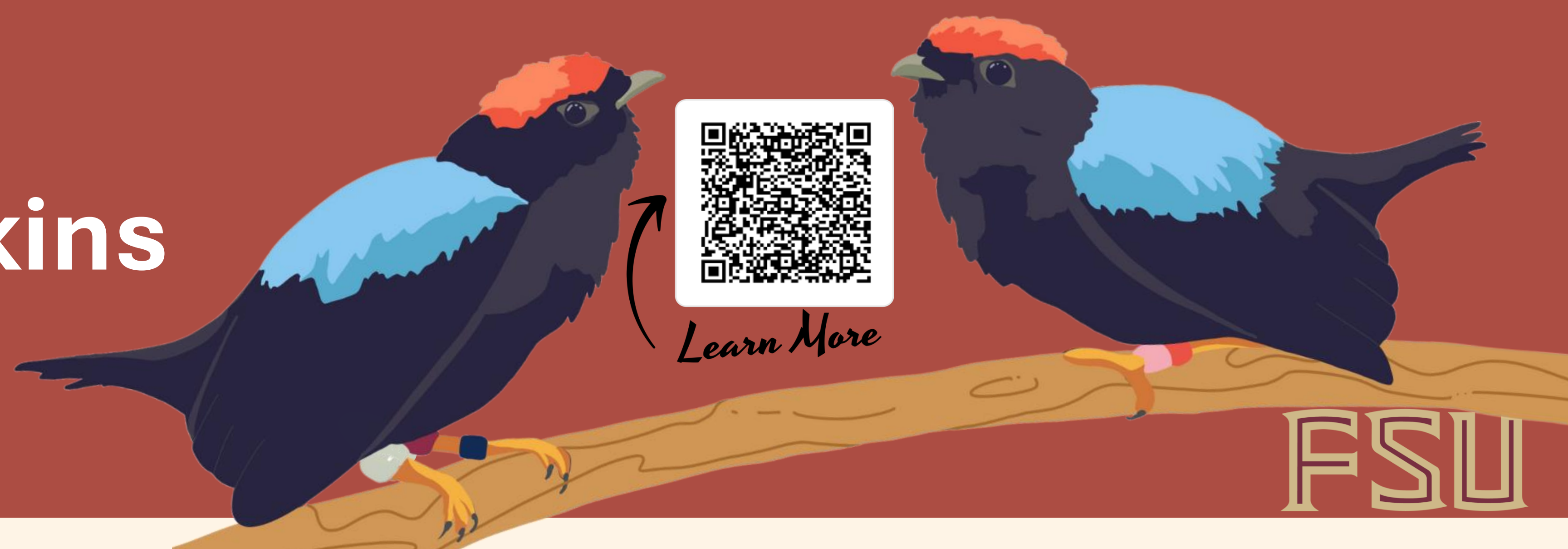


Networking to Rise, Rule, or Learn?

A Study of Social Interactions in Lance-Tailed Manakins

Brooke T. Hagans, Daniel A. Gutiérrez-Carrillo, Dr. Emily H. DuVal

Department of Biological Sciences, Florida State University



Introduction

Social interactions shape animal populations, influencing ecology and evolution. As social networks—the web of connections formed through social interactions—may influence access to resources, reproductive success, and cooperation in behaviors (i.e., predator avoidance and group foraging). Understanding social networks helps explain how social structures facilitate status transitions and impact courtship dynamics in cooperative mating systems.

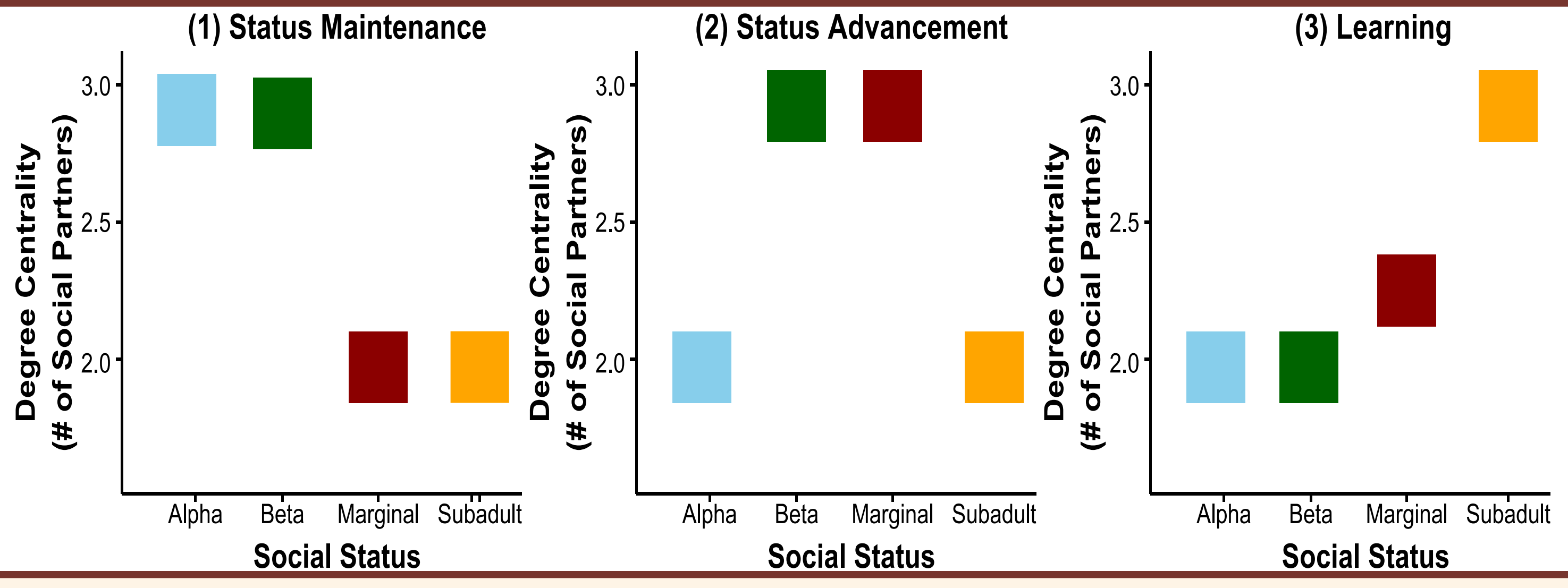
Lance-tailed Manakin (*Chiroxiphia lanceolata*)



How do social interactions vary with social status in the Lance-tailed Manakin?

- Hypothesis 1: Status Maintenance**—alphas and betas have more social partners to reinforce their dominance
- Hypothesis 2: Status Advancement**—betas and marginals have more social partners more to increase their chances of becoming betas or alphas
- Hypothesis 3: Learning**—subadults have more social partners to gain experience in courtship displays.

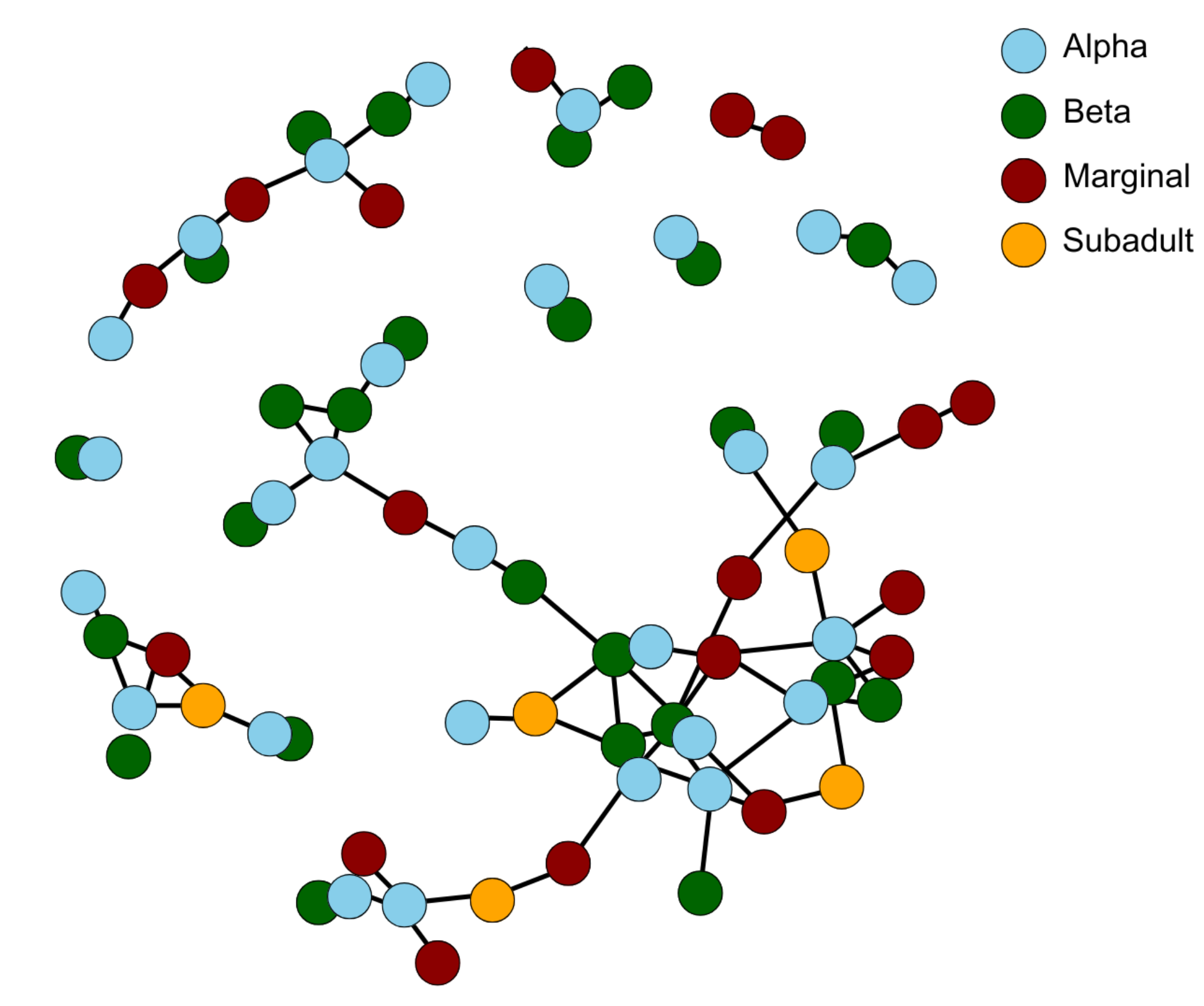
PREDICTION PLOTS



Methods

- Long-term study on Lance-tailed Manakins in Panama (since 1999)
- Behavioral data:**
 - Systematic 1-hour behavioral observations that recorded identities and interactions.
 - 7 years completed.
- Building social networks:**
 - 2-male interactions (singing duets, cooperative displays)
 - Link between social environment and life history (social status)
- What did we measure?**
 - Degree centrality (# of social partners)
 - Generalized Linear Mixed Effects; controlling for individual bird ID and year as random effects.

2024 Social Network



- Who is the most popular?
- Who is the least popular?

Figure 1. Social Network of Lance-tailed Manakins in 2024

Results

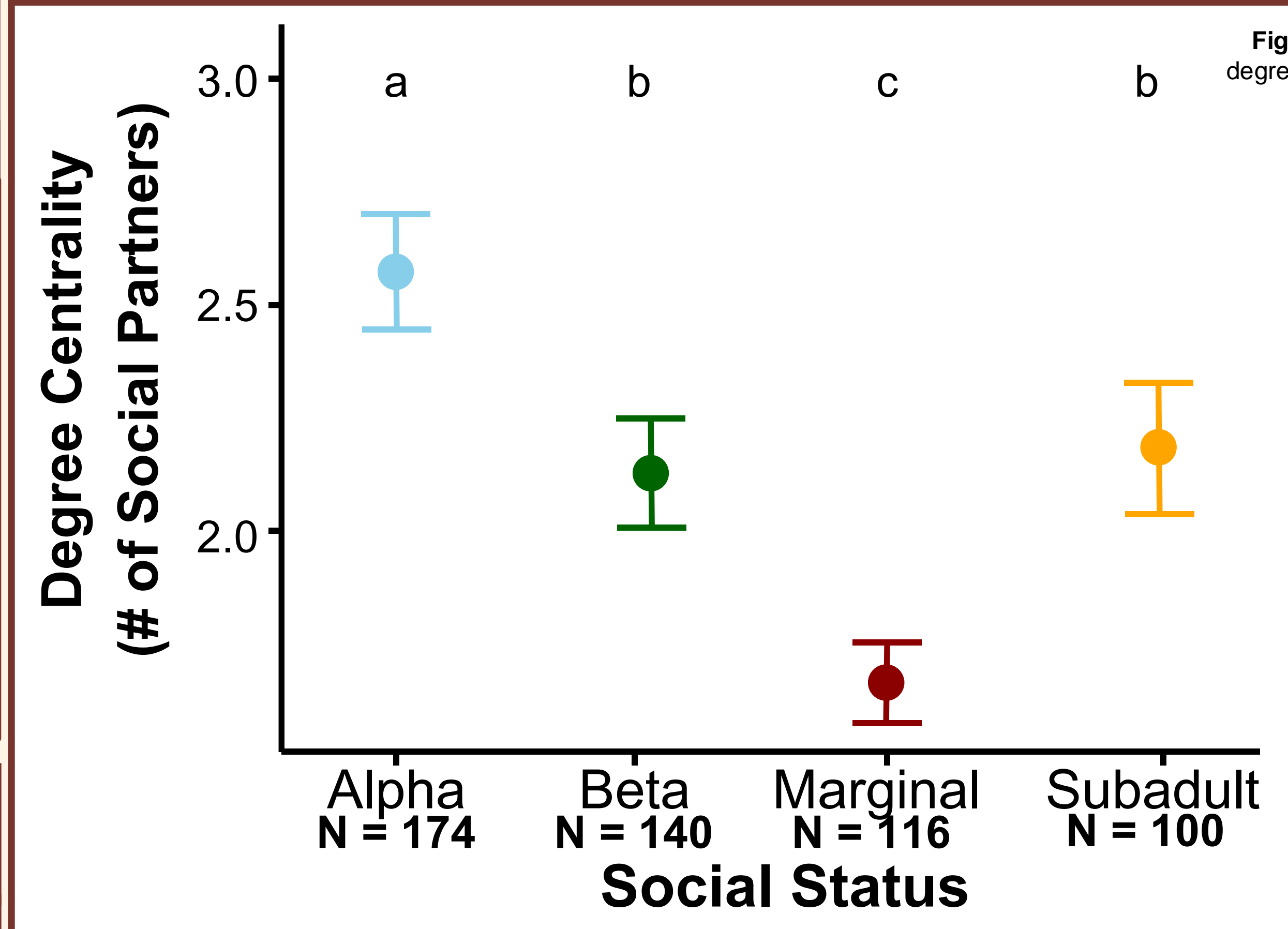


Figure 2. Variation in degree centrality based on social status.

Fixed effect	df	F	P
Social Status		3.00	7.72 <0.001
Contrasts	Estimate ± SE	Z	P
Alpha-Beta	-0.21 ± 0.08	-2.59	0.01
Alpha-Marginal	-0.43 ± 0.09	-4.74	<0.001
Alpha-Subadult	-0.19 ± 0.09	-2.15	0.03
Beta-Marginal	-0.22 ± 0.10	-2.31	0.02
Beta-Subadult	0.01 ± 0.09	0.16	0.87
Marginal-Subadult	0.23 ± 0.10	2.27	0.02

Table 1. Results from the generalized linear mixed-effects model assessing differences in the number of social partners among social status groups of lance-tailed manakins.

Discussion

Multiple hypotheses may explain these results, but no single mechanism accounts for all variation in social connectivity across status groups.

of Social Interactions: Alphas > Betas = Subadults > Marginals

- Status Maintenance Hypothesis**
Alphas had significantly more social partners than all other group, suggesting that higher connectivity may help sustain dominance.
- Status Advancement Hypothesis**
Betas had more social partners than marginals, but their connections did not differ significantly from subadults, indicating that social engagement alone may not ensure progression.
- Learning Hypothesis**
Subadults had more social partners than marginals, which may indicate that social interactions play a role in integration and development.

Social Networks:

- In this study, connectivity varies across status groups, suggesting that different stages of maturity have different reasons for number of social partners.
- By understanding these social dynamics, we can better predict how social hierarchies impact mating success, cooperation, and long-term survival in cooperative species.

Future Directions

- Investigate whether high social connectivity predicts status advancement by tracking individual trajectories over time.
 - Does having more social partners increase a male's likelihood of advancing in status?
- Determine whether social interactions drive status changes or if they simply reflect an individual's current status.
- Clarify how social connectivity shapes cooperative courtship hierarchies and whether some males are inherently disadvantaged in status progression.

Want to follow my journey or the Manakin Project? Scan the QR code!



Acknowledgments

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Relevant Literature

