

# Chapter 1

## Basic Phylogeny Reconstruction

### 1.1 Terminology for trees

### 1.2 Distance-Based Phylogeny Reconstruction

#### 1.2.1 Phylogeny Distances

#### 1.2.2 UPGMA

#### 1.2.3 Neighbor Joining

### 1.3 Parsimony in Phylogeny Reconstruction

$$\begin{aligned} & \lim_{n \rightarrow \infty} \left(1 - \frac{1}{n}\right)^n \\ \lim_{n \rightarrow \infty} n \ln \left(1 - \frac{1}{n}\right) &= \lim_{n \rightarrow \infty} \frac{\ln \left(1 - \frac{1}{n}\right)}{\frac{1}{n}} \\ &= \lim_{n \rightarrow \infty} \frac{\frac{1}{1 - \frac{1}{n}} \cdot \frac{1}{n^2}}{-\frac{1}{n^2}} \\ &= \lim_{n \rightarrow \infty} \frac{-1}{1 - \frac{1}{n}} \\ &= -1 \\ \Rightarrow \lim_{n \rightarrow \infty} \left(1 - \frac{1}{n}\right)^n &= e^{-1} \end{aligned}$$

**1.3.1 Parsimony of a tree**

**1.3.2 Parsimonious Tree for Given Data**

**1.3.3 The Limitation of Parsimony Principle**

**1.4 Measure the Difference of trees**