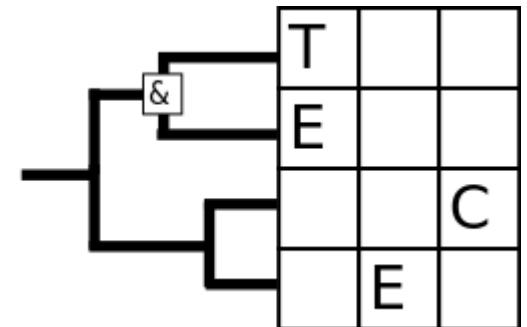


# Sampling incipient trees

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[www.github.com/richelbilderbeek/Science](https://www.github.com/richelbilderbeek/Science)



# Goal

## Share my naivety and insights

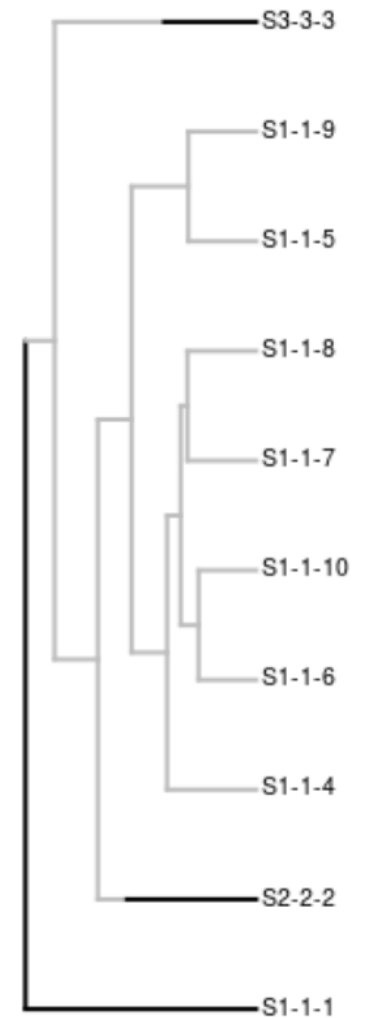
### I will:

Describe how incipient species trees are sampled

When the behavior is as I expected

When the behavior appeared unexpected

Suggest a new sampling method



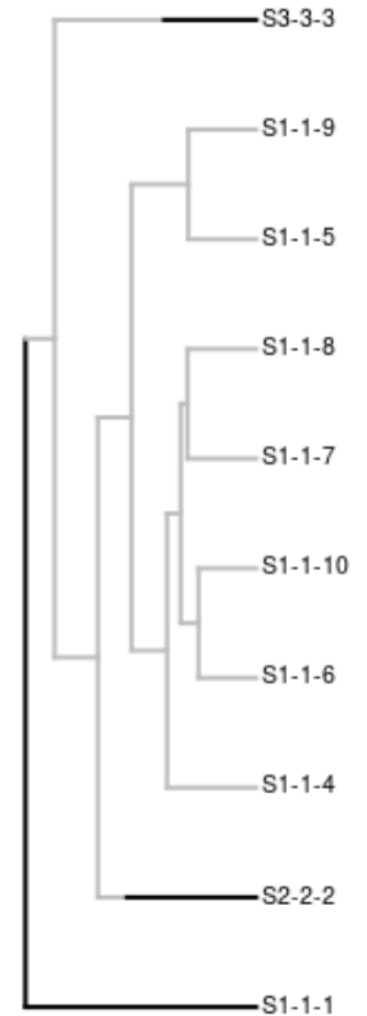
# Sampling

**An algorithm to pick an incipient species to represent a species**

**Three ways:**

- 1) oldest
- 2) random
- 3) youngest

**Can result in different species trees**



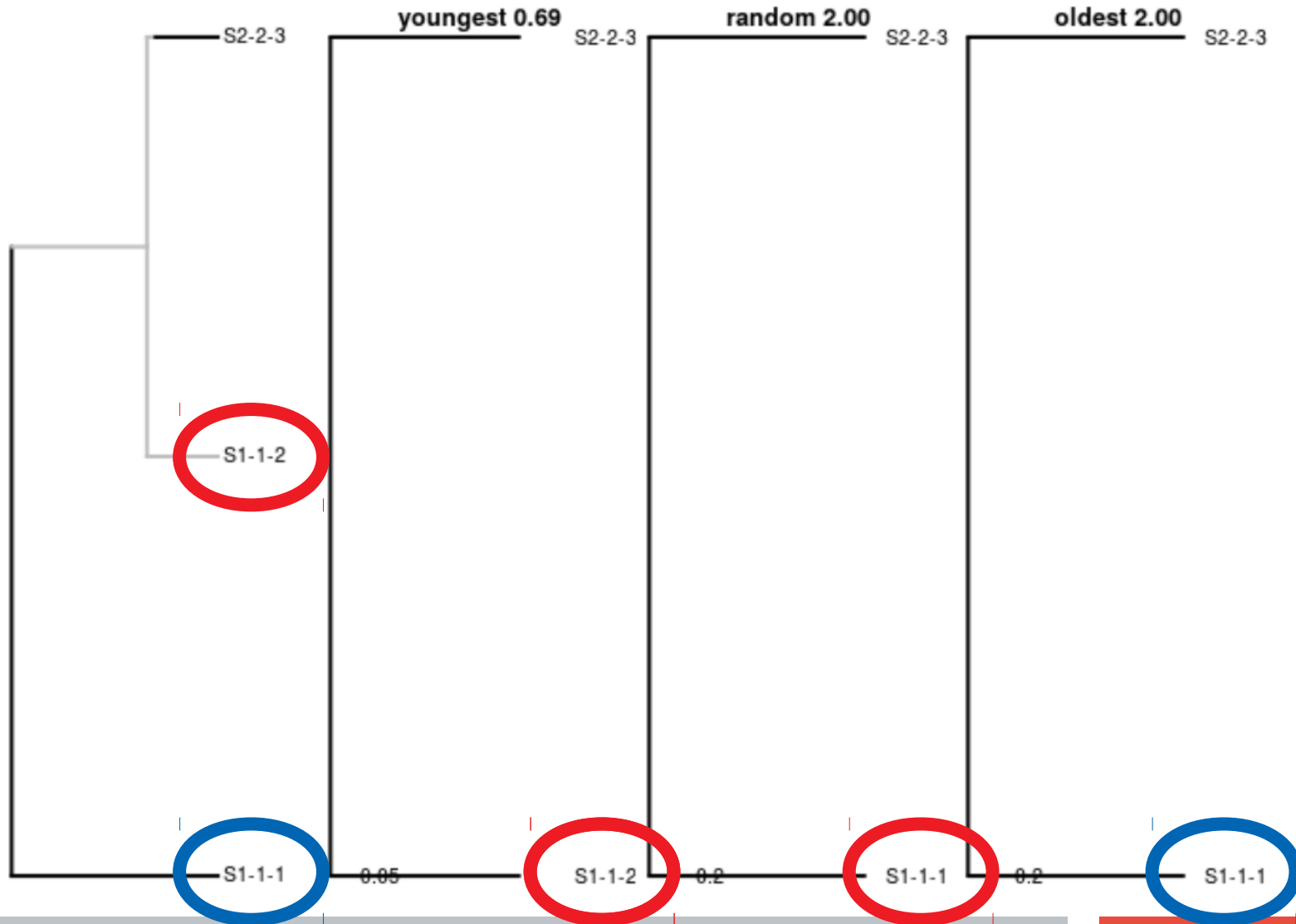
# My naive branch length expectations

youngest  $\leq$  oldest

youngest  $\leq$  random  $\leq$  oldest

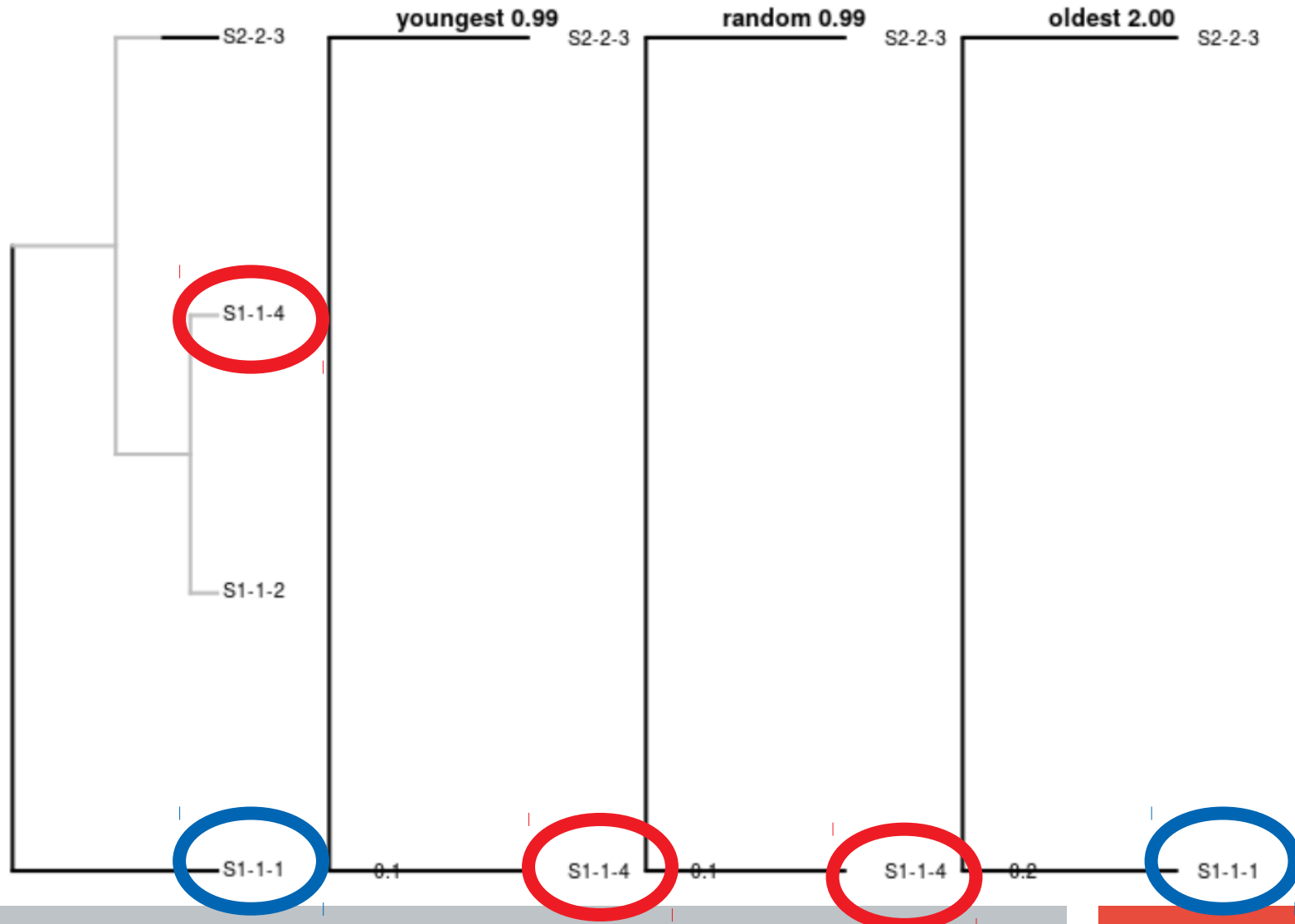
# Expected #1

youngest  $\leq$  random  $\leq$  oldest



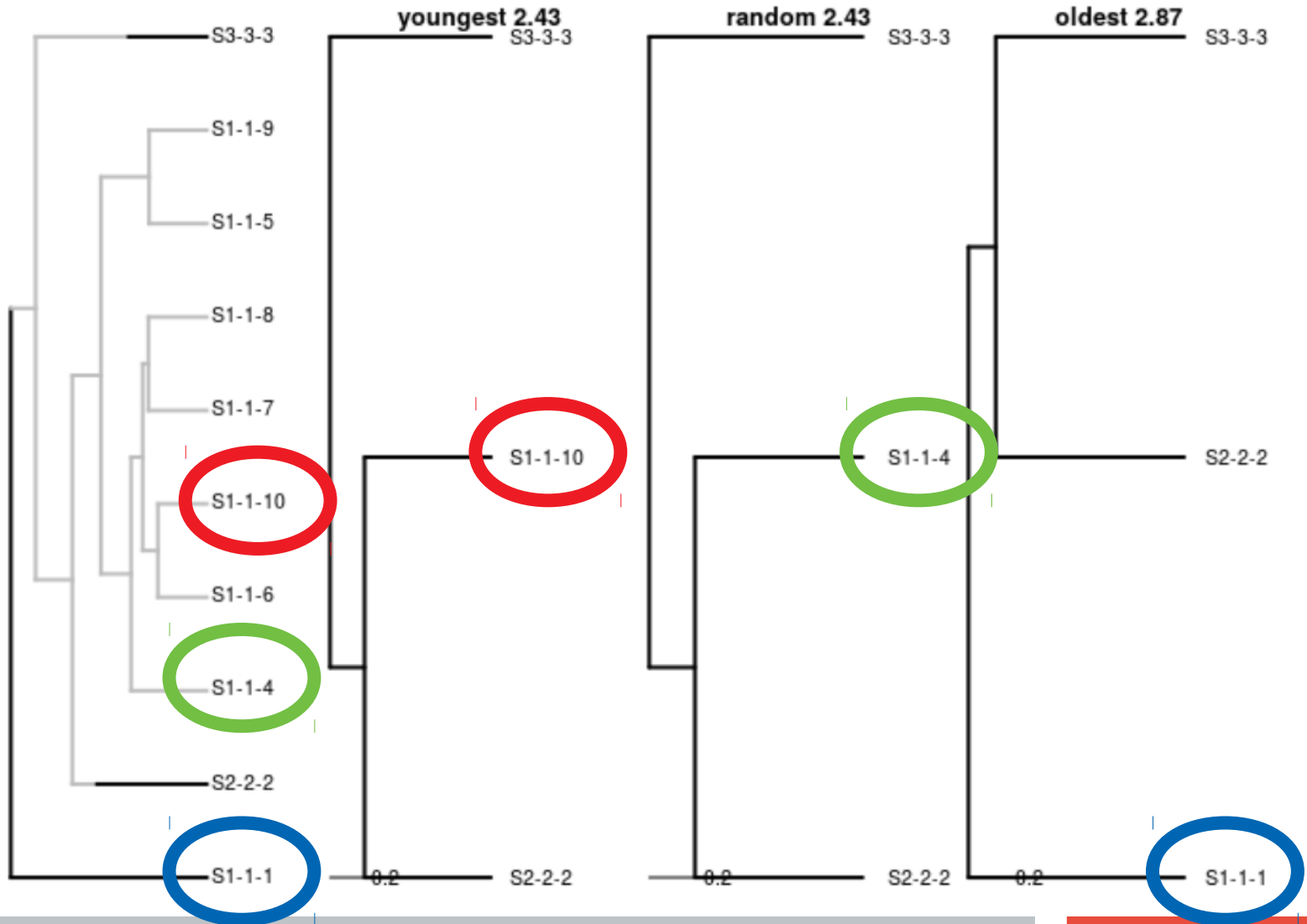
# Expected #2

youngest  $\leq$  random  $\leq$  oldest



## Expected #3

youngest  $\leq$  random  $\leq$  oldest



# My naive branch length expectations

youngest  $\leq$  oldest

youngest  $\leq$  random  $\leq$  oldest

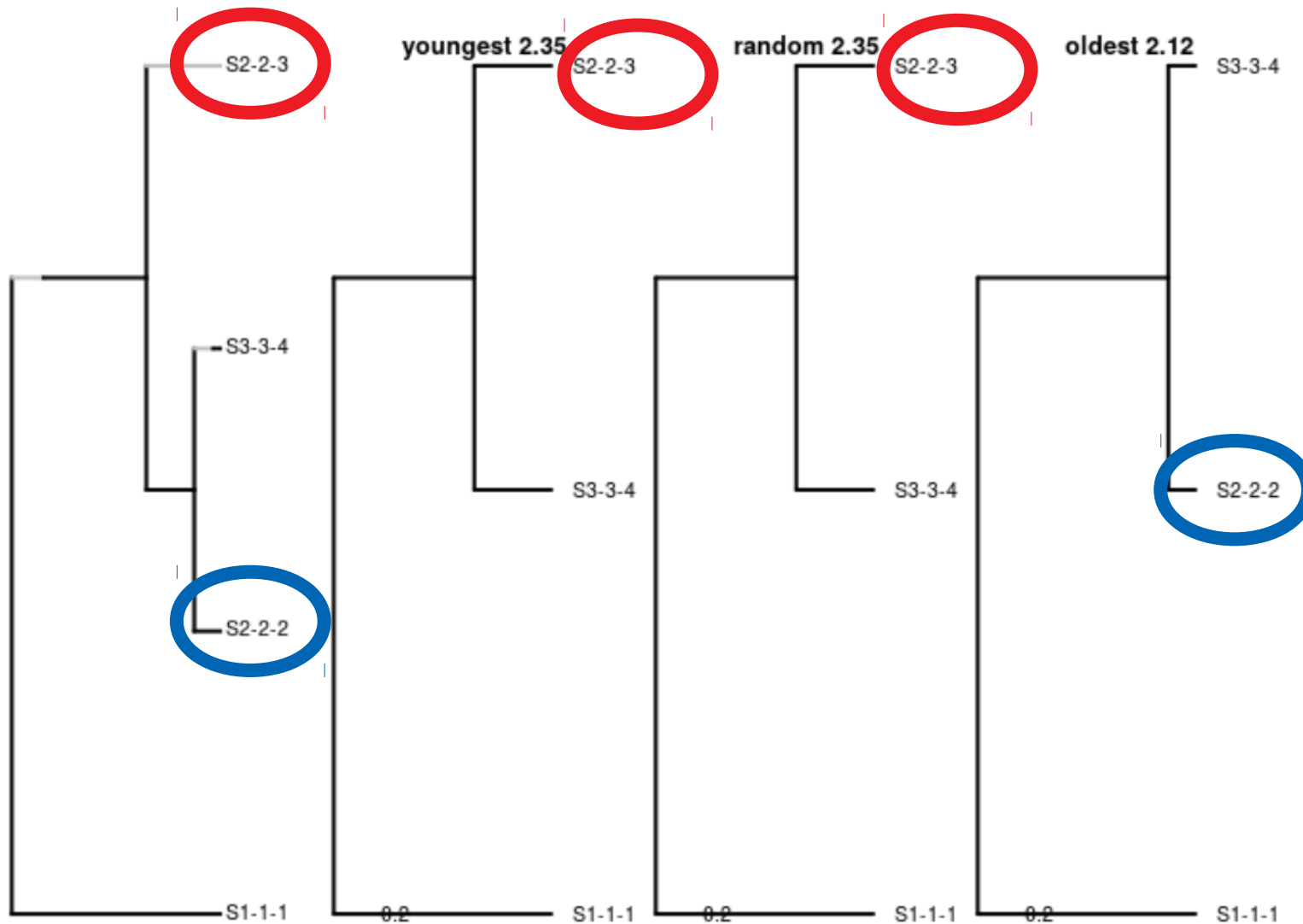


# My naive branch length expectations

youngest  $\leq$  oldest

youngest  $\leq$  random  $\leq$  oldest

# oldest $\leq$ youngest



# My naive branch length expectations



youngest  $\leq$  oldest

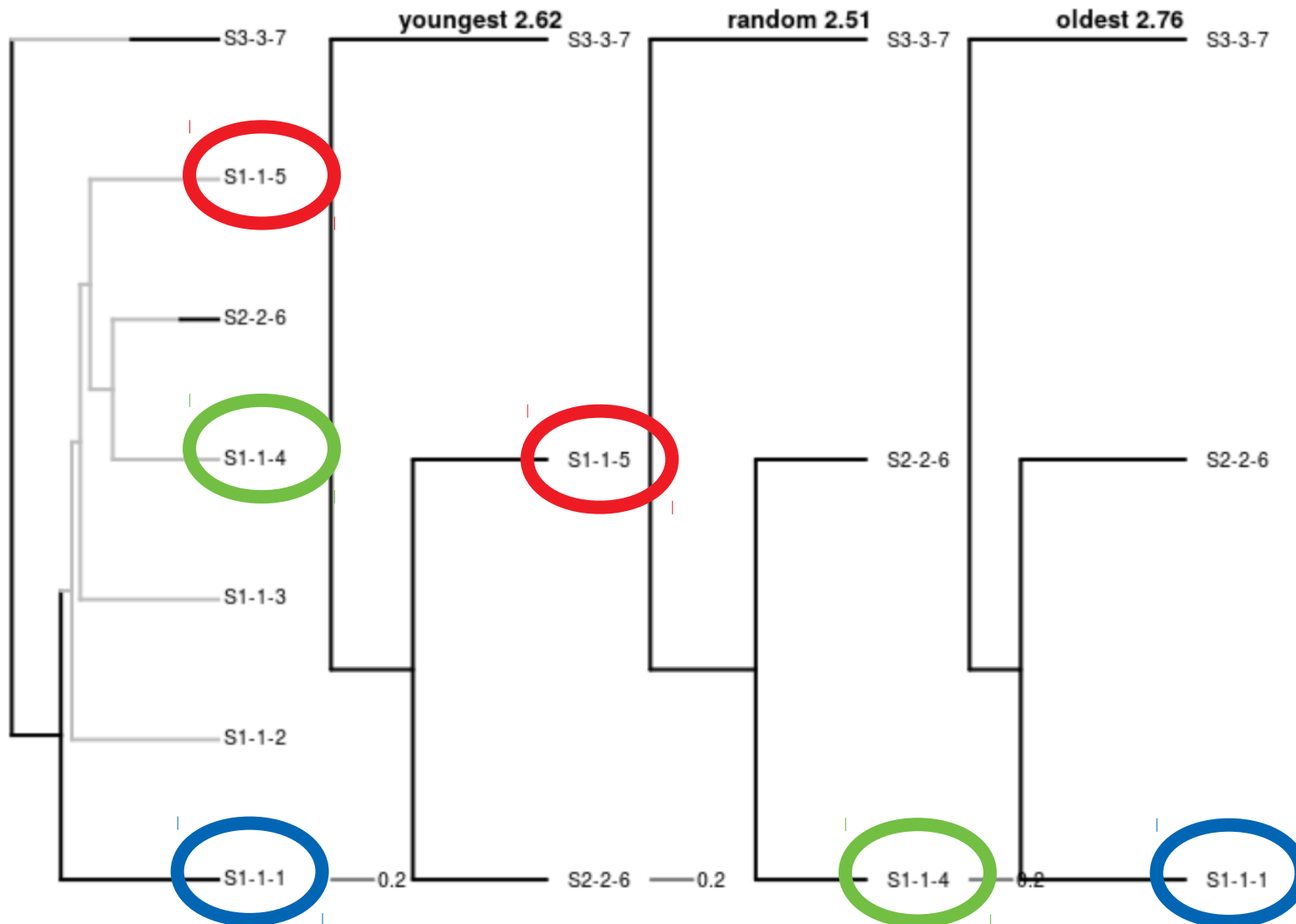
youngest  $\leq$  random  $\leq$  oldest

# My naive branch length expectations

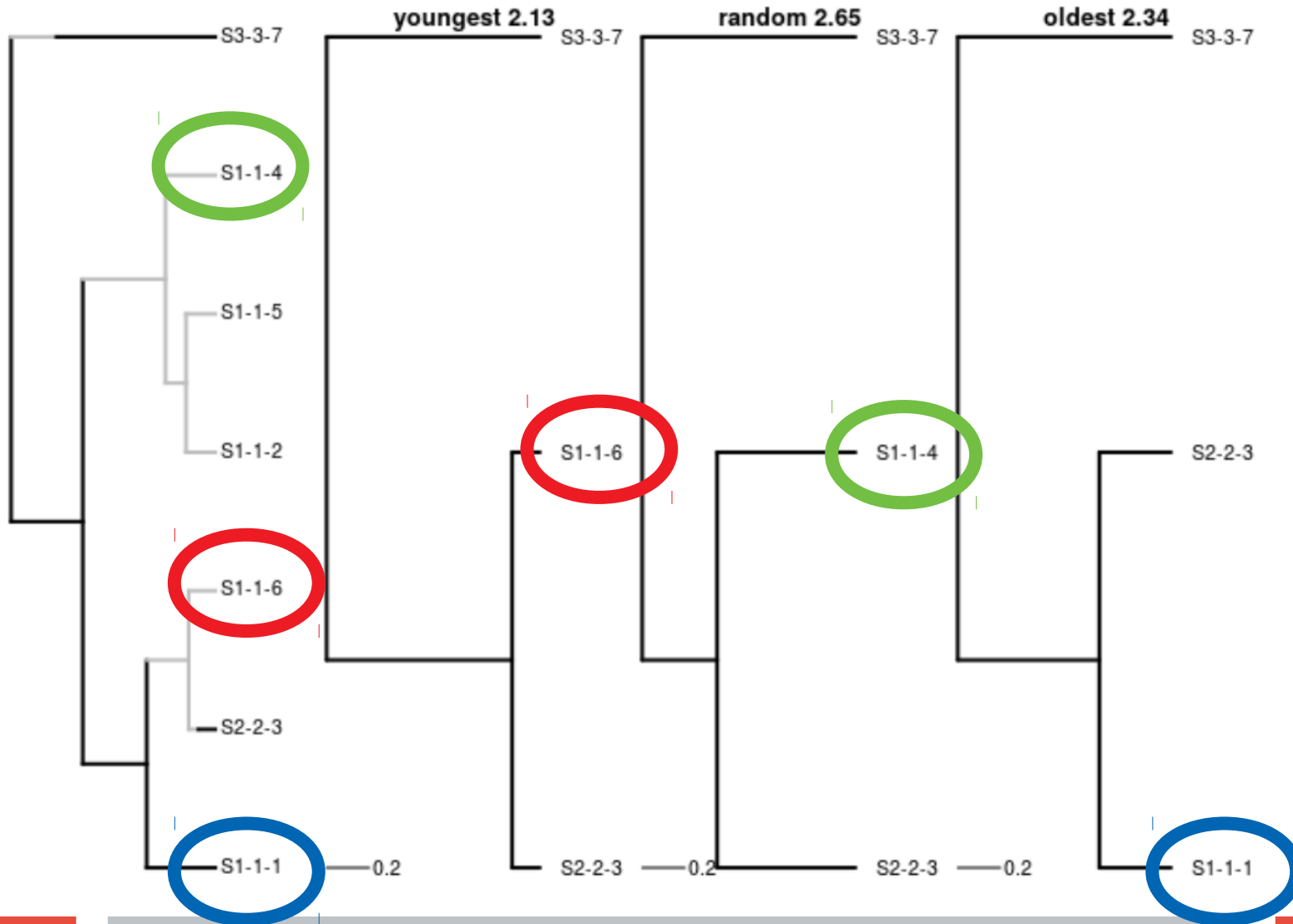
~~youngest  $\leq$  oldest~~

youngest  $\leq$  random  $\leq$  oldest

# random $\leq$ youngest



# oldest $\leq$ random



# My naive branch length expectations

youngest  $\leq$  oldest

youngest  $\leq$  random  $\leq$  oldest

# Conclusions

## The names 'youngest' and 'oldest' misled me:

Youngest does not give shortest branch lengths

Oldest does not give longest branch lengths

Random does not give intermediate branch lengths



$\text{youngest} \leq \text{random} \leq \text{oldest}$



# Conclusions

## Suggest to add 'shortest' and 'longest'

Shortest gives shortest branch lengths

Longest gives longest branch lengths

Random gives intermediate branch lengths


$$\text{shortest} \leq \text{random} \leq \text{longest}$$

# Questions?

**Redo out these calculations by running the vignette 'pbd\_sampling' from:**

**<https://github.com/richelbilderbeek/raket>**

```
devtools::install_package("richelbilderbeek/raket")  
git clone https://github.com/richelbilderbeek/raket
```