

10/28/2025

- ## 2.4. BW-Transform

### ALGORITHM

- We list all 9 rotations of the 9 letter string
- We use wrapping around
- We list the rotations in lexicographic order

Def: In our lexicographic order, "\$" is at the beginning

- The last column (i.e. the last letter of each row from top to bottom) is the output of the algorithm

SORT  
 $\Rightarrow$   
 LEX

the sorted list of  
the 9 rotations

L	F
k	\$
\$	a
a	a
v	a
r	d
r	k
a	r
a	r
d	v

SORT  
 $\Rightarrow$   
 LEX

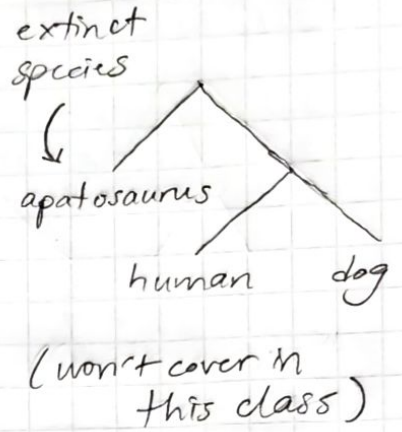
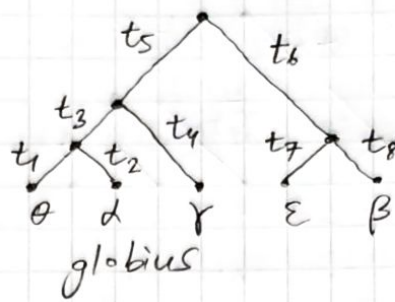
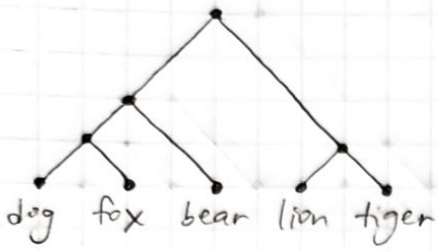
	2
\$	a
a	a
a	r
a	r
d	v
k	\$
r	d
r	k
v	a

LF2  $\Rightarrow$  SORT

3

recreate matrix

### Ch3. Phylogenetic Trees Algorithms



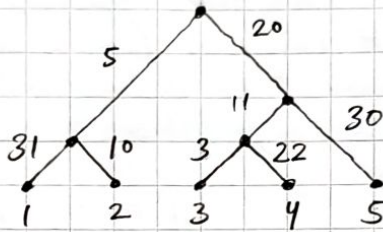
## Distances

set of species:  $\{ \underset{1}{\text{dog}}, \underset{2}{\text{fox}}, \underset{3}{\text{bear}}, \underset{4}{\text{lion}}, \underset{5}{\text{tiger}} \}$

## Pairwise distance

$d_{ij}$  = distance between species  $i$  and  $j$

	1	2	3	4	5
1					
2	5				
3	31	50			
4	20	100	21		
5			5	22	
6				10	



assume universal  
molecular clock  
(strong assumption,  
not very realistic)  
↓  
rates of evolution

OTU = operational taxonomic units  
taxonomy

3.1. UPGMA = unweighted pair group method using arithmetic averages

### Algorithm

Sokol & Michener 1958

## Example 2D

