Corrected UPGMA algorithm
Given: a distance matrix D with n species:

1) Initialize n clusters, $C_1,\ldots,C_n$, each with a single species in it. Create a leaf node for each of the clusters.

2) Define the distance between two clusters as the average pairwise distance between members of the two clusters:

$$d(C_i, C_j) = \frac{\sum_{a \in C_i} \sum_{b \in C_j} D(a,b)}{|C_i| * |C_j|}$$

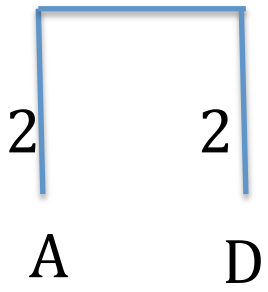
3) Repeat:

3.1 Pick the two clusters C_i and C_j such that d(C_i,C_j) is minimized.
3.2 Create a new cluster $C_k = C_i \cup C_j$
3.3 Create a new node in the tree, make it the parent of nodes *i* and *j*, at height d(C_i,C_j)/2.
3.4 Add cluster C_k to the list of clusters, and remove clusters C_i and C_j.

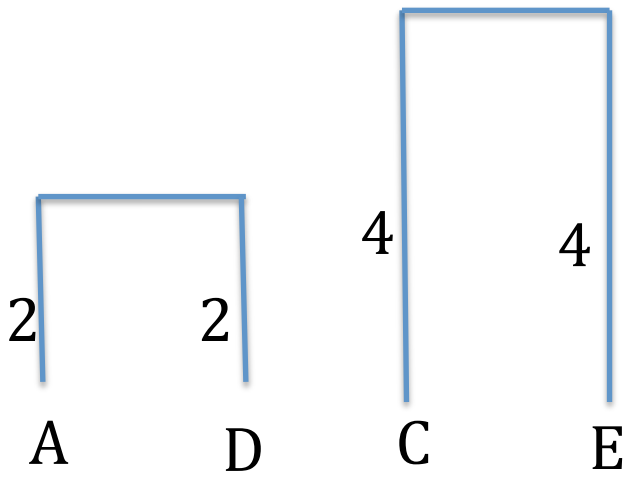
Example: Consider the following distance matrix D:

	A	B	C	D	E
A	-	16	16	4	16
B		-	10	16	10
C			-	16	8
D				-	16
E					-

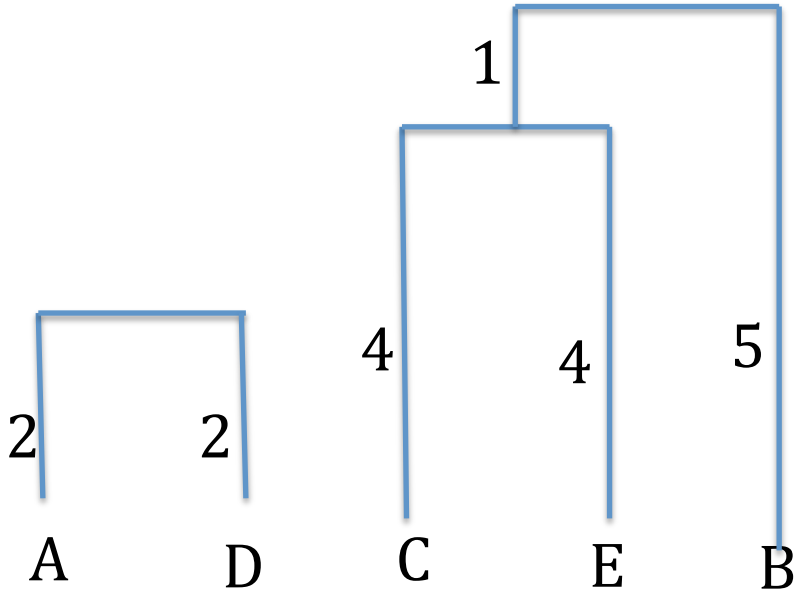
First set C1={A}, C2={B}, C3={C}, C4={D}, C5={E}.
The pair with the smallest distance is (C1,C4). Merge them to obtain C6={A,D} and create their parent node at distance d(C1,C4)/2 = 4/2 = 2 from each, to obtain:



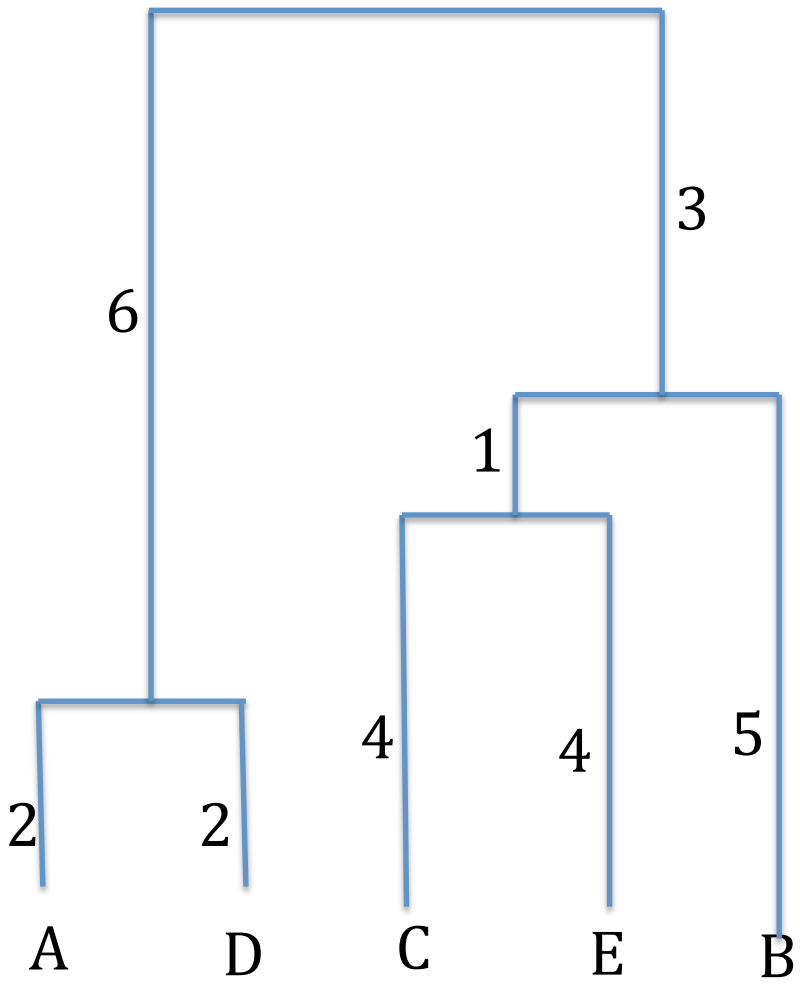
The next pair of clusters that is the closest is C3 and C5, with d(C3,C5)=8. Merge them to obtain C7={C,E} and create their parent node at distance d(C3,C5)/2 = 8/2 = 4 from each, to obtain:



The next pair of clusters that is the closest is C7={C,E} and C2={B}, with d(C7,C2)=(10+10)/2=10. Merge them to obtain C8={C,E,B} and create their parent node at height d(C7,C2)/2 = 10/2 = 5, to obtain:



There are only two clusters C6 and C8. Merge them and place their parent node at height d(C6,C8)/2 = ((16+16+16+16+16+16+16)/6) /2 = 8, to obtain:


6
3
1
4
4
5
2
2
A
D
C
E
B