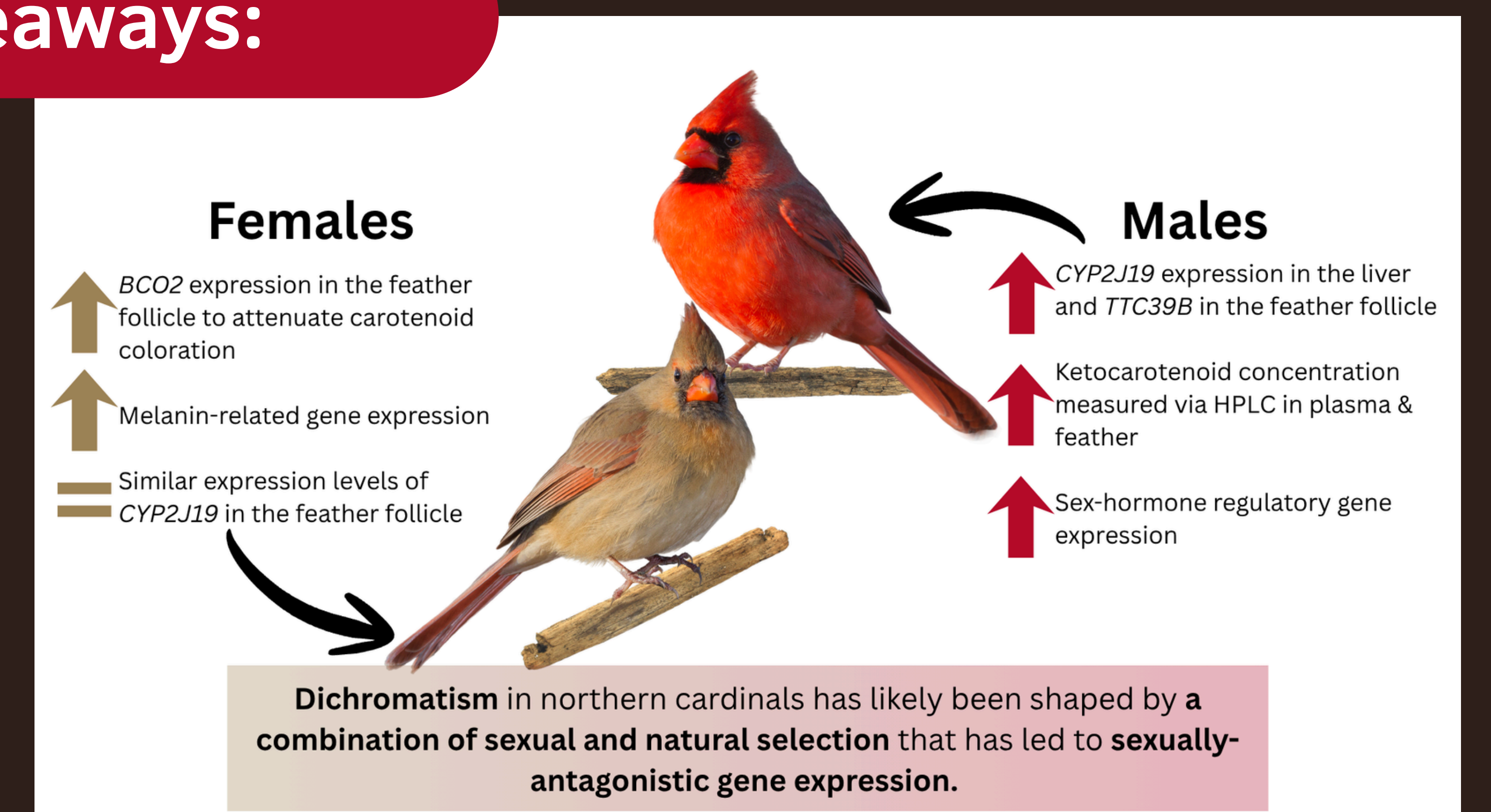


Not all roads lead to red: the genetics of sexual dichromatism in the northern cardinal (*Cardinalis cardinalis*)

Key takeaways:



Introduction

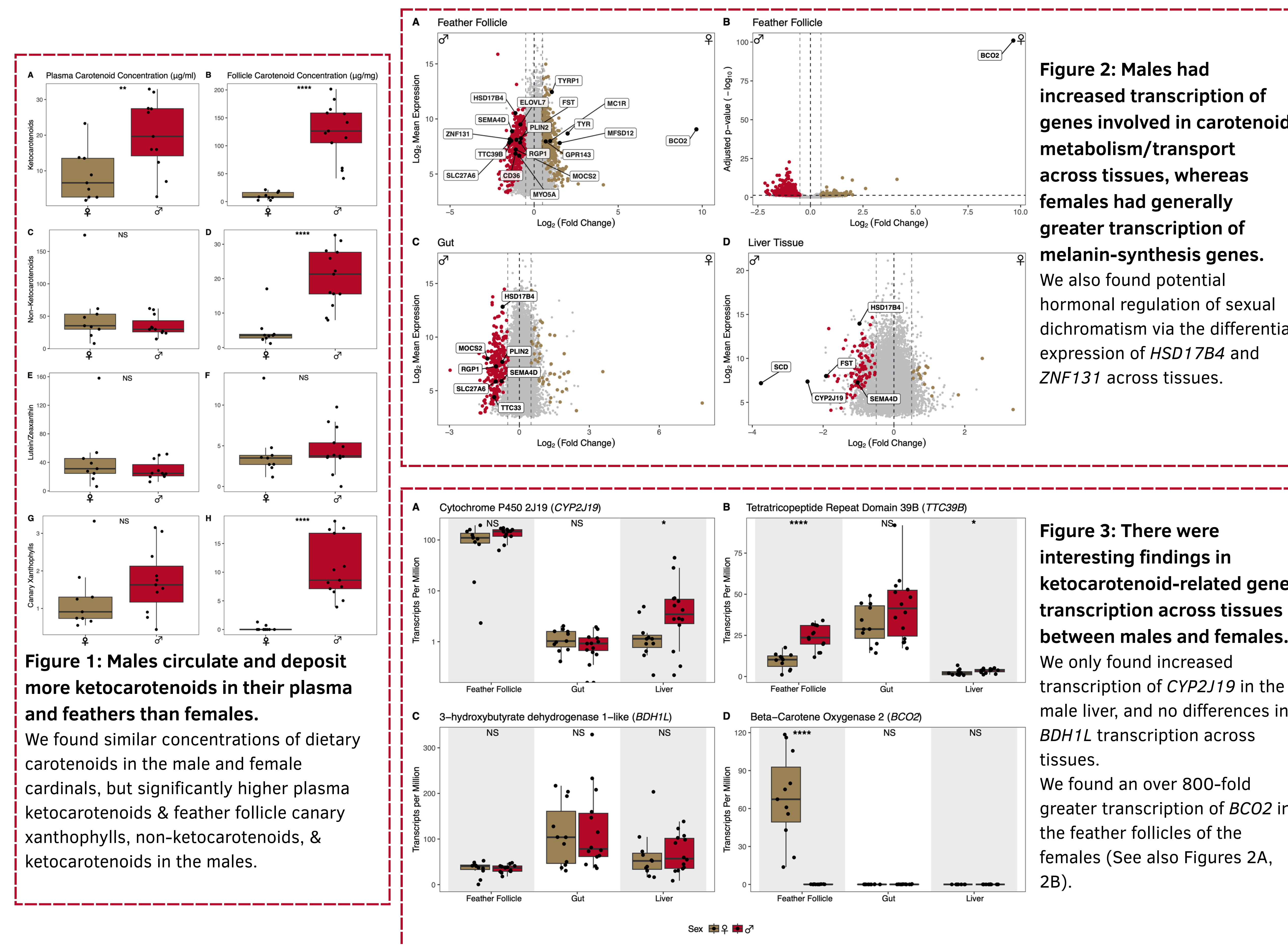
- Sexual dichromatism is a common phenomenon among birds, often involving carotenoid-based pigmentation.
- Despite extensive research on the social and ecological environments favoring sexual dichromatism, the molecular mechanisms underlying its development and evolution remain largely unexplored.
- In this study, we investigated the genetic and molecular processes creating sexual dichromatism in the red ketocarotenoid-based plumage coloration of northern cardinals (*Cardinalis cardinalis*).

Methodology

- Captured male and female cardinals during prebasic molt
- Quantified carotenoid concentrations in plasma and feather follicles using HPLC
- Confirmed that homologs of *CYP2J19*, *BDH1L*, and *TTC39B* catalyze the addition of a keto group at C4 using functional testing
- Performed gene expression analyses across feather follicle, gut, and liver tissues

Conclusions

- The evolution of sexual dichromatism in northern cardinals involves both natural selection (favoring cryptic females) and sexual selection (favoring conspicuous males).
- Mutations and regulatory changes in genes like *CYP2J19* have likely driven the evolution of male red coloration under sexual selection.
- However, these changes may be detrimental to females. *BCO2* upregulation in females may be a response to sexual antagonism, balancing natural and sexual selection pressures.



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