

Disease Emergence and Richness in Primates

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Introduction

We are interested in the drivers of parasitism in primates...

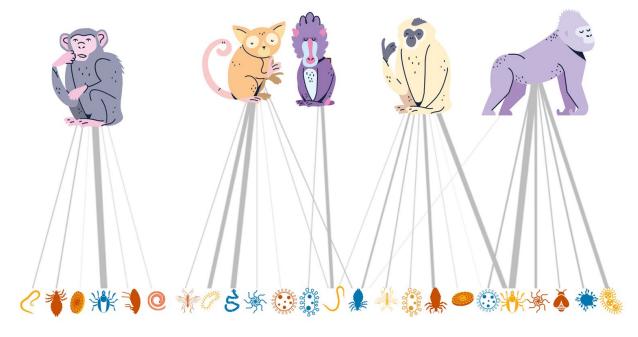
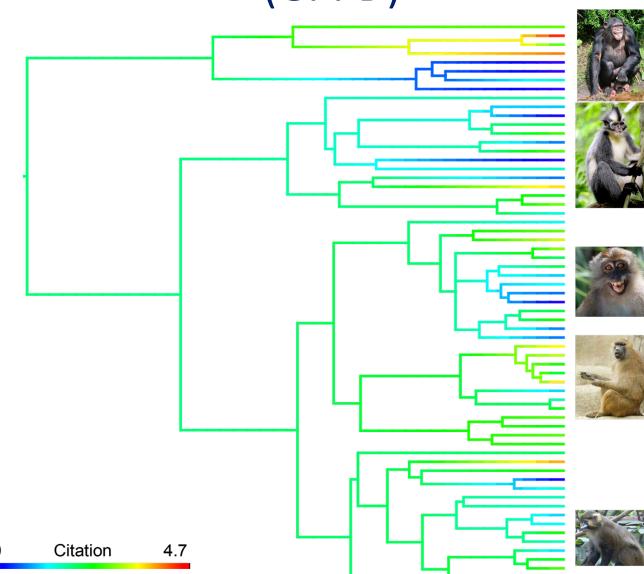


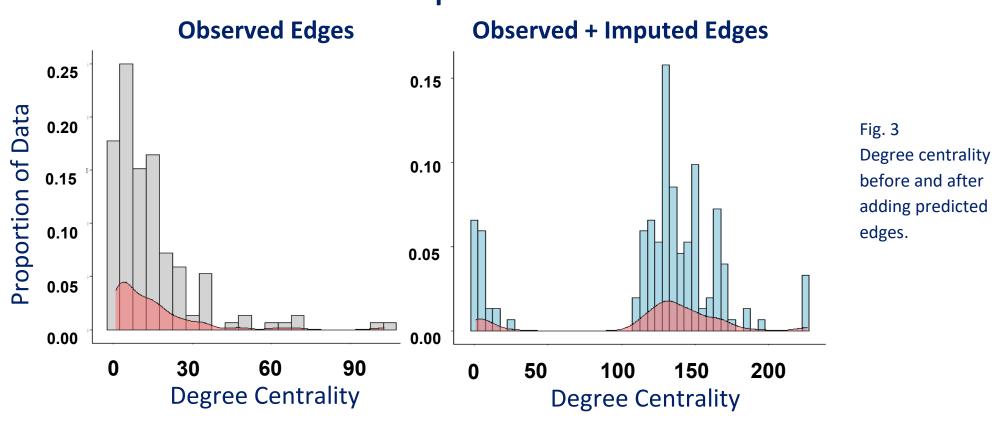
Fig. 1 bipartite network linking host to parasite.

Data

Global Primate Parasite Database (GPPD)







PGLS

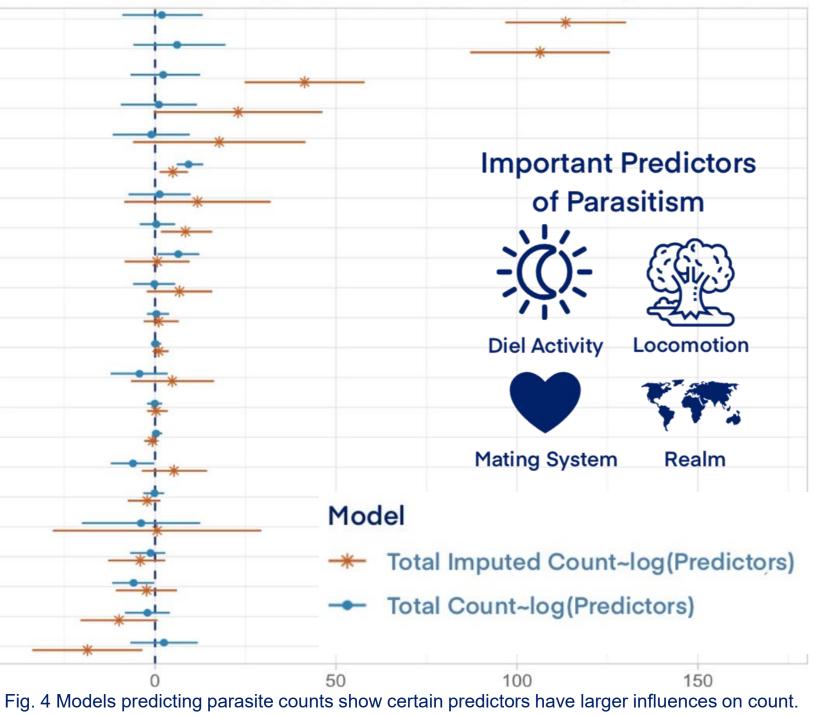
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Coefficients in PGLS Models with Citation as Weight and Covariate Predicting Total Count and Total Imputed Count

Diel Activity: Diurnal
Diel Activity: Nocturnal
Locomotion: Terrestrial
ating System: Multimale-multifemale
Mating System: Polygynous
log(Citation)
Mating System: Monogamy
Trophic: Non-folivore
Realm: Africa
Locomotion: Both
log(Female Bodymass)
log(Centroid Latitude)
IUCN: Near Threatened
log(D-Index)
log(Total Geographic Area)
IUCN: Least Concern
log(Mean Groupsize)
Intercept
log(Habitat Count)
IUCN: Vulnerable
Realm: Neotropics
Realm: Madagascar

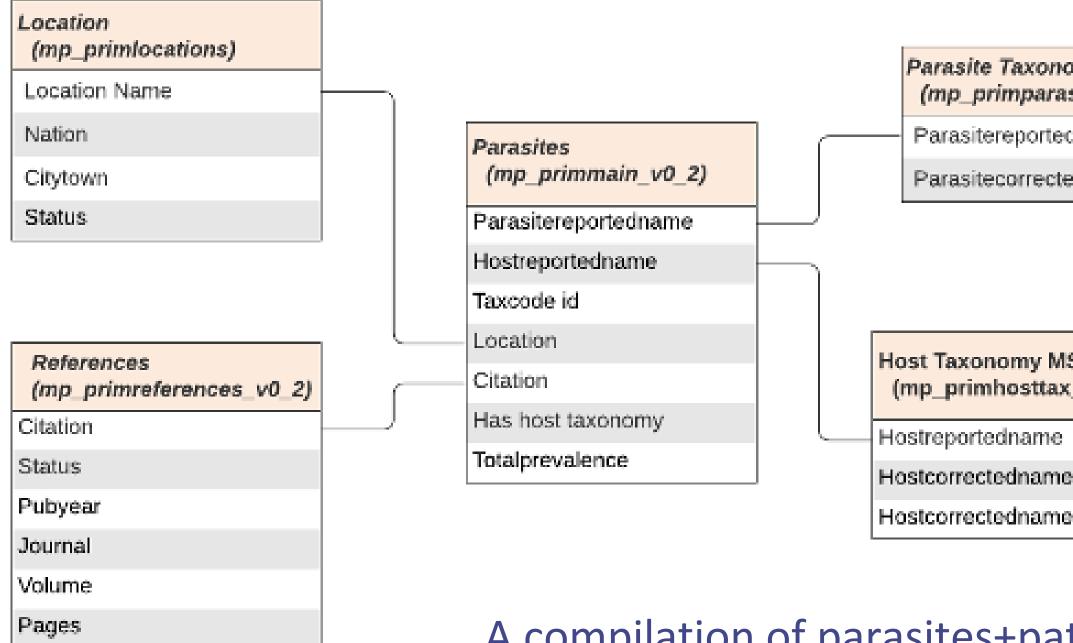
Fig. 2 Phylogenetic tree colored by sampling effort.

Phylogeny-based prediction methods identified undocumented host-parasite interactions.

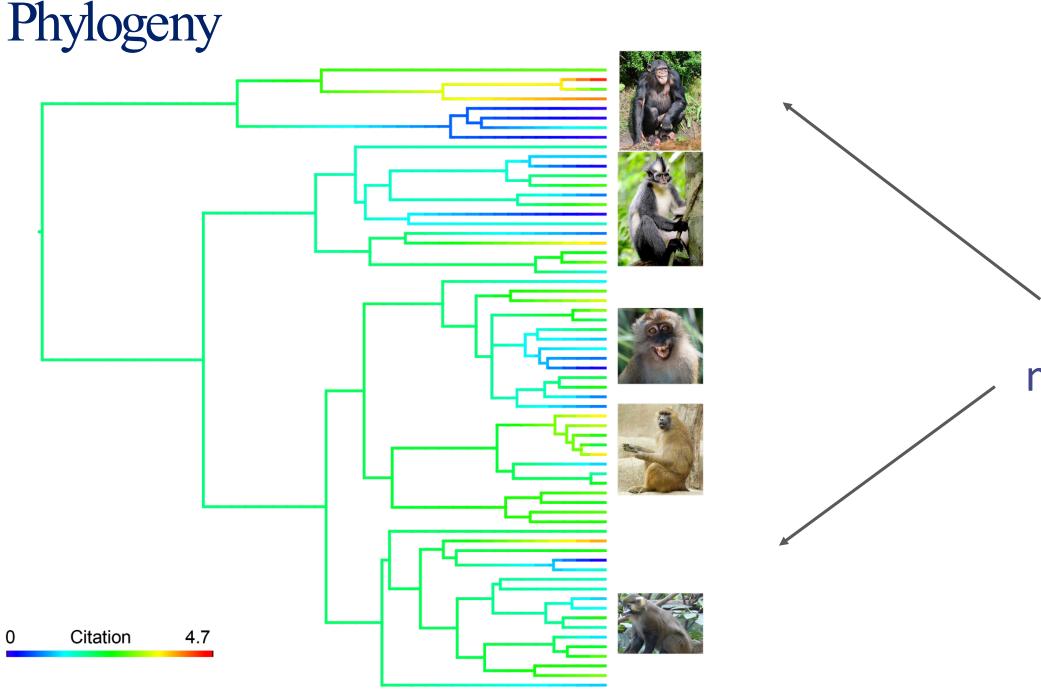


Data

Global Primate Parasite Database (GPPD)



A compilation of parasites+pathogens from wild primate hosts





site Taxonomies	
_primparasitetax)	Parasite Data
sitereportedname	(mp_primparasitedata)
sitecorrectedname -	Parasitecorrectedname
	Parasitetype

onomy MSW05 imhosttax_MSW05)	
ortedname	
ectedname	

Hostcorrectedname msw05

Traits

Host Data

(mp_primhostdata)

Hostcorrectedname

Citations

Some species are studied much more than other species

Phylogenetic Generalized Least Squares (PGLS) models

Diel Activity: Diurnal -

Diel Activity: Nocturnal -

Locomotion: Terrestrial -

Mating System: Polygynous -

Mating System: Monogamy -

Trophic: Non-folivore -

IUCN: Least Concern -

IUCN: Near Threatened log(Centroid Latitude) -

log(Female Bodymass) -

log(Total Geographic Area) -

log(Mean Groupsize) -

Realm: Madagascar -

IUCN: Vulnerable log(Habitat Count) -Realm: Neotropics -

Locomotion: Both -

log(Citation) -

Realm: Africa -

log(D-Index) -

Intercept -

- A consensus chronogram was Mating System: Multimale-multifemale obtained from 10K tree, and used in phylogenetic regression
- log(Citation) used as weights and included as covariate to control for sampling efforts
- Possible models were ranked by AIC values, and coefficients were obtained through model averaging
 - Diel Activity: Diurnal -Diel Activity: Nocturnal -Locomotion: Terrestrial -Mating System: Multimale-multifemale -Mating System: Polygynous -Mating System: Monogamy -Trophic: Non-folivore -Locomotion: Both IUCN: Least Concern log(Citation) -**IUCN: Near Threatened** log(Centroid Latitude) log(Female Bodymass) -Realm: Africa -Intercept
 - log(D-Index) -
 - log(Total Geographic Area)
 - log(Mean Groupsize) -
 - **IUCN: Vulnerable -**
 - log(Habitat Count) -
 - Realm: Neotropics -Realm: Madagascar -

Important Predictors of Parasitism





Diel Activity

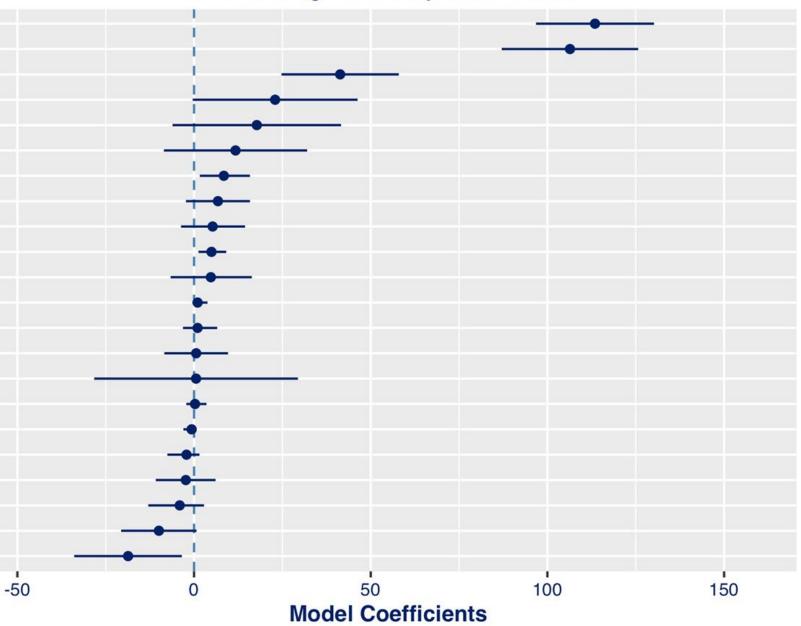




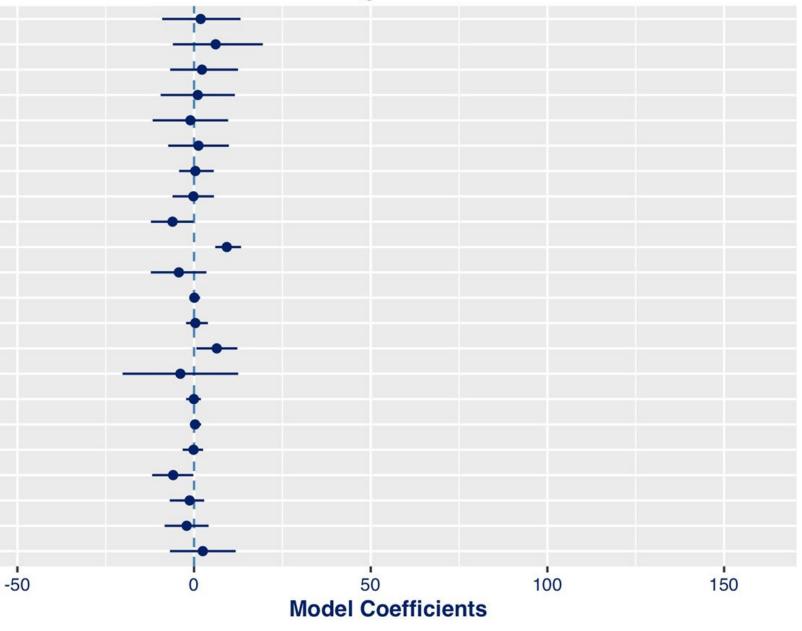
Mating System

Realm

Coefficients in PGLS Model with Citation as Weight and Covariate **Predicting Total Imputed Count**

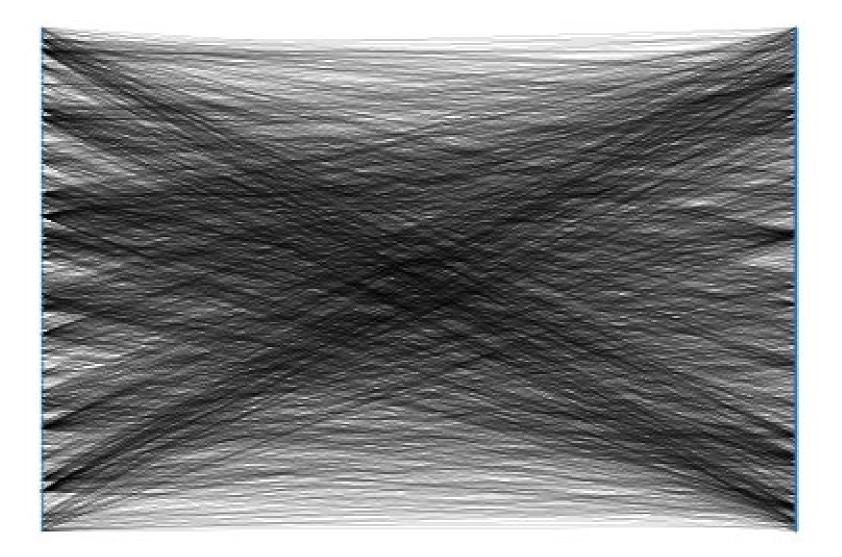


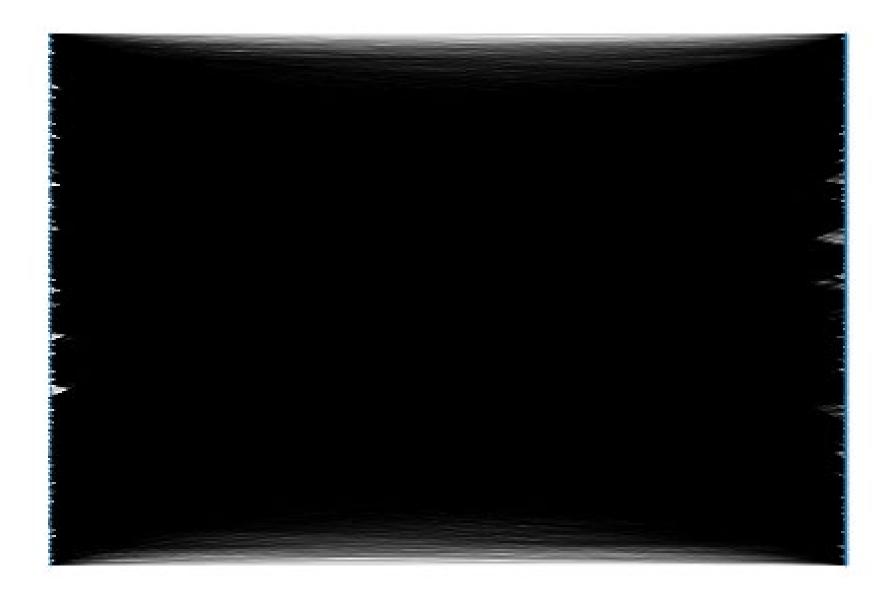
Coefficients in PGLS Model with Citation as Weight and Covariate **Predicting Total Count**



Predicting Undocumented Host-Parasite Interactions

- Evolutionary relationships encoded as weighted network.
- Top edges were ranked by relative probabilities of existing (p).
- Citation count variable decreased in importance (eased sampling effort problem)
- 5-Fold Cross Validation to test predictive accuracy.

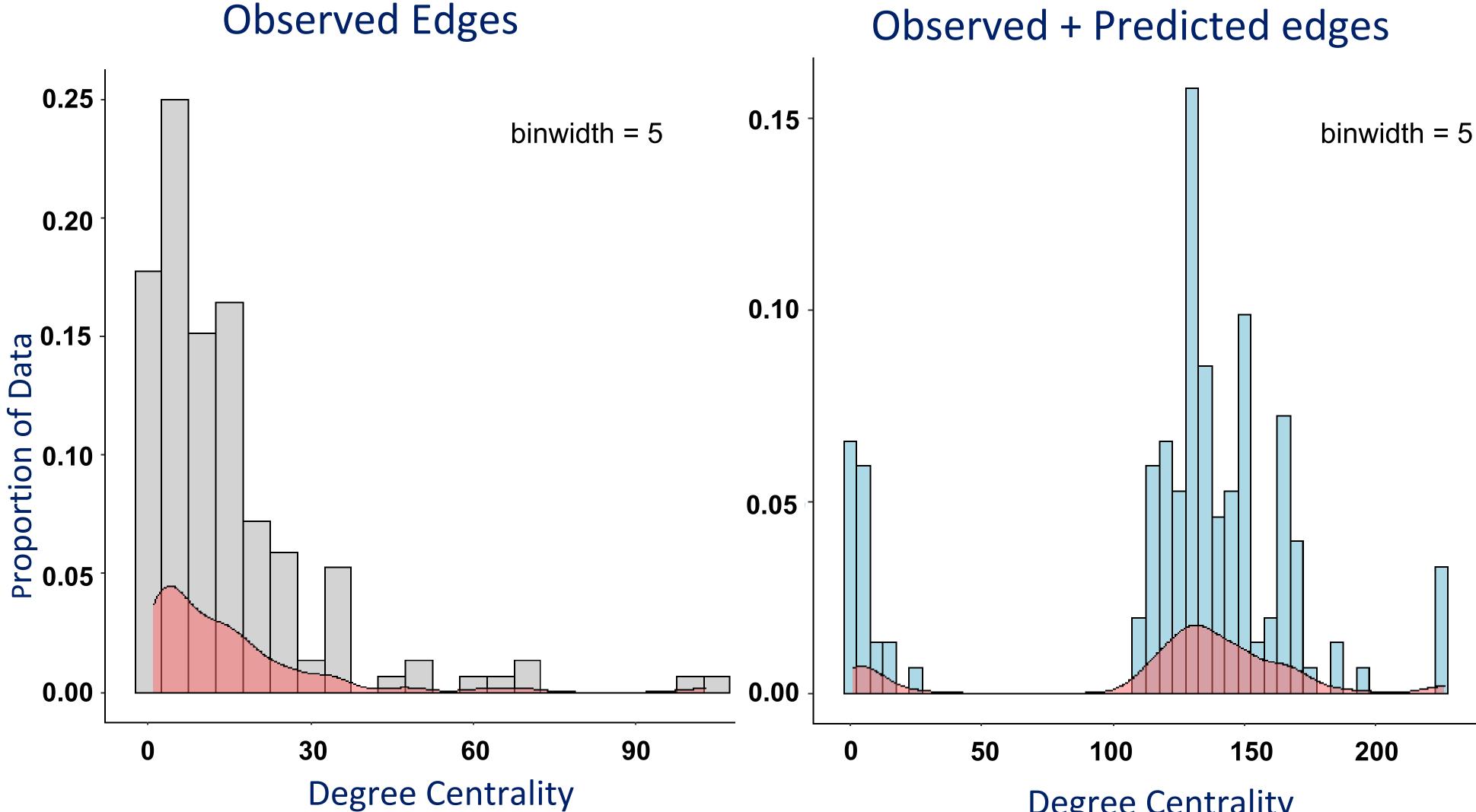




Only Original Data (2415 Edges)

Network With Predicted Edges (16262 Edges)

Distribution of Host Degree Centrality



Degree Centrality: the number of edges connected to a node.

i.e. the number of parasites connected to a host.



