

Reconstructing networks of rabies transmission

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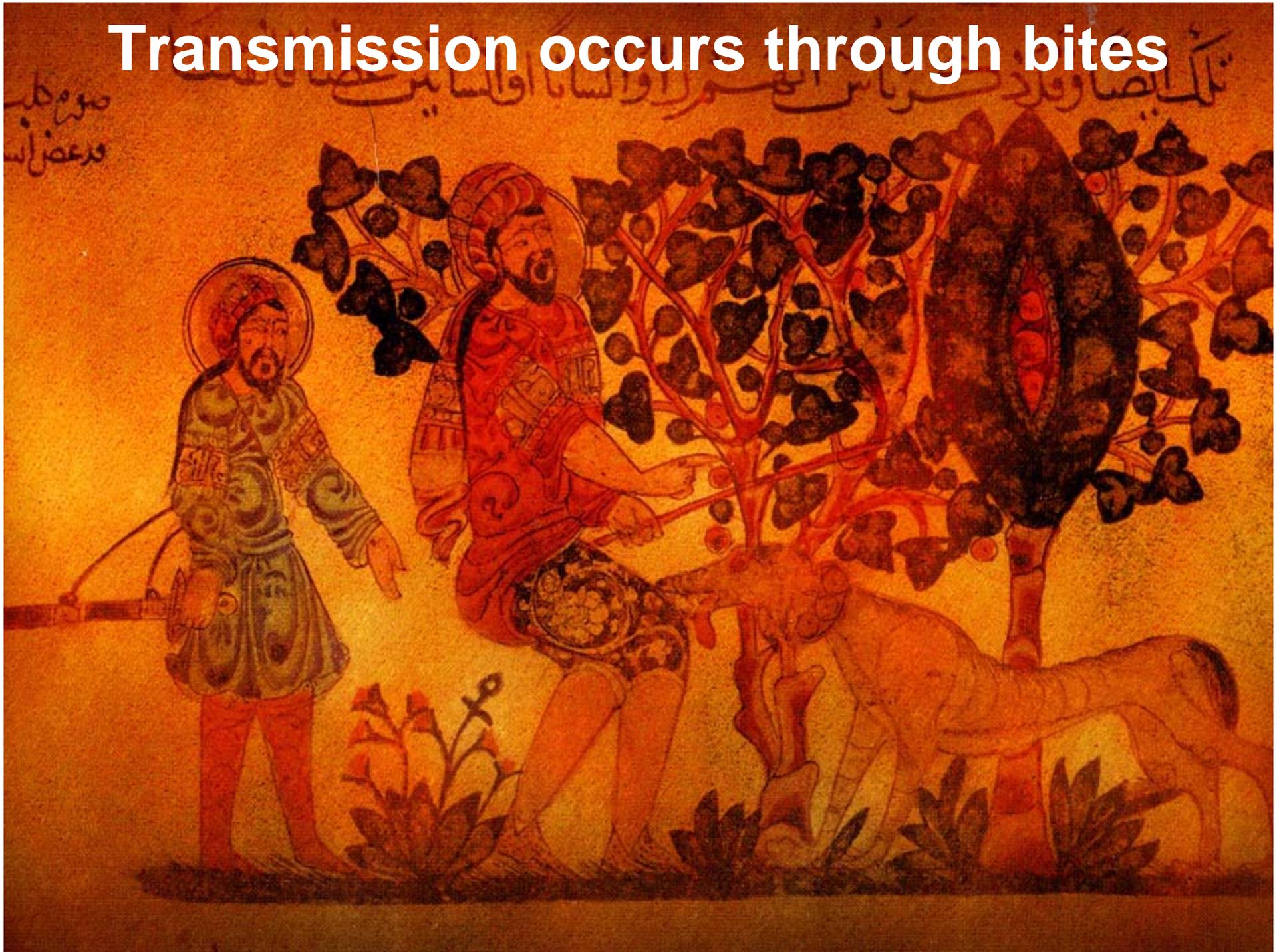
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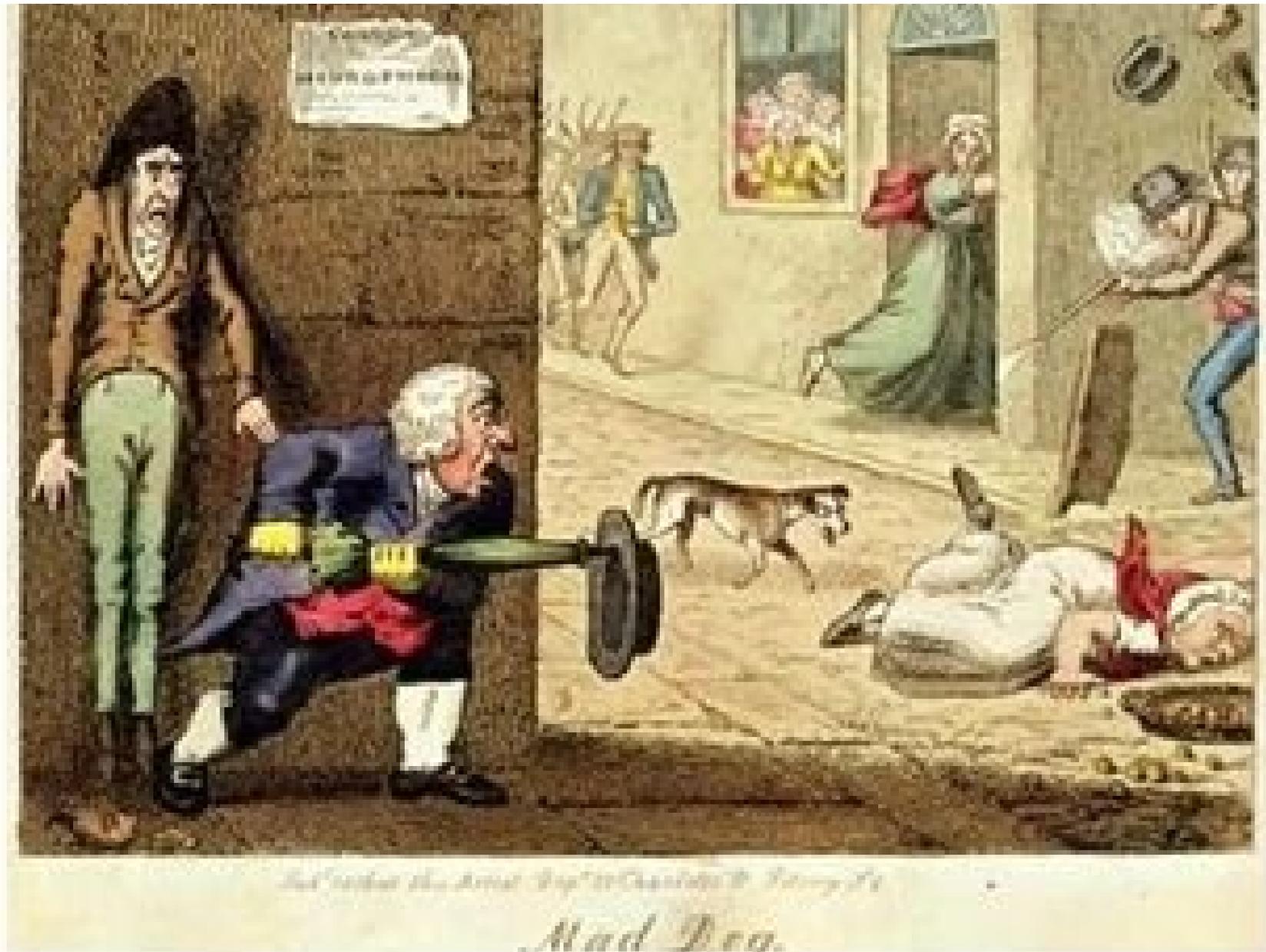
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Transmission occurs through bites



Transmission is often observed



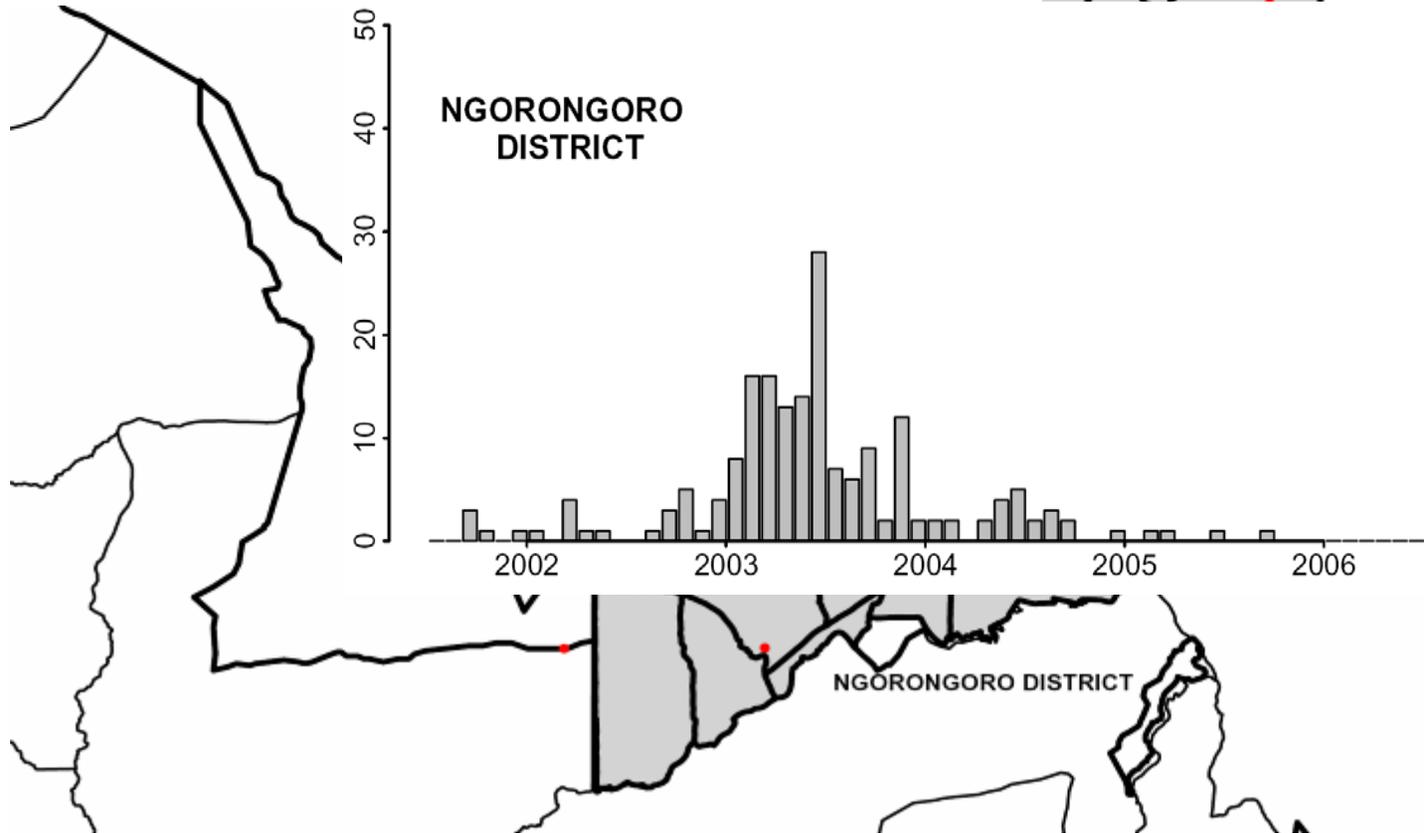
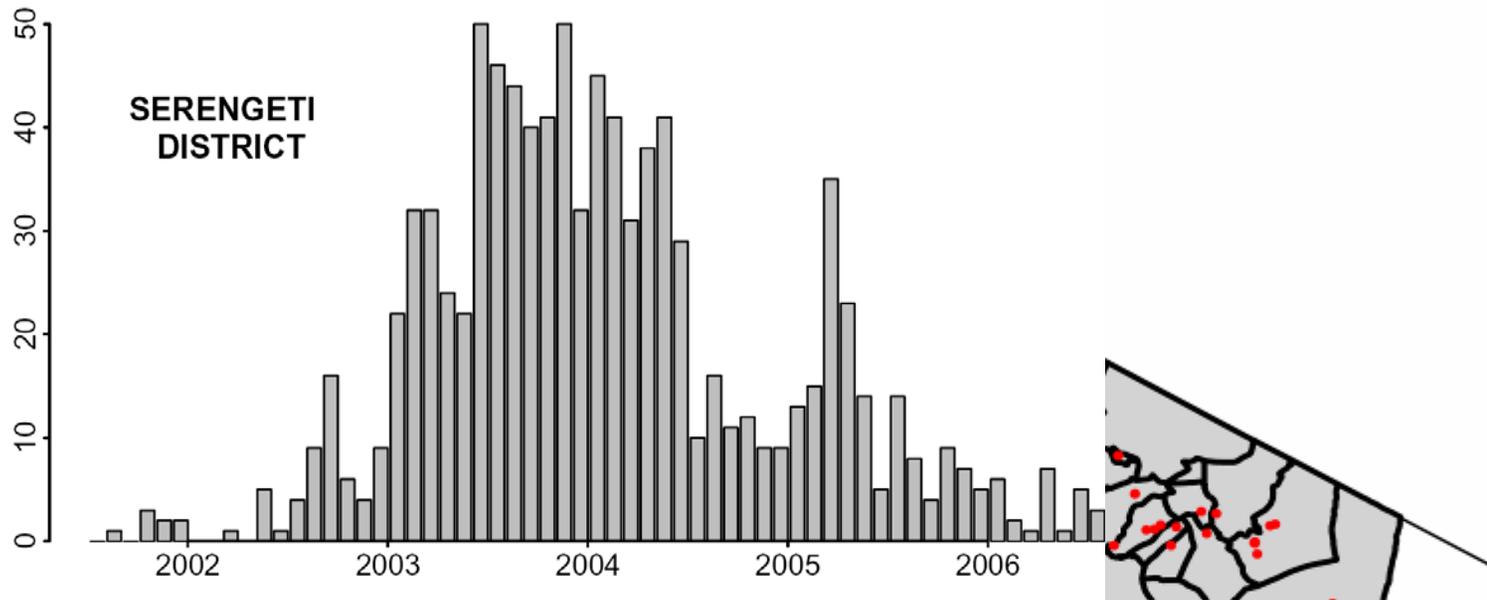
Rabid animals are usually recognizable



Data Collection:

CONTACT TRACING





Questions:

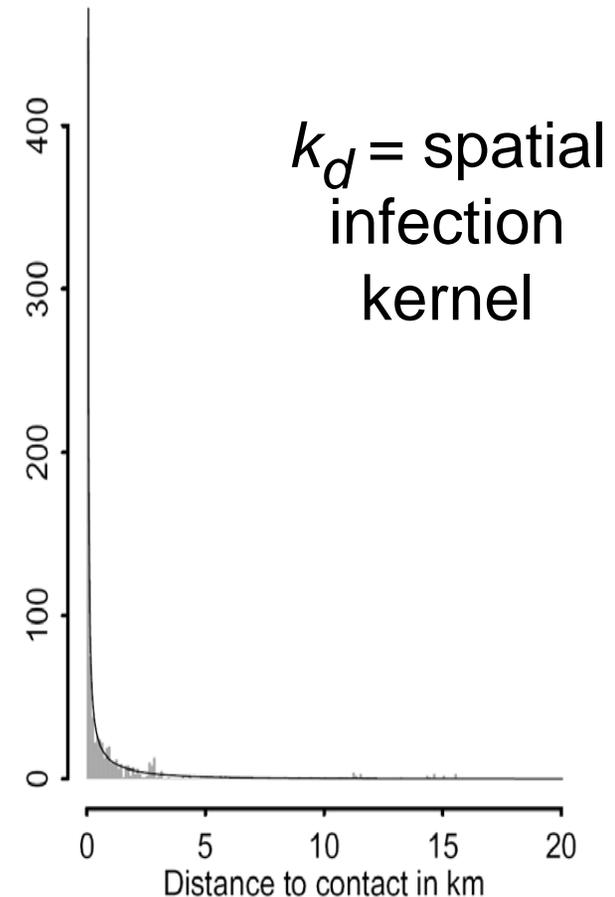
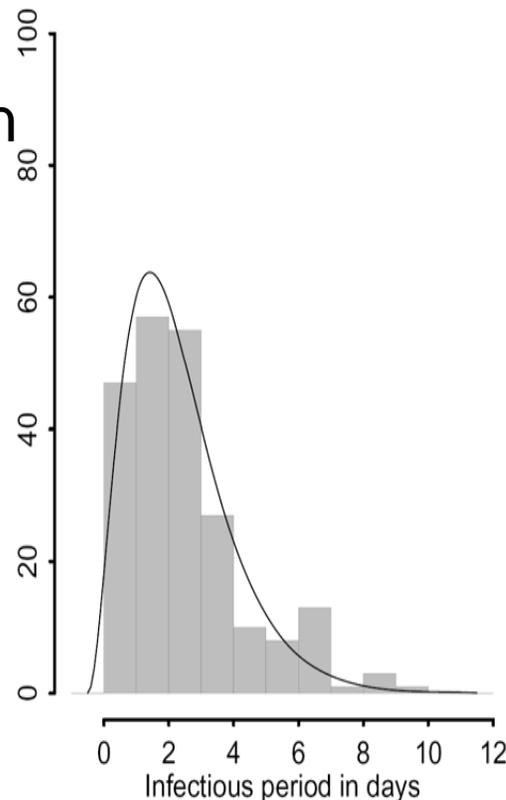
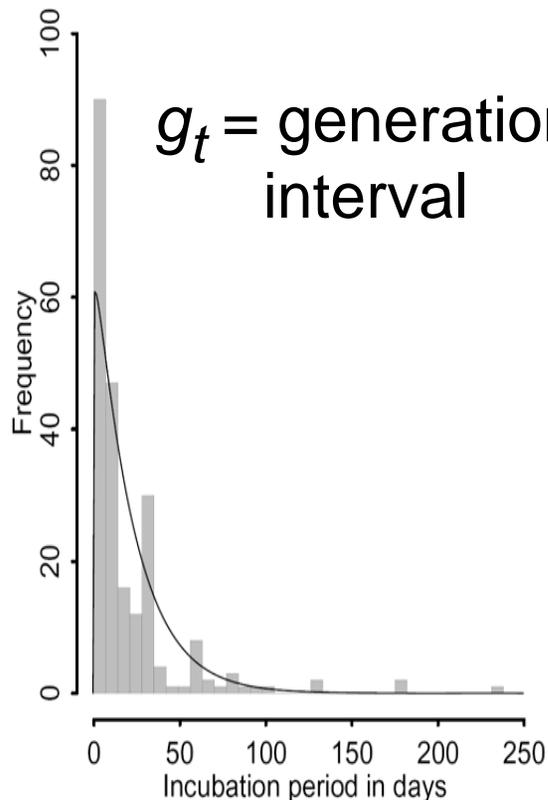
- Can the transmission network be inferred?
- What is R_0 ? (are our estimates biased)
- How does within and between species transmission differ? (are differences due to preferential contact or spatial configuration)

TREE-BUILDING ALGORITHM

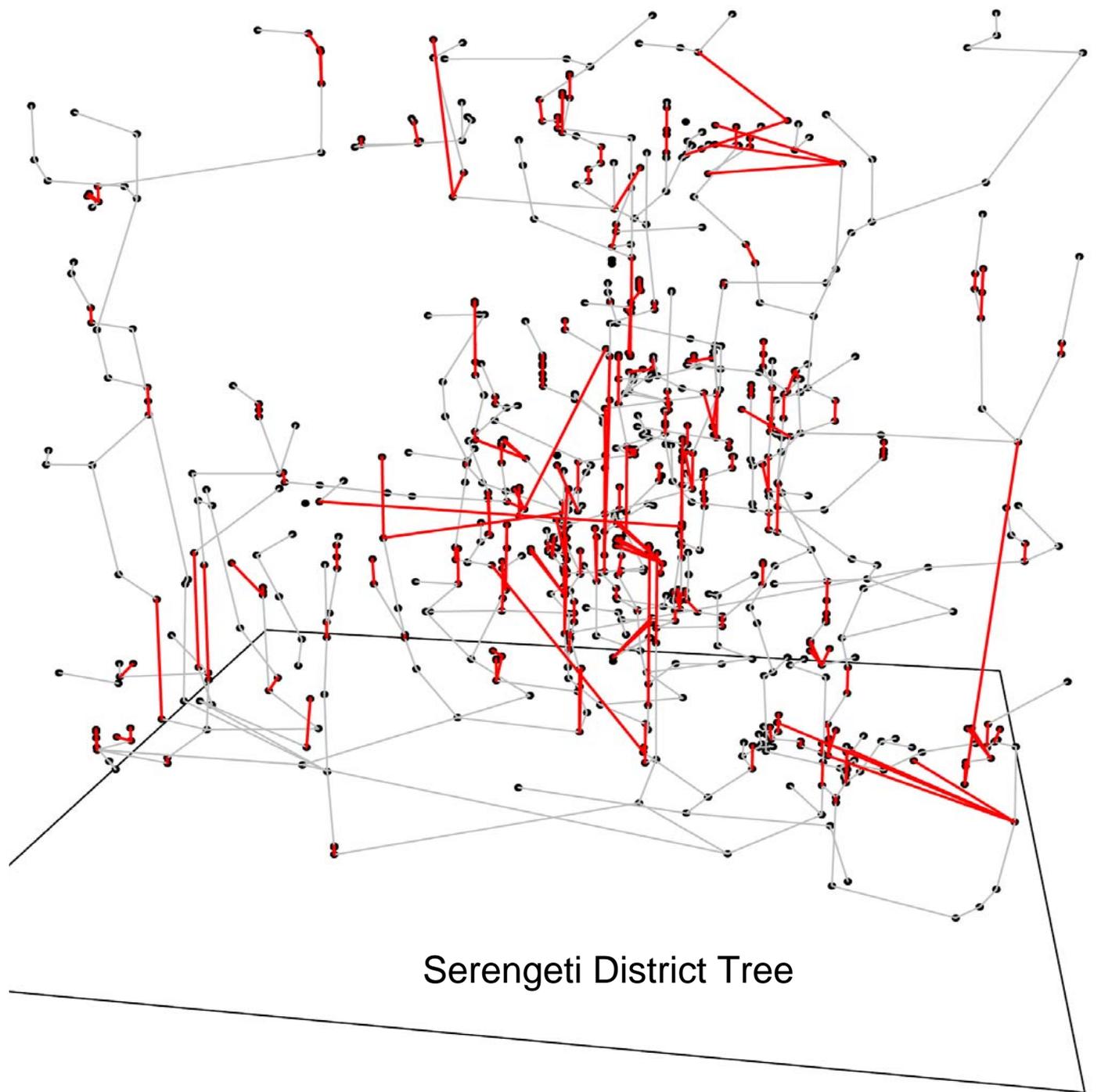
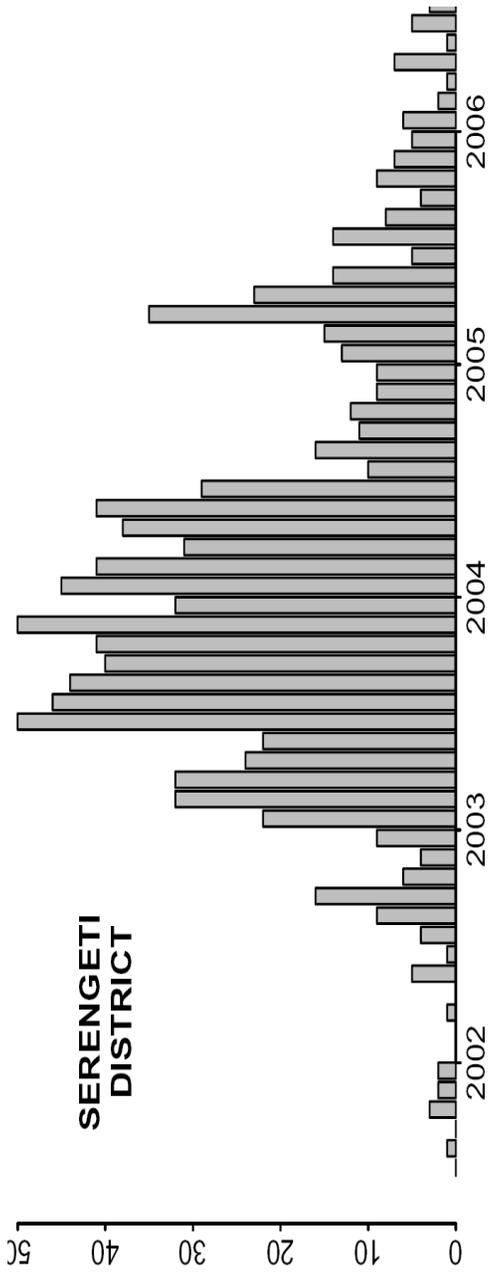
For every case i , all preceding cases are potential progenitors with probability p :

$$p_{ij} = \frac{g(t_{ij})k(d_{ij})}{\sum_{k=1}^n g(t_{ik})k(d_{ik})}$$

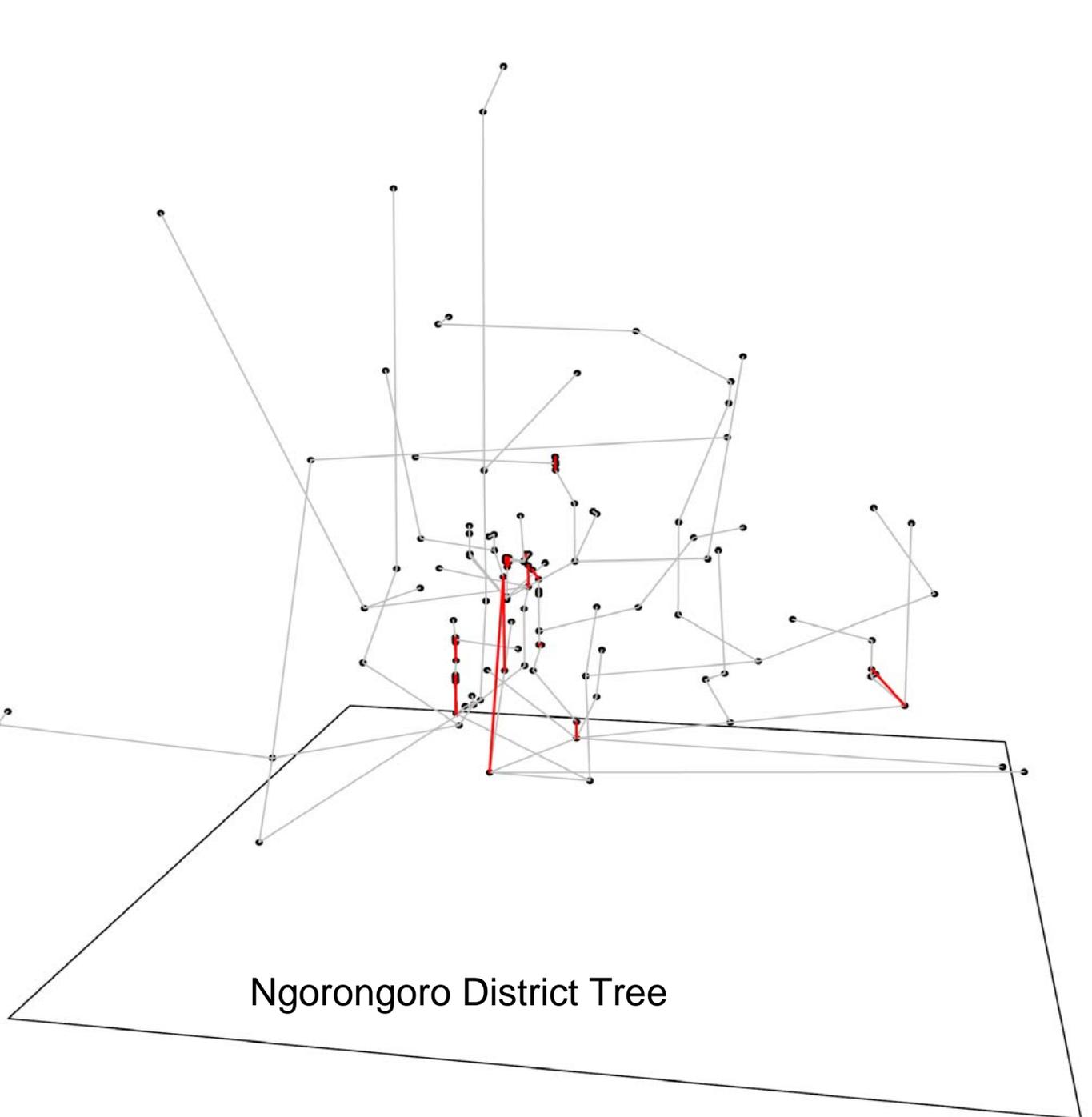
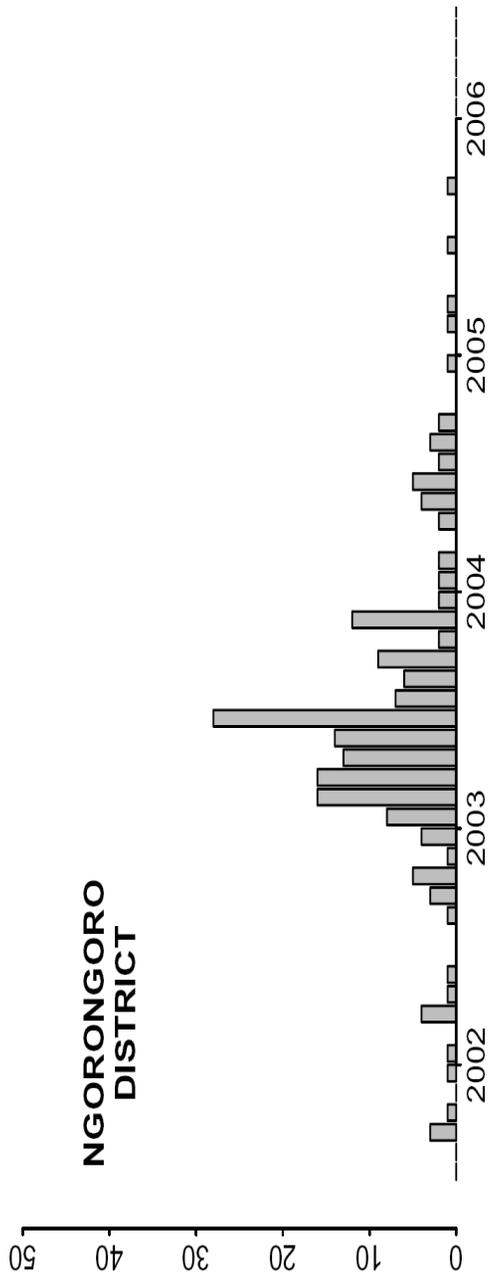
Where:



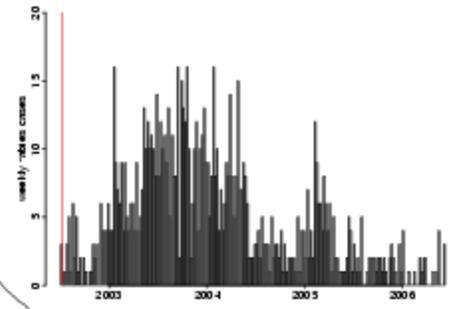
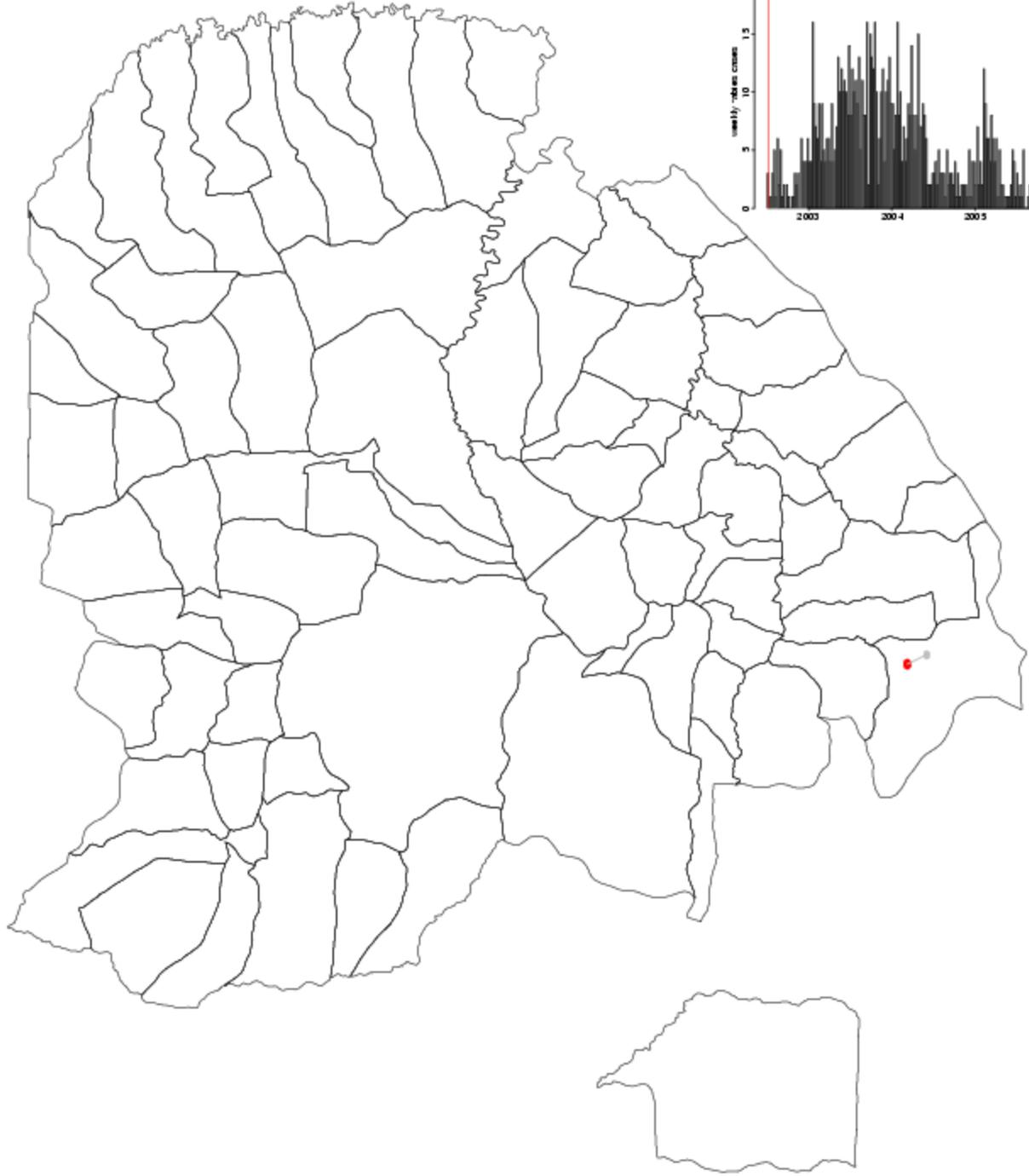
The resulting network....

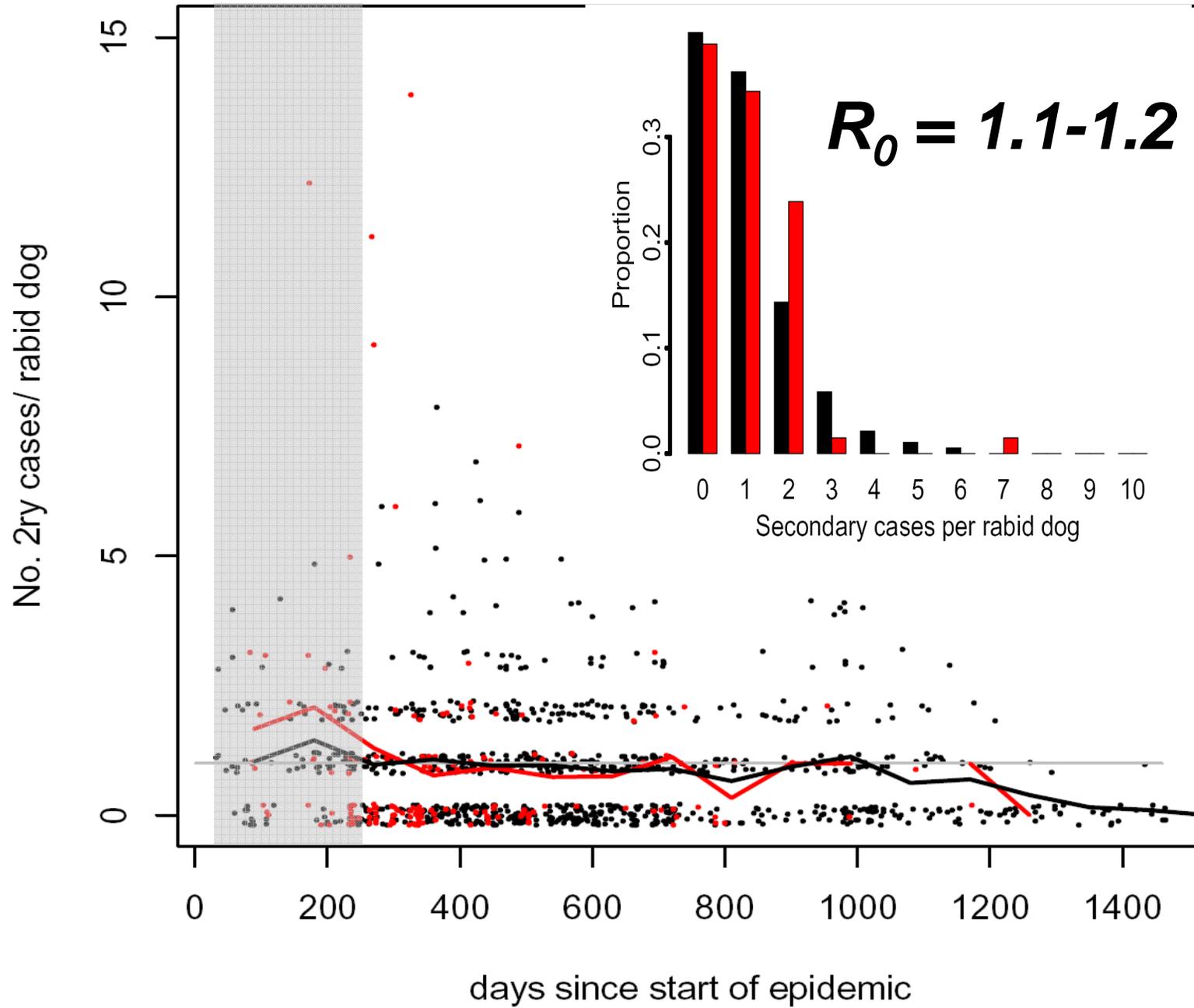


Serengeti District Tree





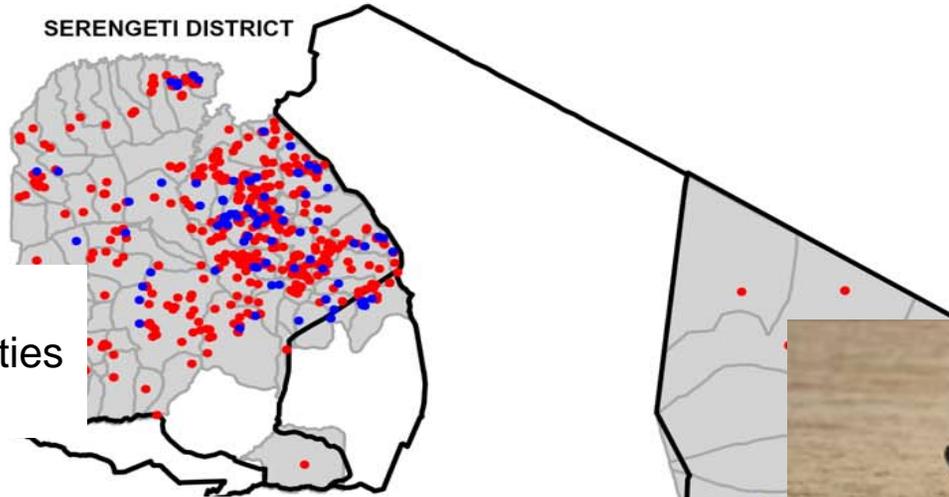




WITHIN AND BETWEEN SPECIES TRANSMISSION



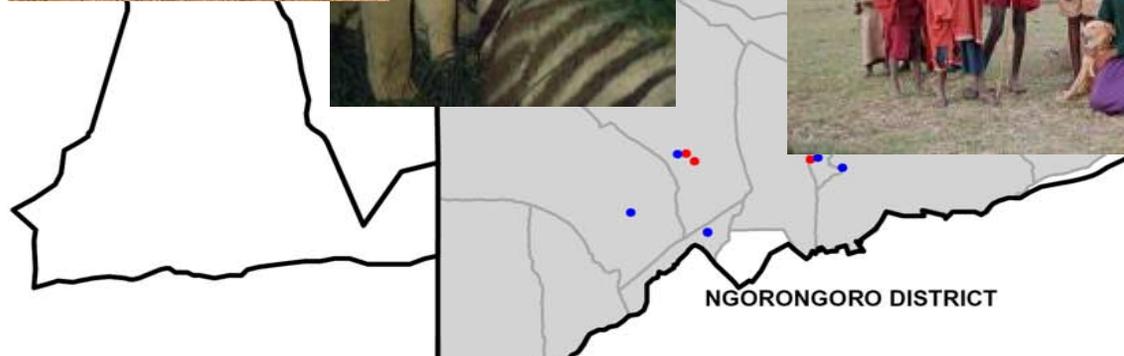
Serengeti District:
High domestic dog densities
Low density wildlife



Serengeti National Park
No domestic animals
Abundant and diverse wildlife

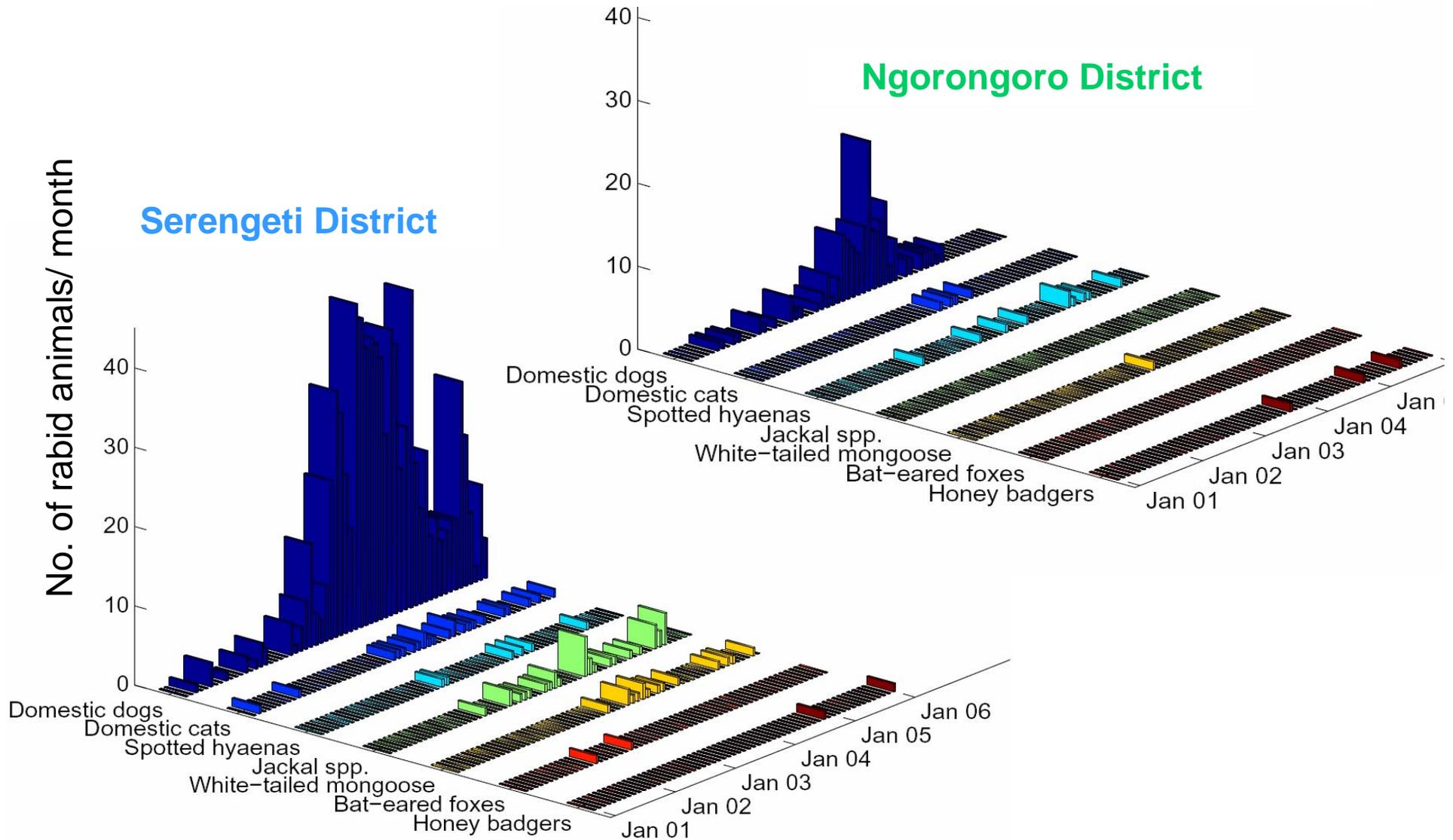


Ngorongoro District:
Low domestic dog density
Diverse wildlife

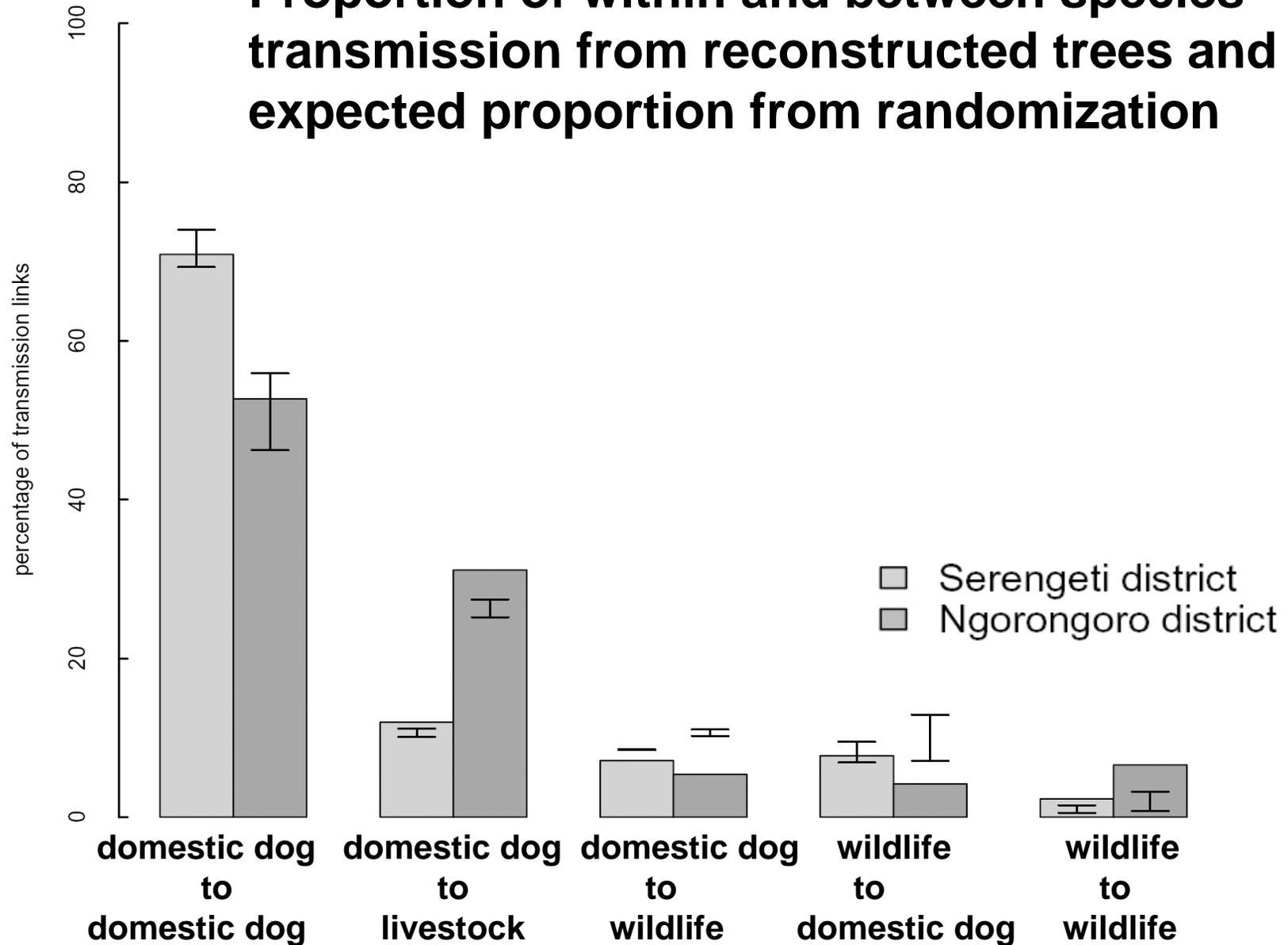


NGORONGORO DISTRICT

1 genetic variant



Proportion of within and between species transmission from reconstructed trees and expected proportion from randomization



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