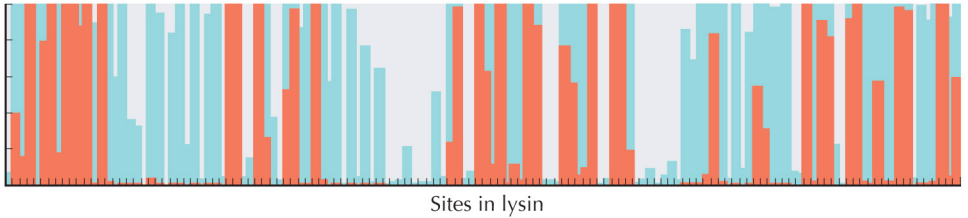


A



B



**FIGURE 19.13.** Rates of amino acid substitution vary greatly across the sperm lysin gene of abalone. (A) The *red bars* indicate that a codon evolves rapidly ( $K_a/K_s \sim 3.1$ ), the *blue bars* that a codon evolves at intermediate rates ( $K_a/K_s \sim 0.91$ ), and the *gray bars* a low rate ( $K_a/K_s \sim 0.09$ ). (B) Lysin crystal structure from the red abalone, with sites colored according to their rate of evolution (A). Sites that are likely to evolve rapidly (*red*) tend to cluster around the top and bottom, which are exposed.

19.13, redrawn from Yang Z. et al., *Mol. Biol. Evol.* **17**: 1446–1455, © 2000 Oxford University Press