*red dots*) occur at a rate  $\theta = 4N_e\mu = 20$ . (B) A genealogy sampled from a population that had experienced a sharp bottleneck at  $0.6N_e$  generations in the past (*dashed line*). This causes a rapid burst of coalescence: Eight lineages present after the bottleneck trace back to just two lineages immediately before the bottleneck. (C) A genealogy sampled from a population growing exponentially. Coalescences now tend to occur relatively further back, when the population was much smaller. The whole sample shares common ancestry  $0.45N_e$  generations back, an order of magnitude more recently than expected if population size had stayed at  $N_e$  throughout. At that time, the population was only 10% of the size when the sample was taken,  $N_e$ .