

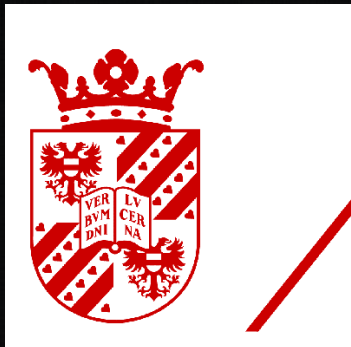
Ignoring incipient species

TRES meeting 2017-02-13

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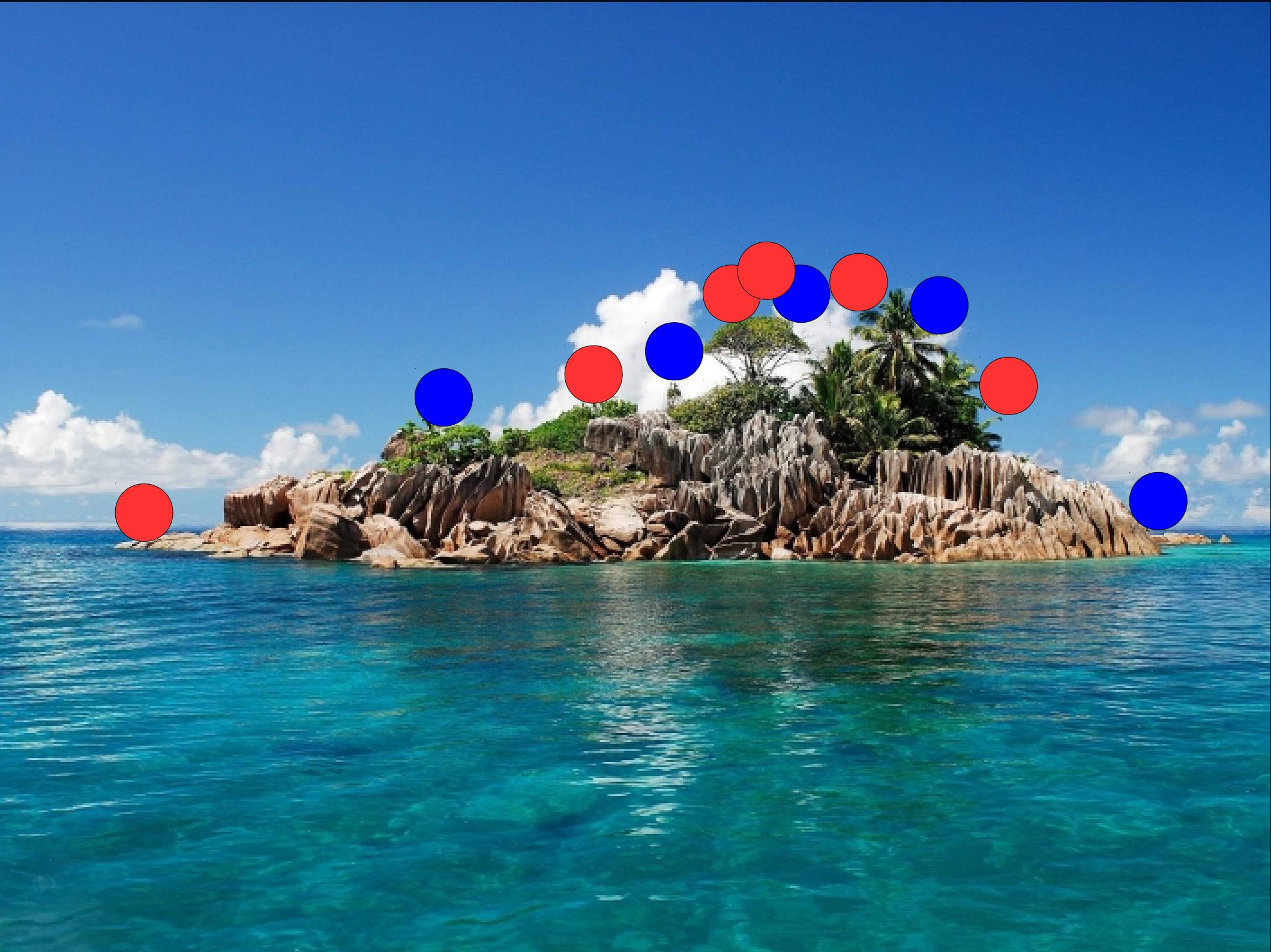


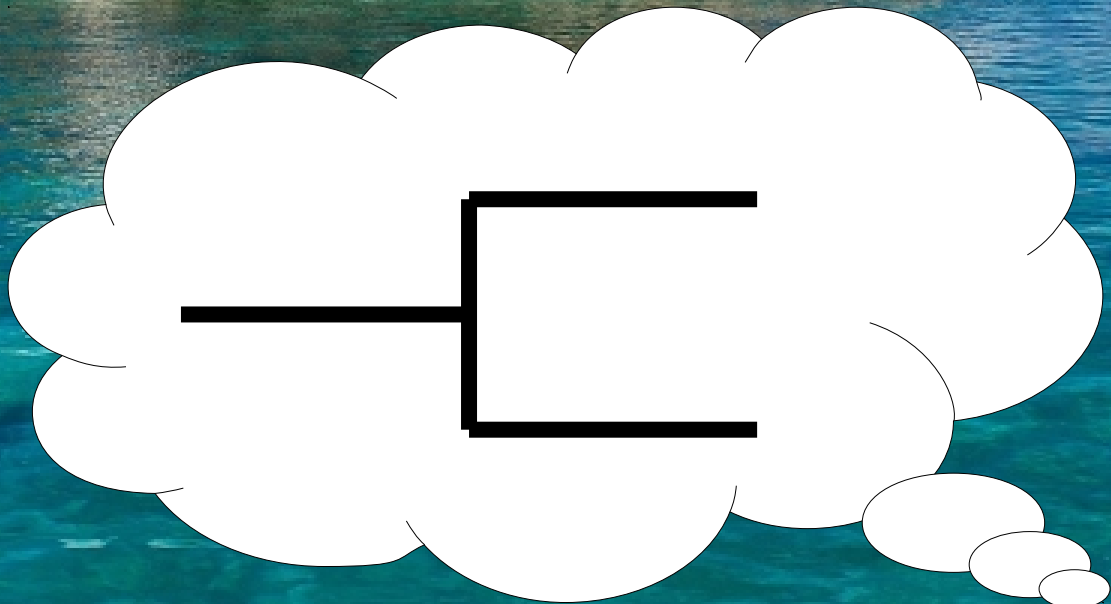
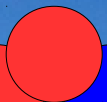
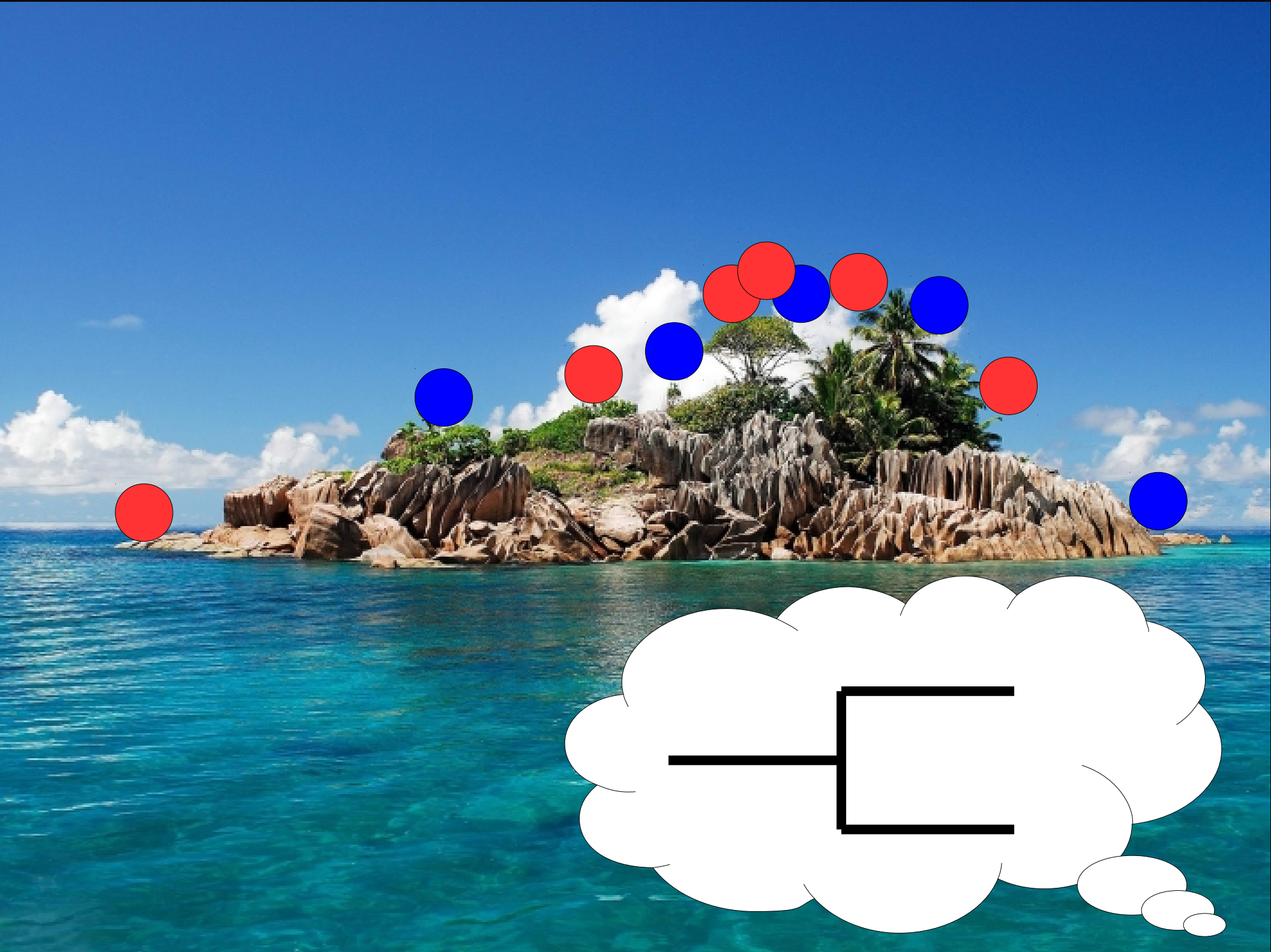
www.github.com/richelbilderbeek/Science













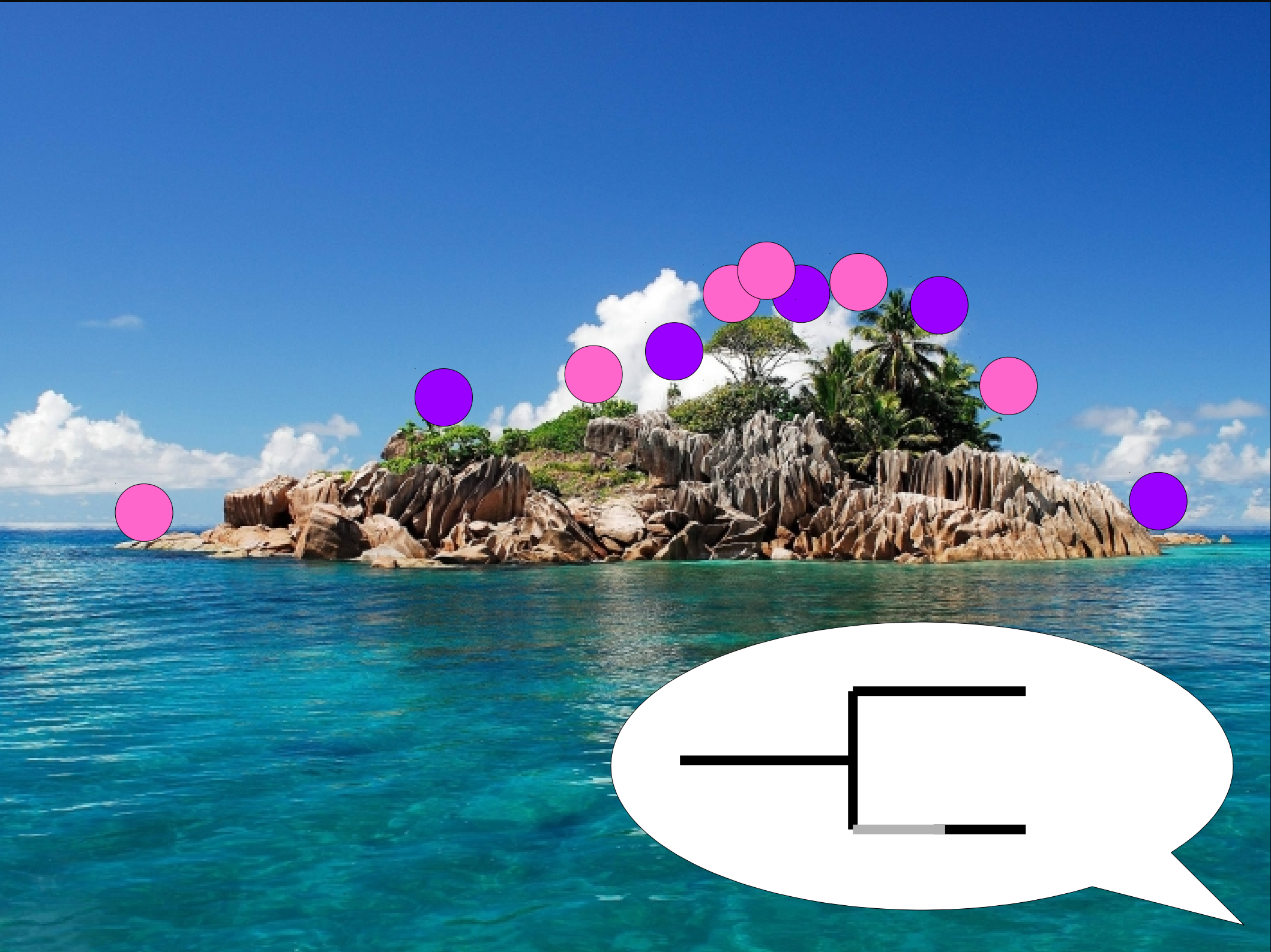


Research question

- What is the effect of ignoring the phase in which species are being formed?

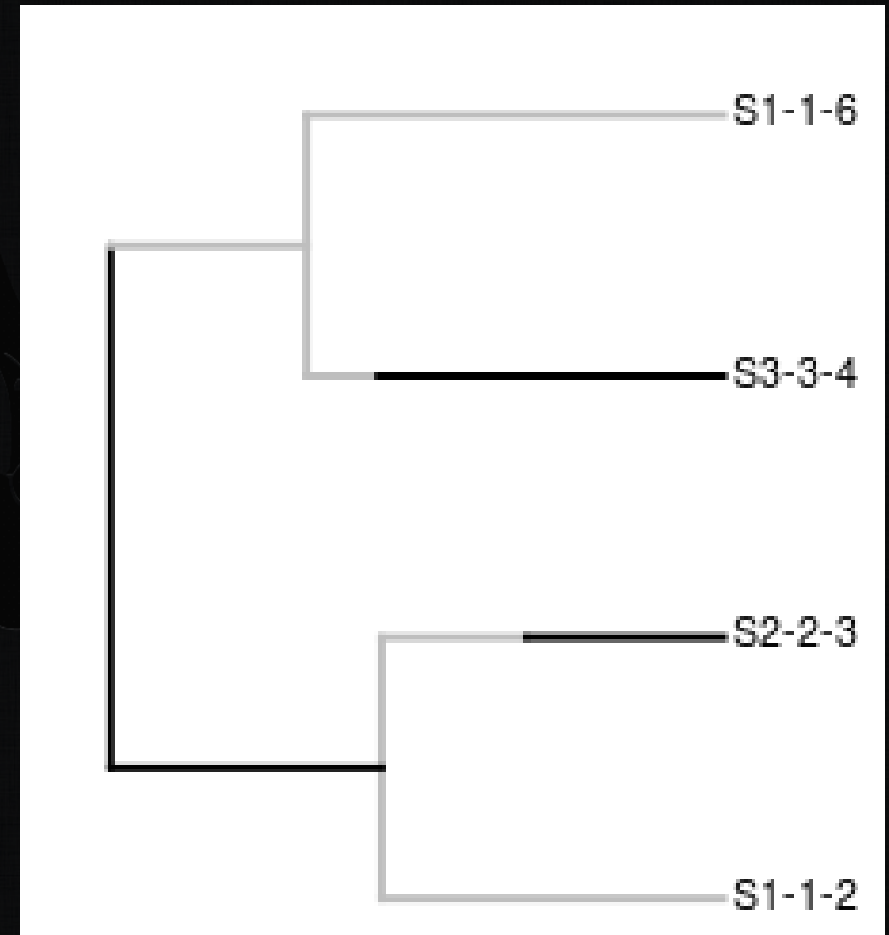
How long does that phase last?

Which species lived when?



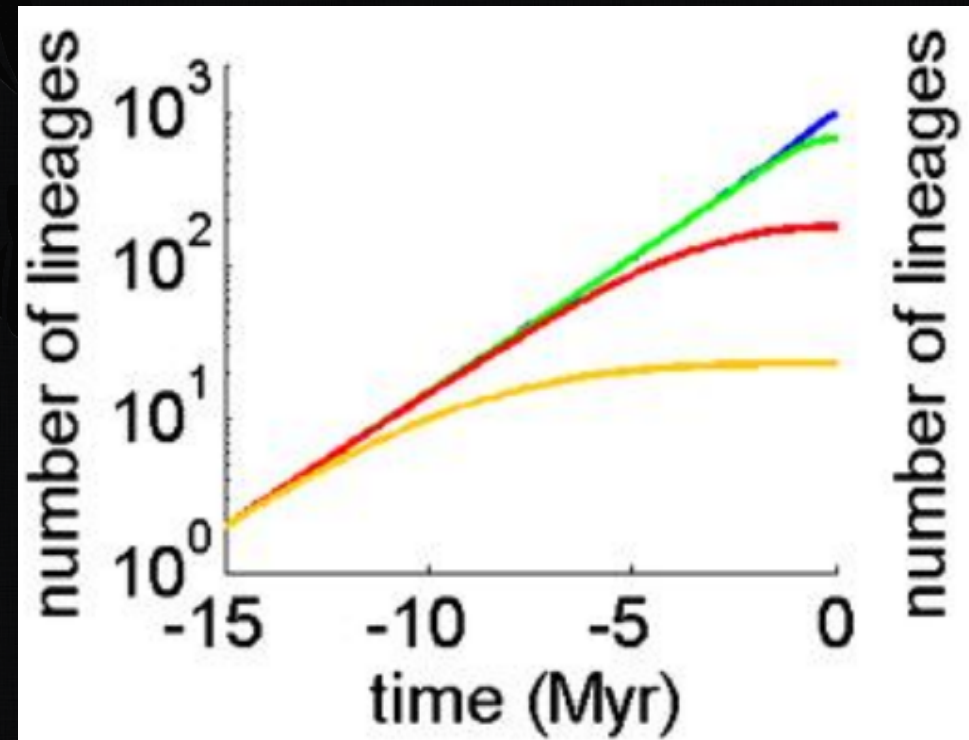
Protracted speciation [1]

- Extension of Birth-Death (BD) model [2]
- New species are incipient
- Speciation completion rate
 - Incipient \rightarrow good
 - BD if infinite



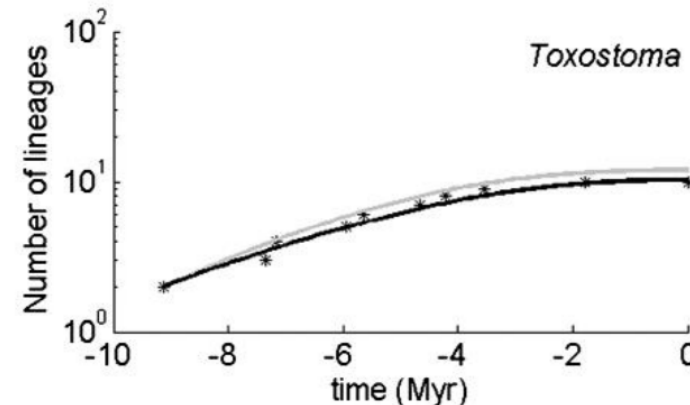
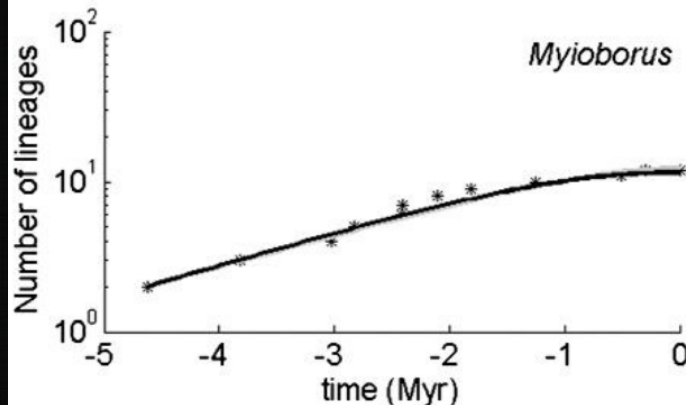
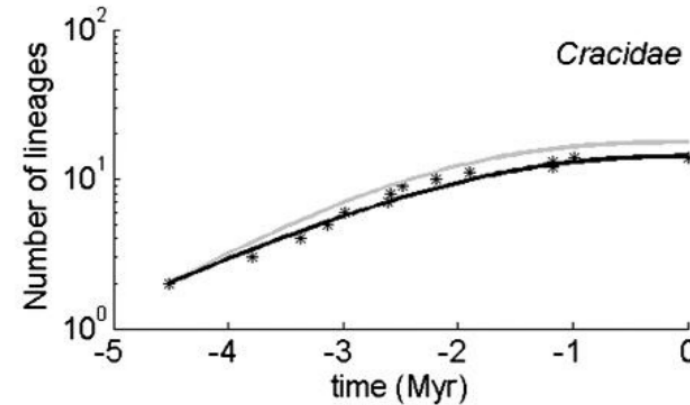
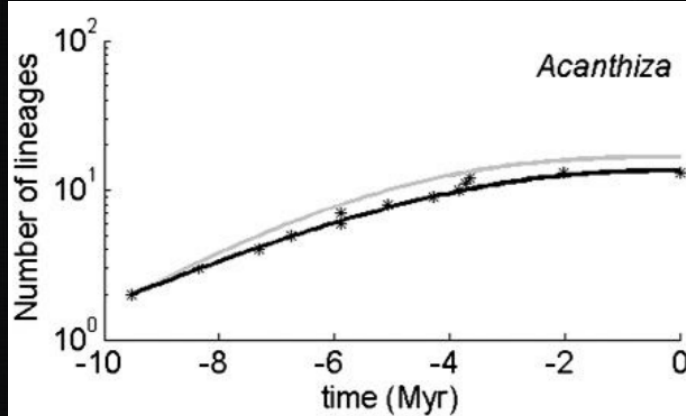
Protracted speciation

- Number of lineages towards the present flattens of
- Difference between two (n)LTT plots: nLTT statistic [1]



PBD in nature

Acanthiza nana,
Yellow
Thornbill



Crax daubentoni,
Yellow-
knobbed
Curassow



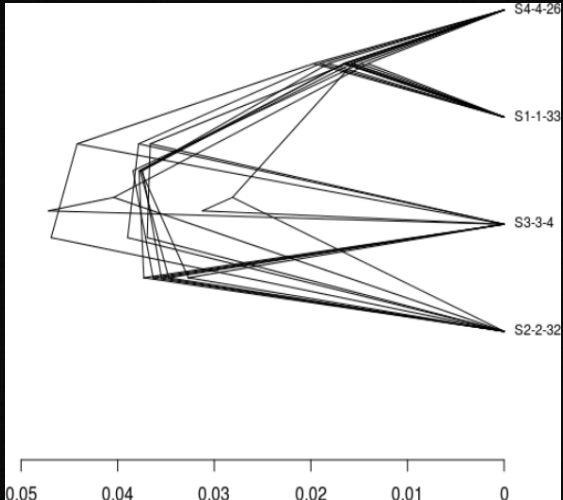
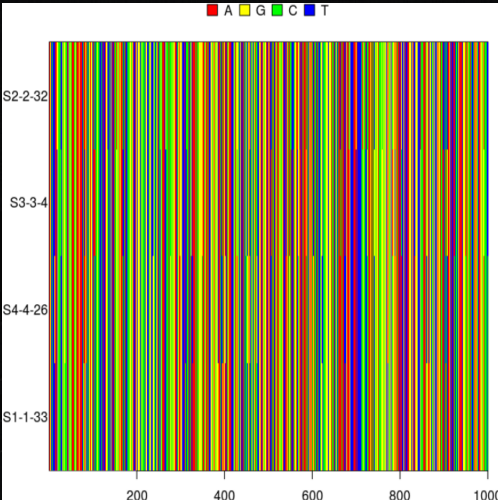
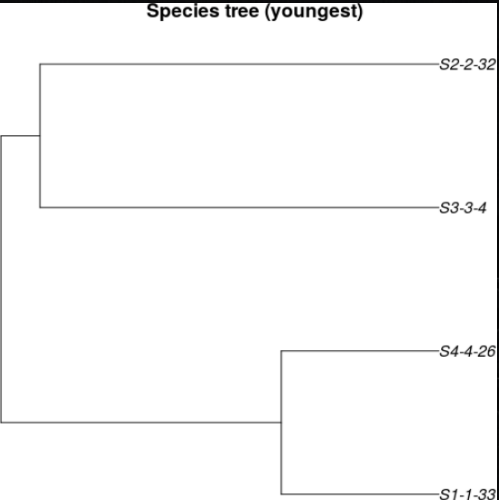
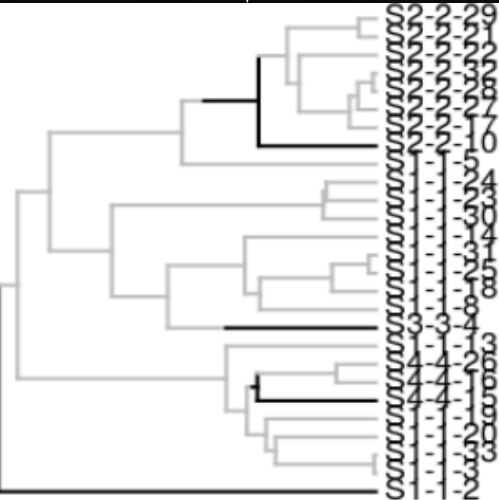
Myioborus torquatus,
Collared
Whitestart



Toxostoma rufum,
Brown
Thrasher

Etienne & Rosindell, 2012

Approach



Simulate an
incipient
species tree

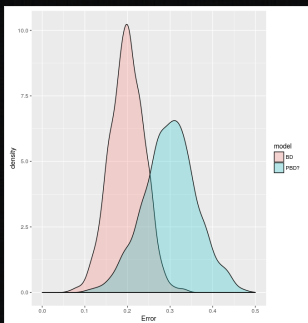
Sample species
trees

PBD

Simulate DNA
alignments

Infer species
tree posterior
(BEAST2)

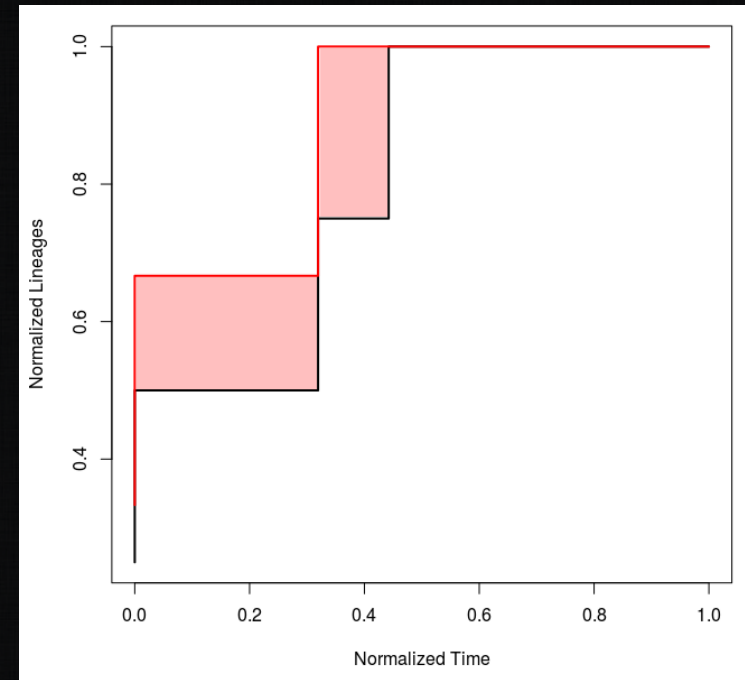
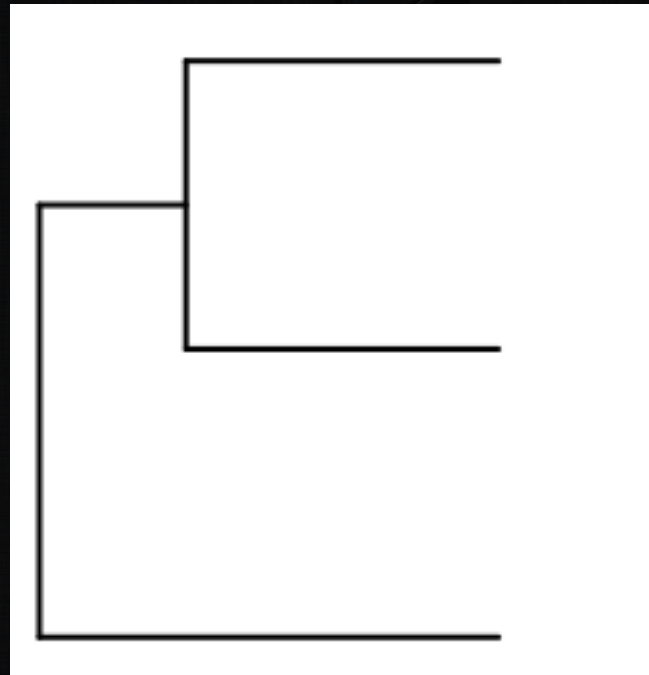
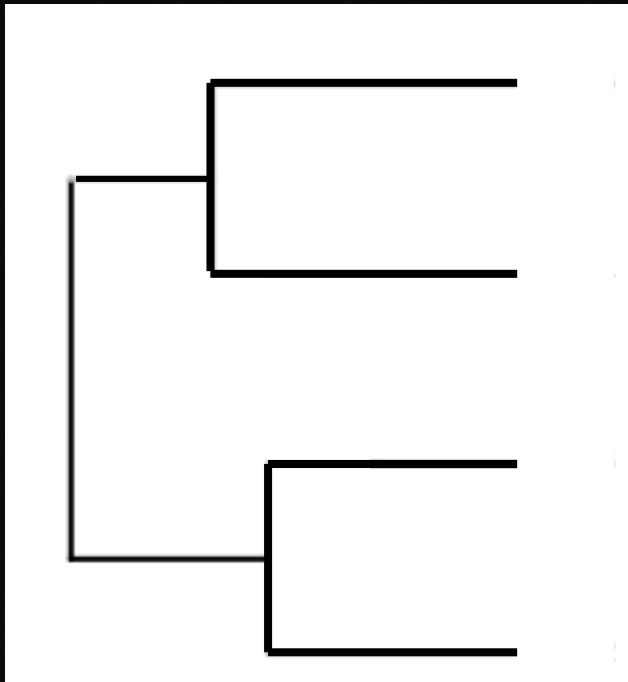
BD
prior



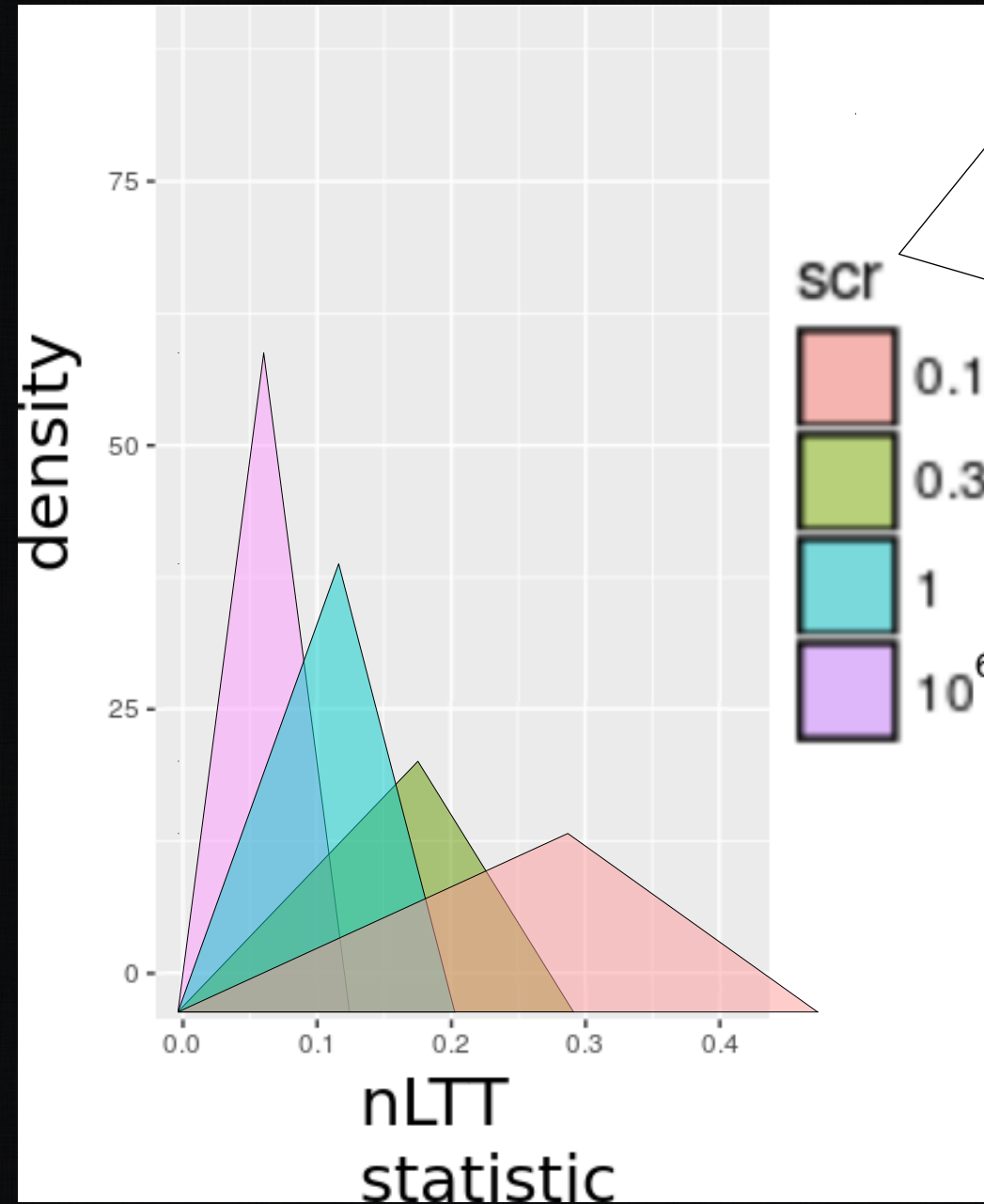
Measure difference/error (nLTT statistic)

nLTT statistic [1]

- Quantify difference between two phylogenies



Effect of SCR, prediction

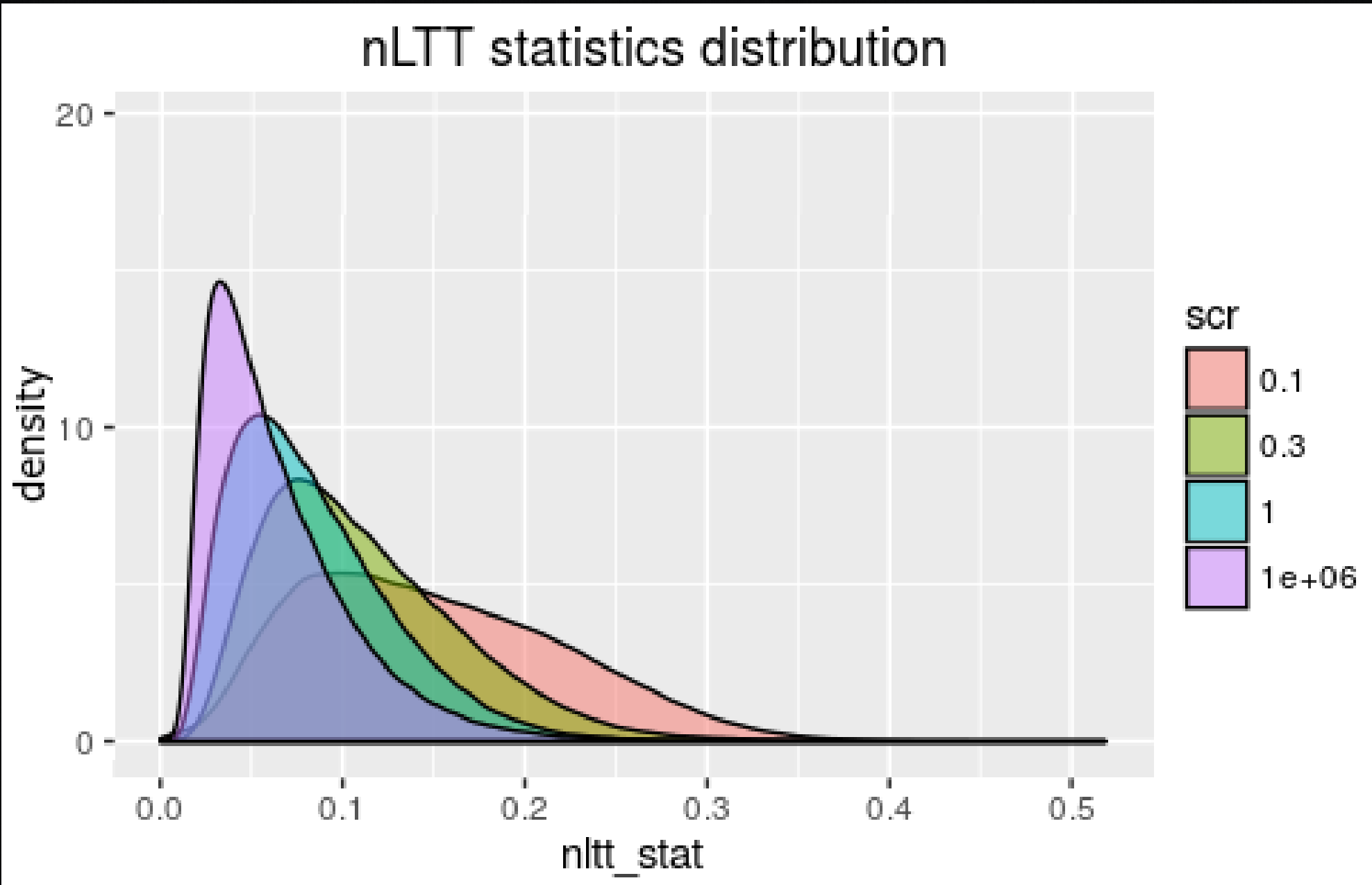


Speciation Completion Rate

Protracted Birth-Death

Birth-Death (BD) model

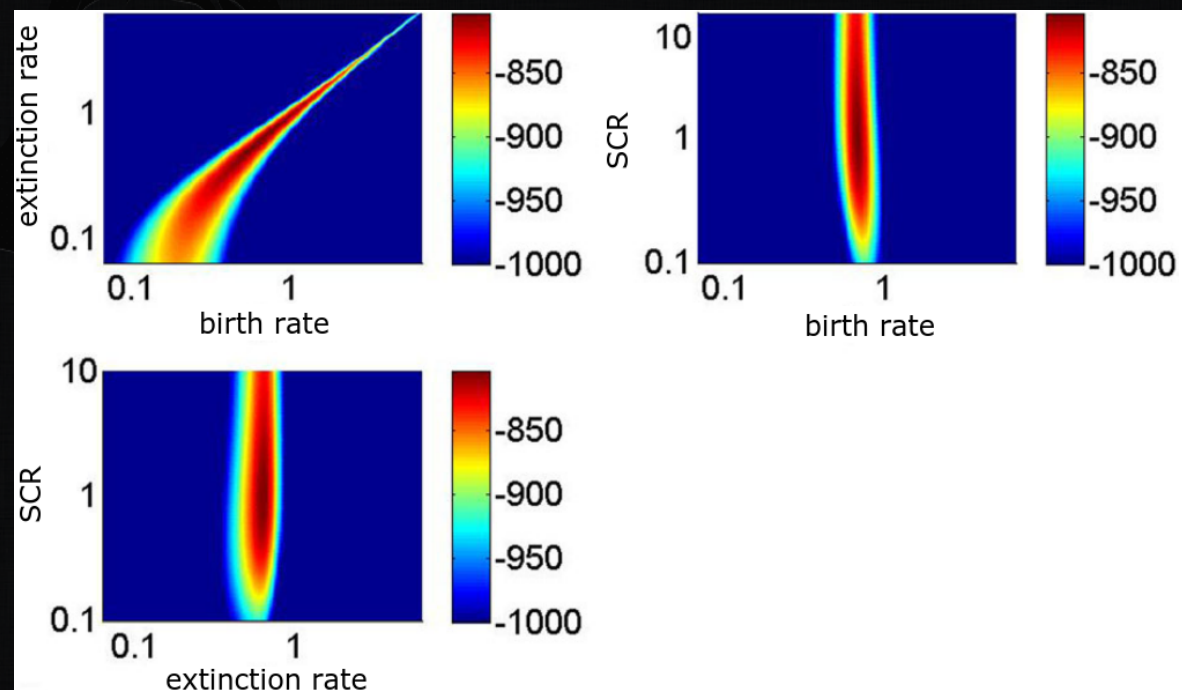
Effect of SCR, measured



SCRs in nature

- Birds: 0.04-0.89
- Primates: around 1

Data set	λ_2 (Myr ⁻¹)
<i>Acanthiza</i>	0.07
<i>Cracidae</i>	0.16
<i>Myioborus</i>	0.39
<i>Toxostoma</i>	0.06



Adapted from Etienne et al., 2014

Conclusion

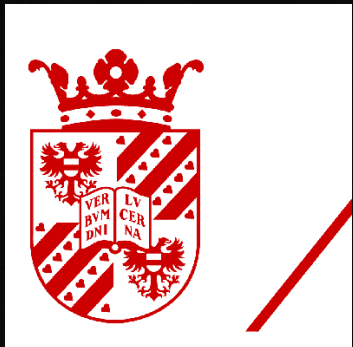
- Low SCR increases the error made in inference by a BD prior
- For primates ($SCR \approx 1$): good enough
- For birds ($SCR < 1$): maybe not
- Lower extinction rates reduces error (not shown)

Discussion

- Factorial setup of all parameters failed for some combinations for unknown reasons
 - Only one speciation initiation rate
- Other summary statistics
 - γ , Δr , MRBS
- Redo my research:
 - www.github.com/richelbilderbeek
 - wiritttes: simulation
 - wiritttea: analysis

Acknowledgements

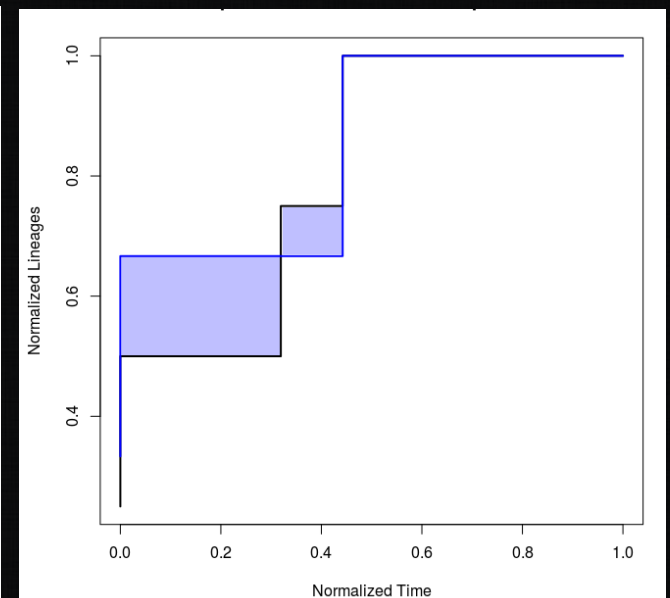
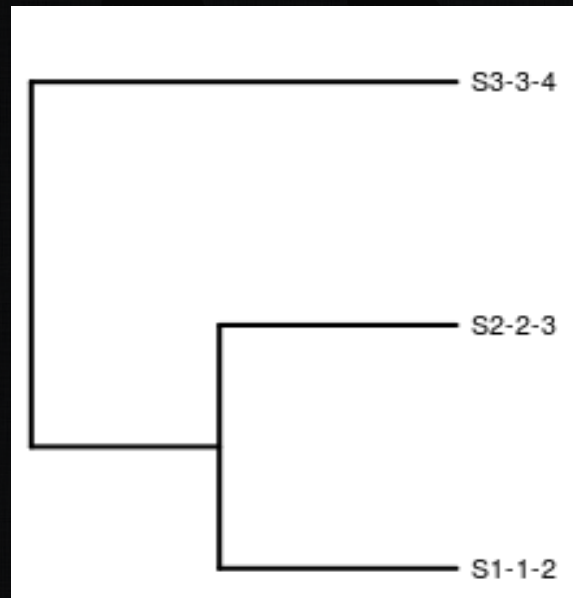
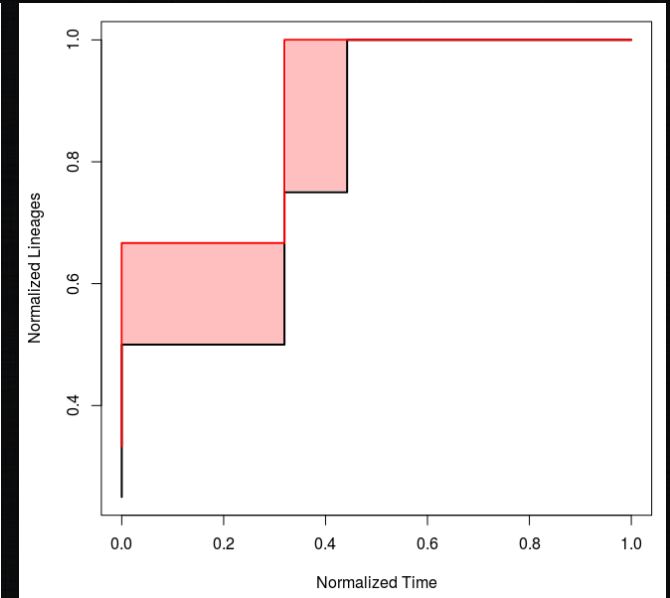
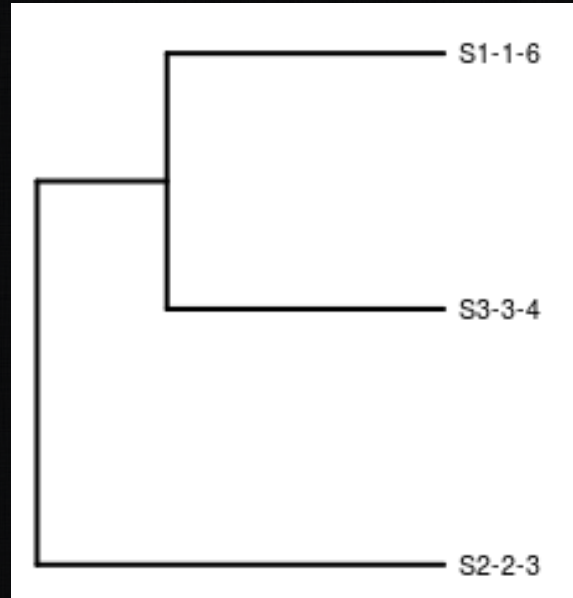
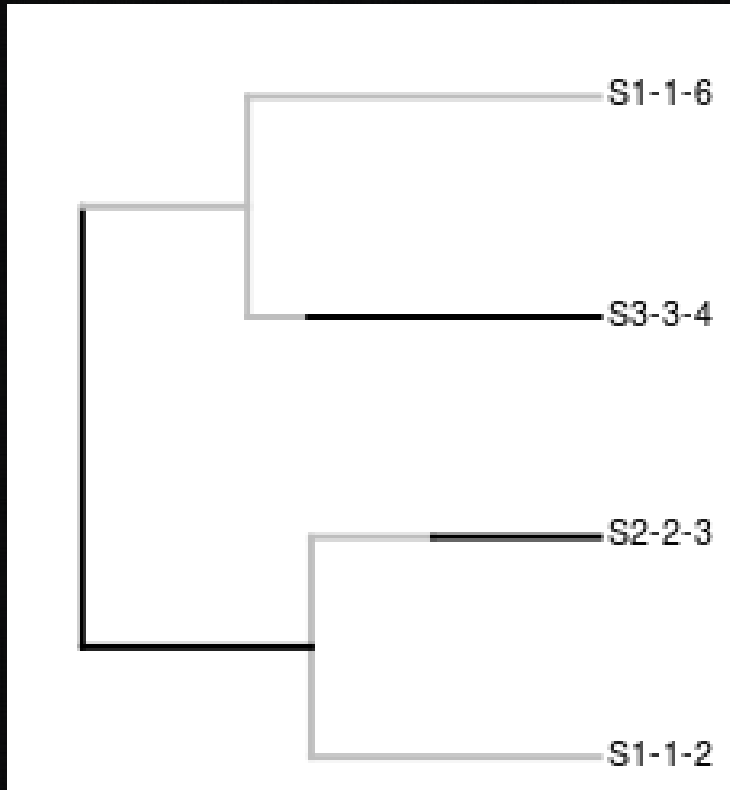
- Rampal Etienne
- Jolien Gay
- Femke Thon



Questions?

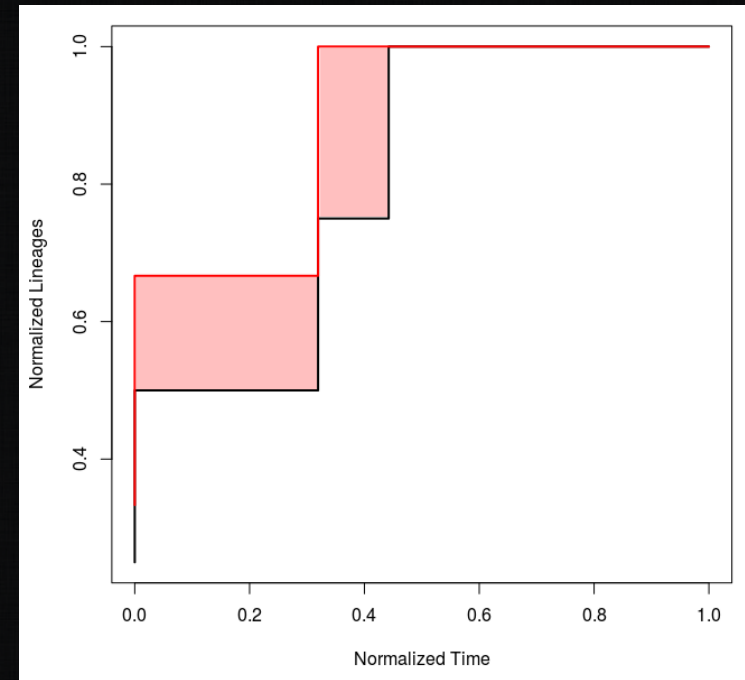
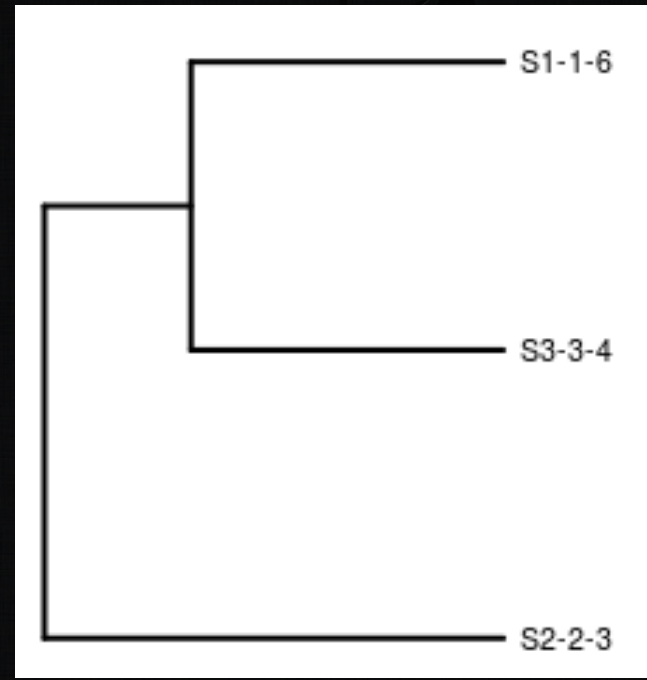
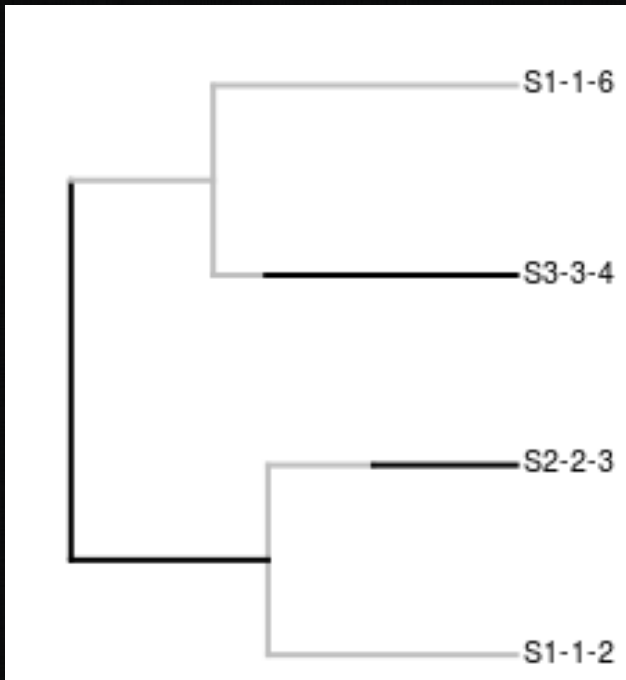


Simulated truth

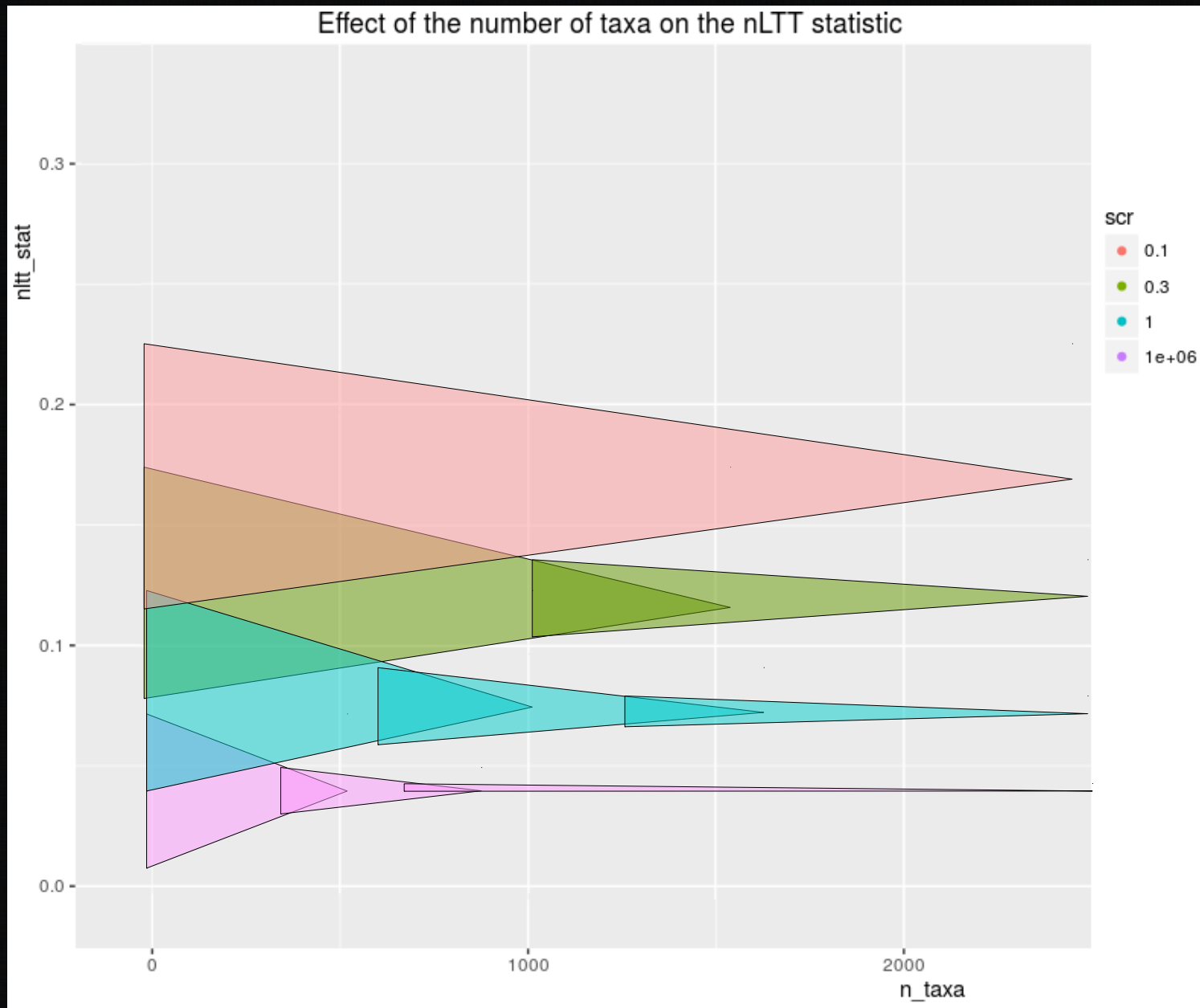


nLTT statistic [1]

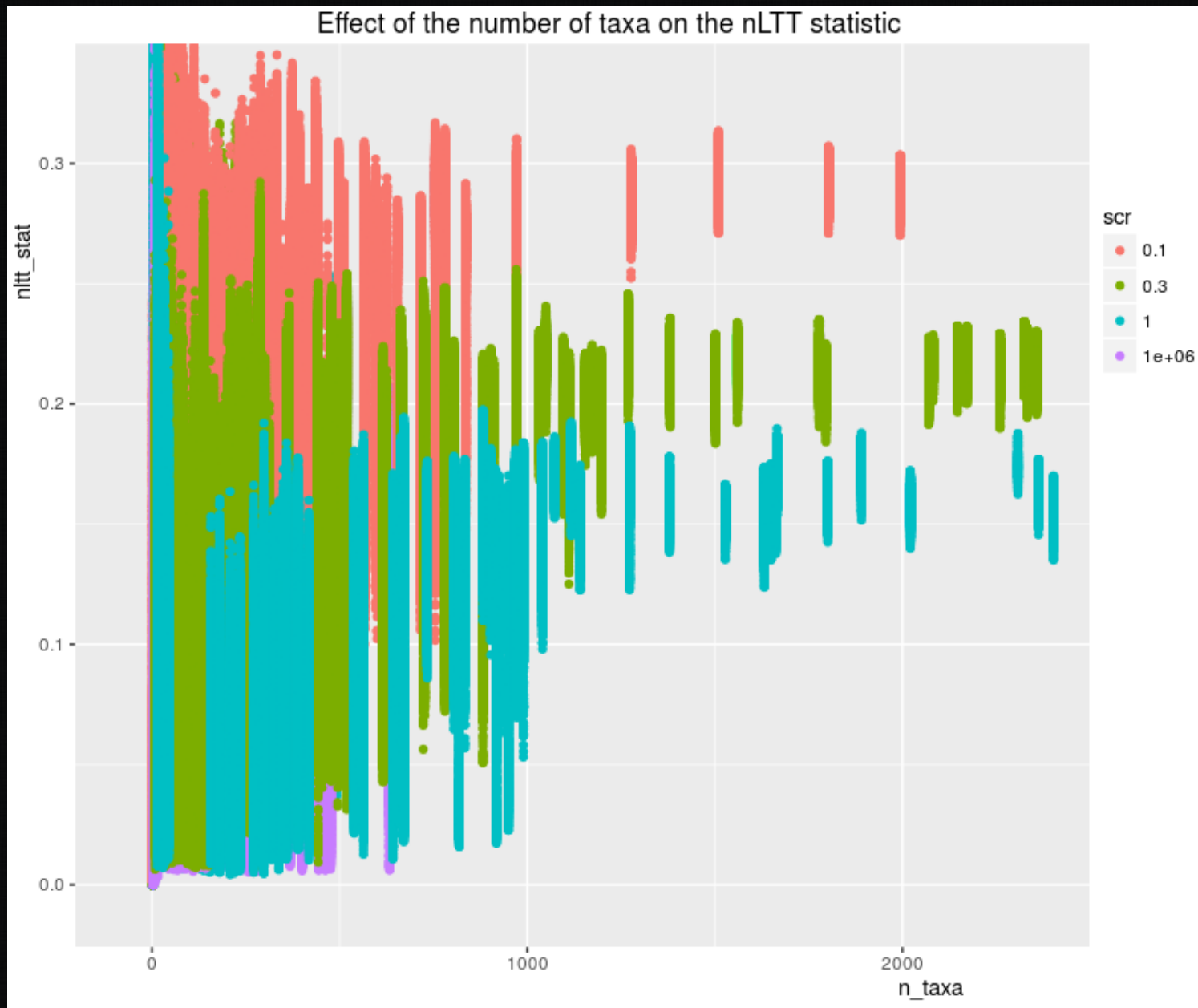
- Quantify difference between two phylogenies



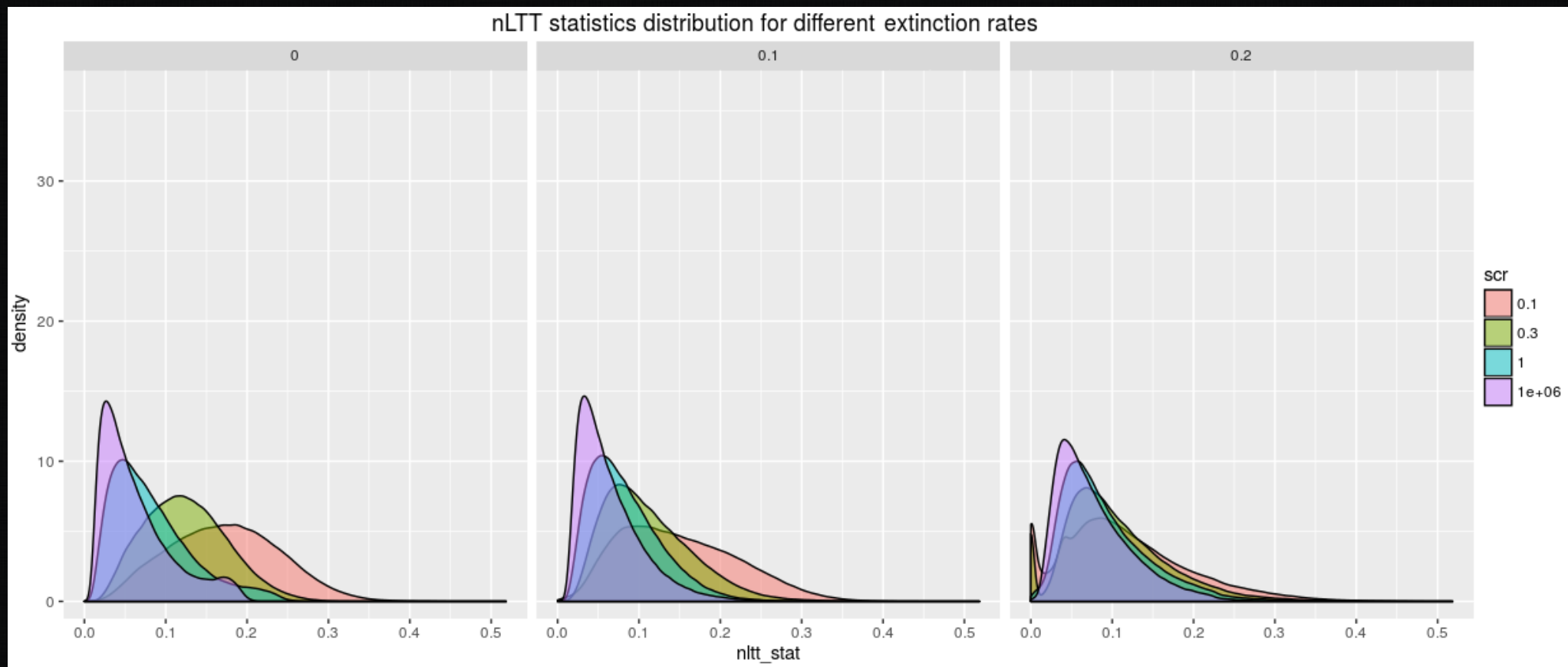
Effect of #taxa, expected



Effect of #taxa, measured



Extinction rates



nLTT statistics distribution for different speciation initiation (rows) and extinction rates (columns)

