



FIGURE 27.33. Sequence similarity does not always accurately represent relatedness. In this hypothetical tree, the evolution of three species is indicated by *thick light blue bars* and the evolution of specific genes is indicated by *thin red and blue lines* within the bars. An early gene duplication gave rise to the α and β genes; thus all of the α genes are paralogs of the β genes. Over time, the α and β genes diverged such that their functions now differ (indicated by *red* and *blue*). The multiple forms of the α genes arose through speciation events, and thus all are orthologs of each other (and likewise for all the β genes). If species 3 had a slower rate of evolution than the other two, then the α and β paralogs within species 3 will be more similar to each other (as measured by summing the branch lengths connecting them) than either is to their orthologs in other species. (Redrawn from Eisen J.A. *Genome Res.* **8**: 163–167, Table 4, © 1998 CSHLP.)