Phylogenetics Z620 Homework 5

(1) Verify that the formulas for t and R given in equation 13.3 on p. 198 solve the equations given in 13.2 on the previous page when the left hand sides of 13.2 are replaced as follows: Prob(transitions| t) by P, the proportion of transitions and Prob(transversions| t) by Q, the proportion of transversions, in a given dataset.

(2) For the following pair of aligned sequences, calculation the proportion of transitions, P, and the proportion of transversions, Q. Use these to estimate the scaled time of divergence, t, and the ratio of transitions to transversions, R. How might you try to estimate the absolute time of divergence (in years)? Besides the point estimates for the scaled time and transition to transversion ratio, you would also like to have interval estimates (equivalently, you would like estimates for their variances). How might you be able to develop such estimates? (Just describe what you might do in words; you don't have to carry out your method. There a multiple possibilities here.)

Data:

Sequence1:
CAGTAAAGATCACATCCCAGAAGGGTCTAAAGTGGGCAGCAGGTCCCCCTGCCTCAGGGAC
AGCCTGTGCCCAGAGCACGGTGGGAGGGAGCAGGGTGTT
Sequence 2:
CAGCAGAGATCACATCCCAGAAGGGTCTAAACTGGGCAGCAGGTCCCCCTGCCTCAGGGAC
AGCCTGTGCCCAGAGCACAGCGGGAGGGACCAGGGTGTC