

## Chapter 24

### Evolutionary Aside 24.1--Role of stabilizing and divergent selection in genome evolution

A comparison of the mouse and rat genomes reveals a smaller ratio of nonsynonymous to synonymous changes than that seen between humans and chimps. The higher ratio in the primates indicates that fewer nonsynonymous mutations have been removed by natural selection than has occurred in mice and rats. The removal of nonsynonymous codons during evolution is an example of stabilizing selection (see chapter 20). Stabilizing selection prevents change and maintains the same protein structure across species. For 387 human and chimp genes, the rate of nonsynonymous changes was higher than expected.

Selection has not been preventing change in protein structure between these genes in human and chimp. Rather, divergent selection has been at work. In divergent selection, two phenotypes, the one original one and the one resulting from the nonsynonymous change, are both advantageous and increase fitness. Thus both traits persist in the population. Comparing the chimp and human sequences with an outgroup, the macaque, we see that chimps have experienced a higher rate of divergent selection than humans since they last shared a common ancestor.