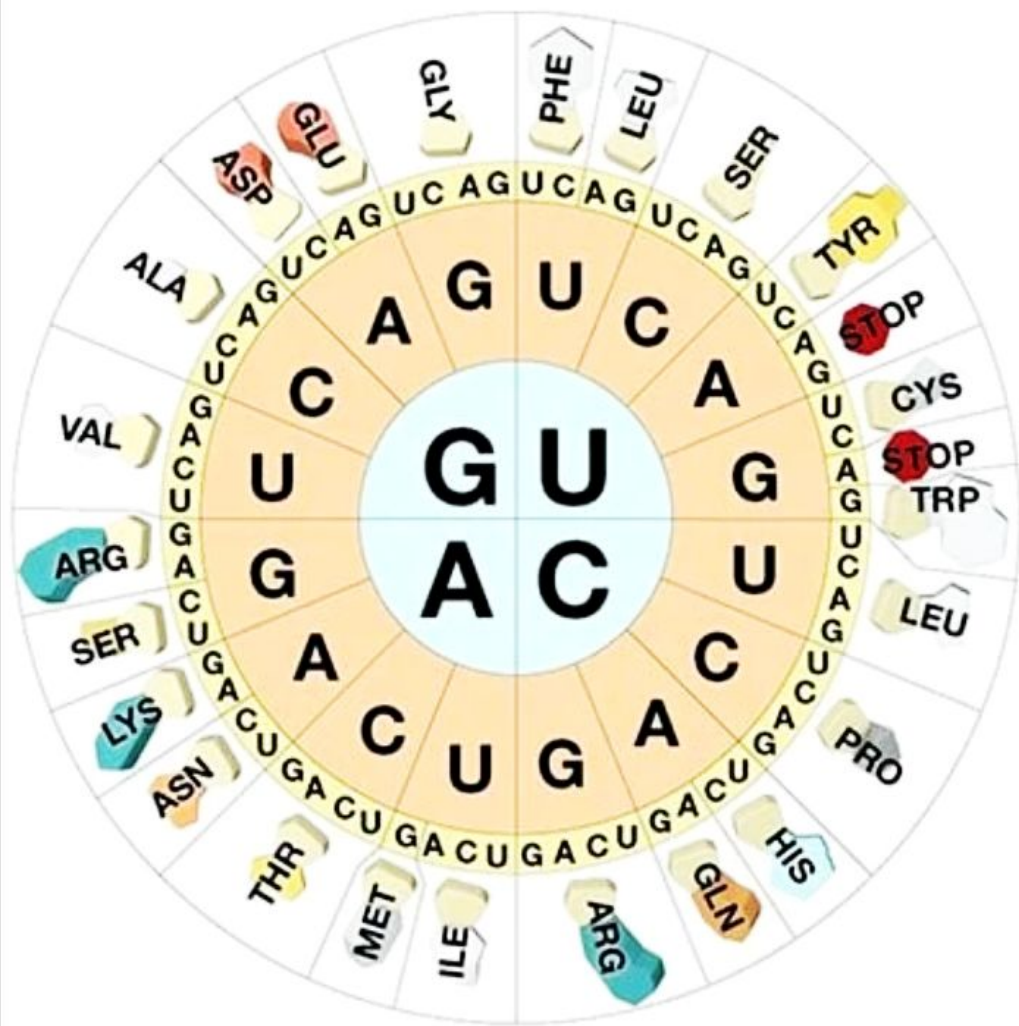




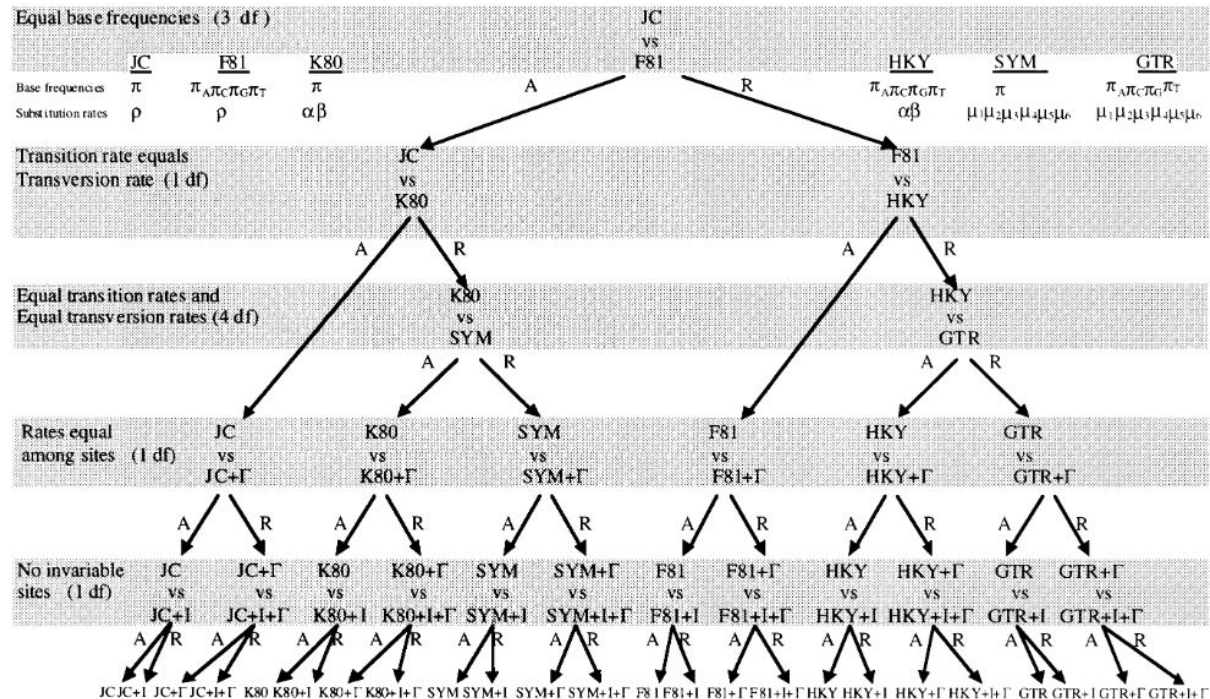


Fig. 1. Hierarchical hypothesis testing in MODELTEST. At each level the null hypothesis (upper model) is either accepted (A) or rejected (R). The models of DNA substitution are: JC (Jukes and Cantor, 1969), K80 (Kimura, 1980), SYM (Zharkikh, 1994), F81 (Felsenstein, 1981), HKY (Hasegawa *et al.*, 1985), and GTR (Rodríguez *et al.*, 1990). Γ : shape parameter of the gamma distribution; I: proportion of invariable sites. df: degrees of freedom. 1: equal base frequencies (0.25), π_A : frequency of adenine, π_C : frequency of cytosine, π_G : frequency of guanine, π_T : frequency of thymine. ρ : equal substitution rate, α : transition rate, β : transversion rate; μ_1 : A $\Rightarrow$ C rate, μ_2 : A $\Rightarrow$ G rate, μ_3 : A $\Rightarrow$ T rate, μ_4 : C $\Rightarrow$ G rate, μ_5 : C $\Rightarrow$ T rate, μ_6 : G $\Rightarrow$ T rate.

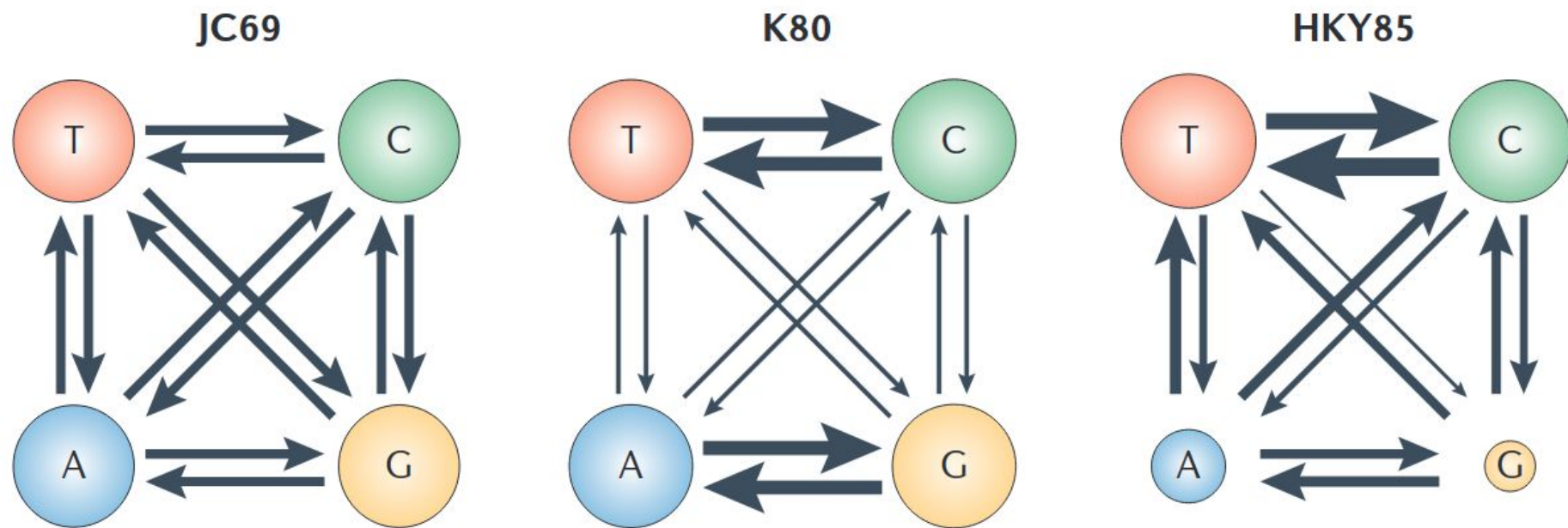


Figure 1 | **Markov models of nucleotide substitution.** The thickness of the arrows indicates the substitution rates of the four nucleotides (T, C, A and G), and the sizes of the circles represent the nucleotide frequencies when the substitution process is in equilibrium. Note that both JC69 and K80 predict equal proportions of the four nucleotides.