

BACKGROUND

In birds that perform acrobatic courtship displays, extended and precise movement and aerial flight is standard (fig. 2).

Hypoxia-inducible factor 1-alpha (HIF1A) is a gene that assists with the regulation of red blood cell production, the formation of new blood vessels, and metabolism.

By investigating variation in this gene among an array of lekking species I can draw correlation between HIF1A gene expression and enhanced endurance ability.



Figure 1: Photo of golden-collared manakin. [Photo by Francesco Veronesi]

Research Question: How does variation in the Hypoxia-inducible factor 1-alpha gene contribute to endurance in acrobatic displays?

Hypothesis: The aBSREL test will find evidence of episodic diversifying selection in the phylogeny on the HIF1A gene.

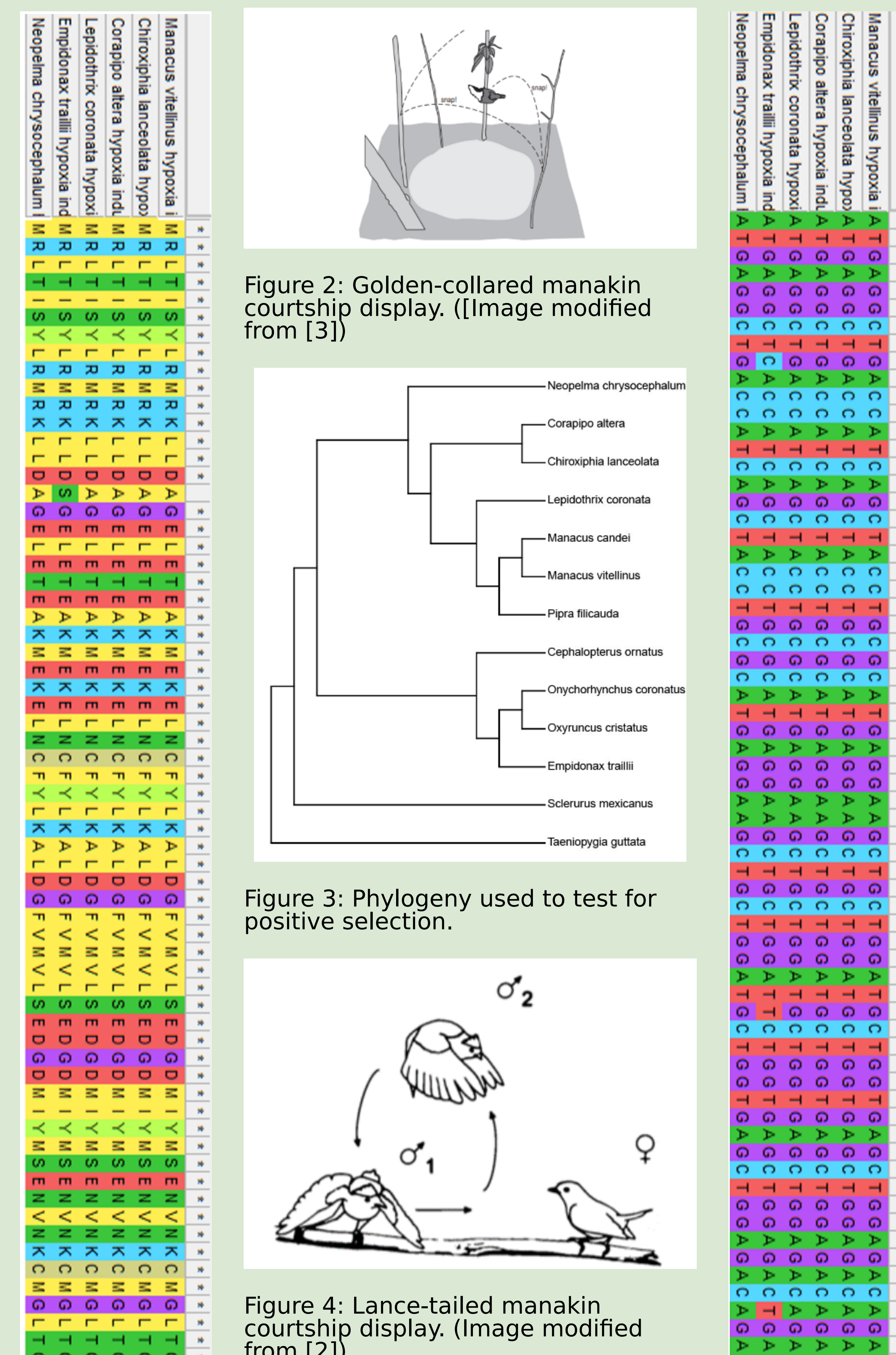
METHODS

1. Selected a group of related, courting bird species to create a cross-species analysis.
2. Accessed the GenBank record to collect the exon coding sequences of the species.
3. Used MEGAX sequence alignment to align the genes using the codon aware MUSCLE algorithm and edited to prepare for testing.
4. Ran the aBSREL model, phylogeny (fig. 3), and sequenced gene to test if positive selection has occurred on selected branches.

RESULTS

A total of 2 species (*Chiroxiphia lanceolata* and *Manacus vitellinus*) were formally tested for diversifying selection. Significance was assessed using the Likelihood Ratio Test at a threshold of $p \leq 0.05$, after correcting for multiple testing where the p -value=1.00.

aBSREL found no evidence of episodic diversifying selection in the phylogeny.



CONCLUSION

Lekking species and all birds likely already require high endurance abilities for flight and would then have little variation on the HIF1A gene.

Managing hypoxic conditions in tissues maintains the life of the tissue; nonsynonymous mutations could otherwise result in death, and not be advantageous.

In future research it could be interesting to observe polymorphisms within a population to gain a better understanding of the advantages of endurance gene polymorphisms.



Figure 5: Two lance-tailed manakin males preparing for a courtship display. [Photo by the DuVal Lab at Florida State University]

REFERENCES

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