

# Fitness effects of mitonuclear incompatibilities in swordtail (*Xiphophorus*) hybrids

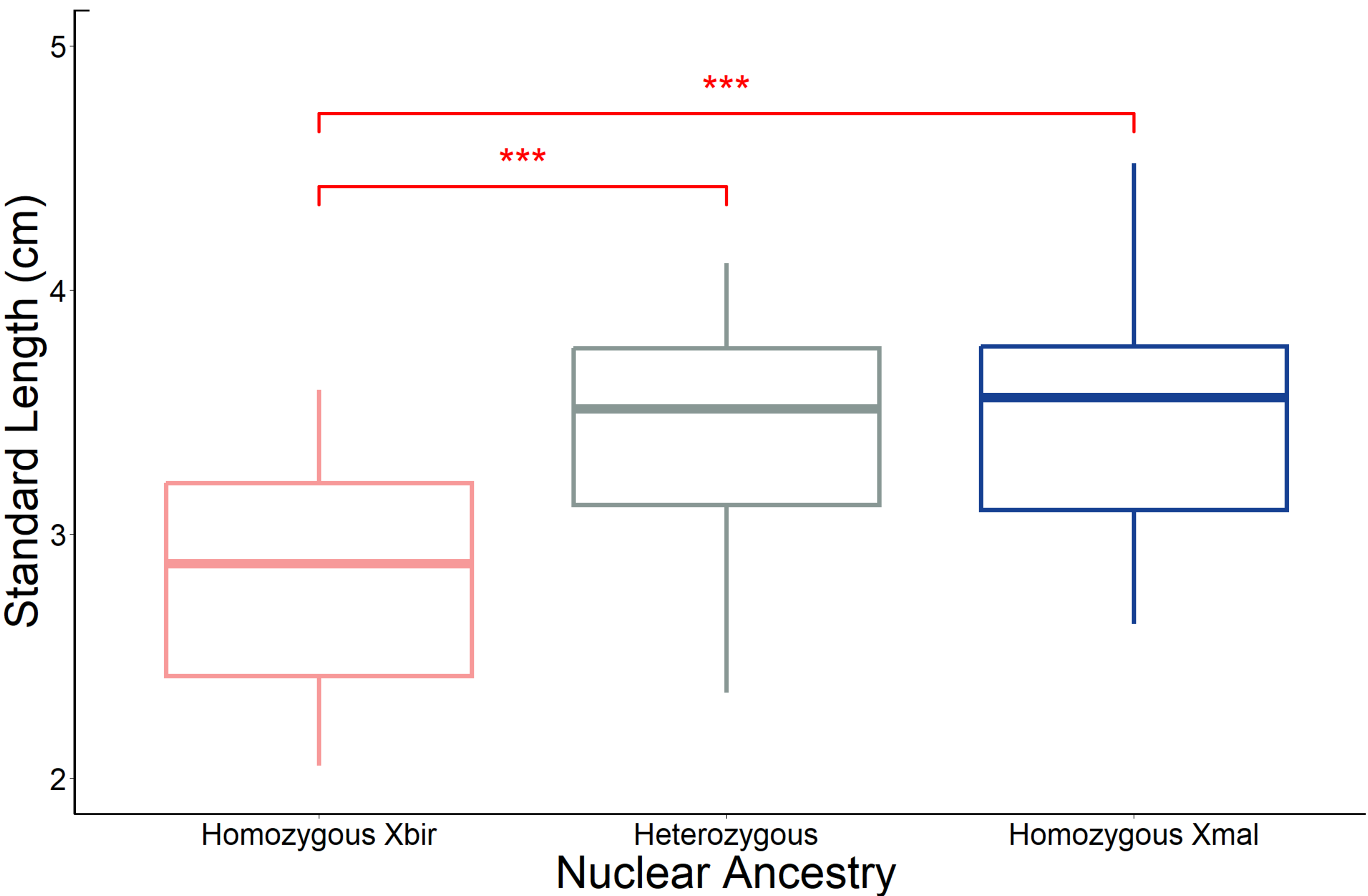
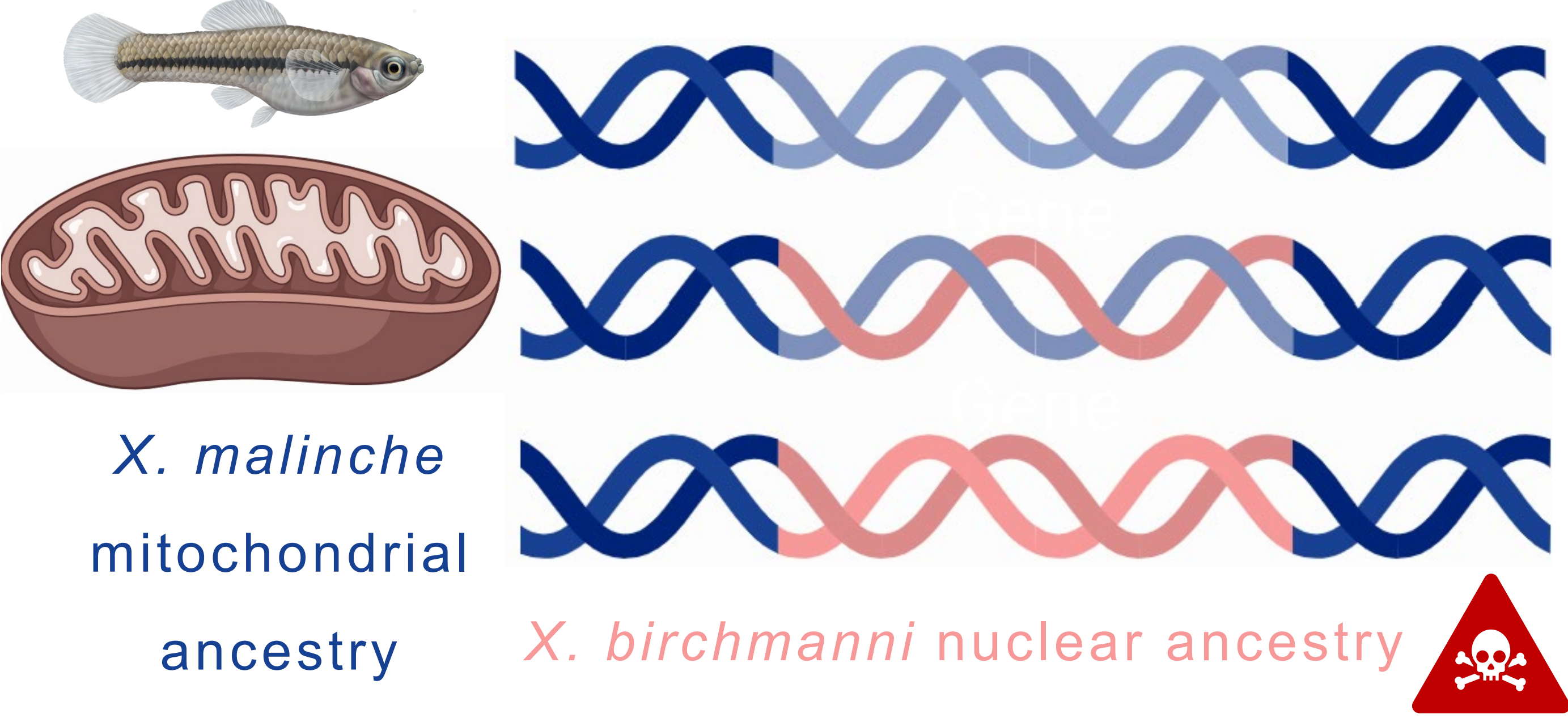


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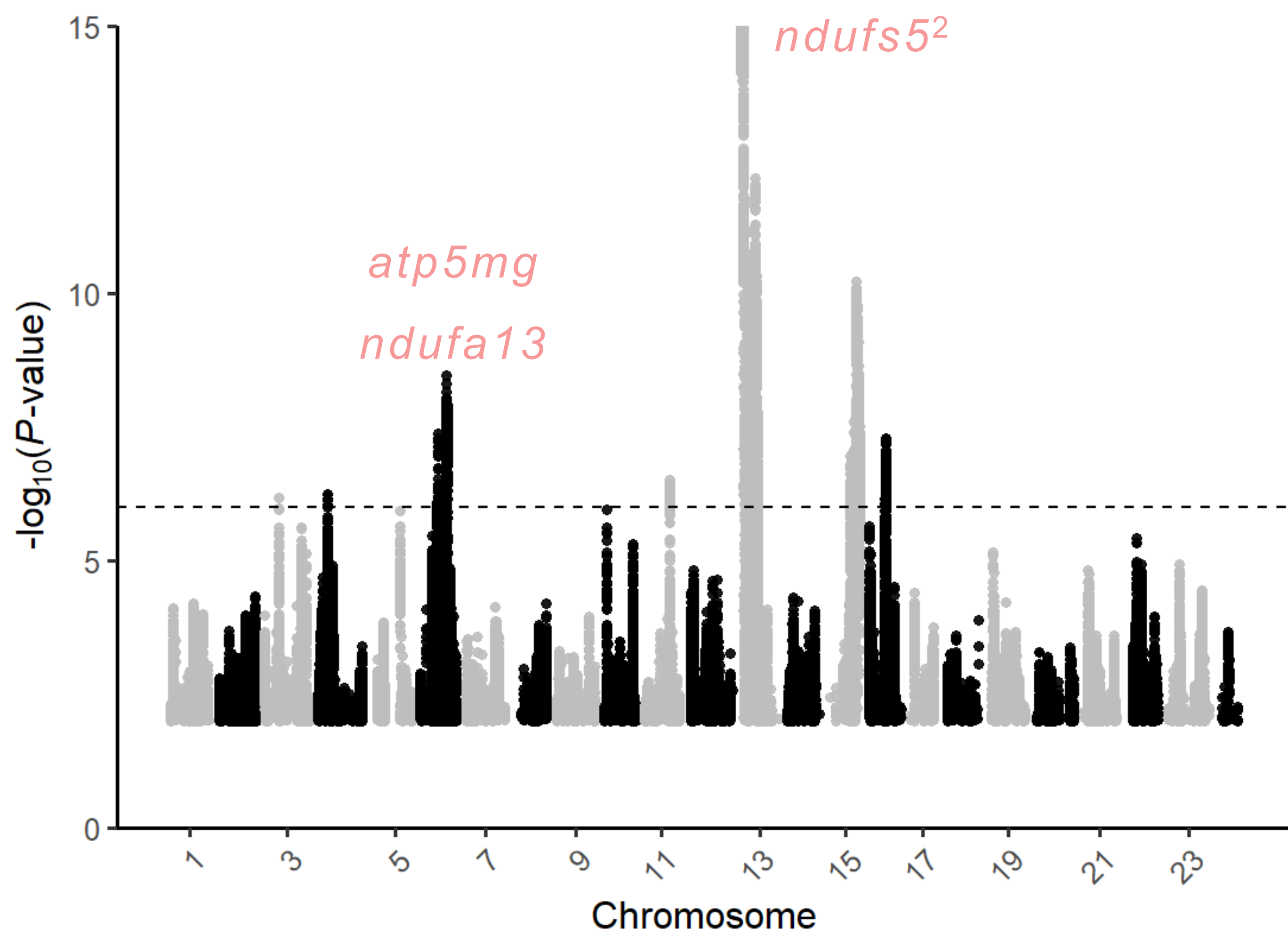
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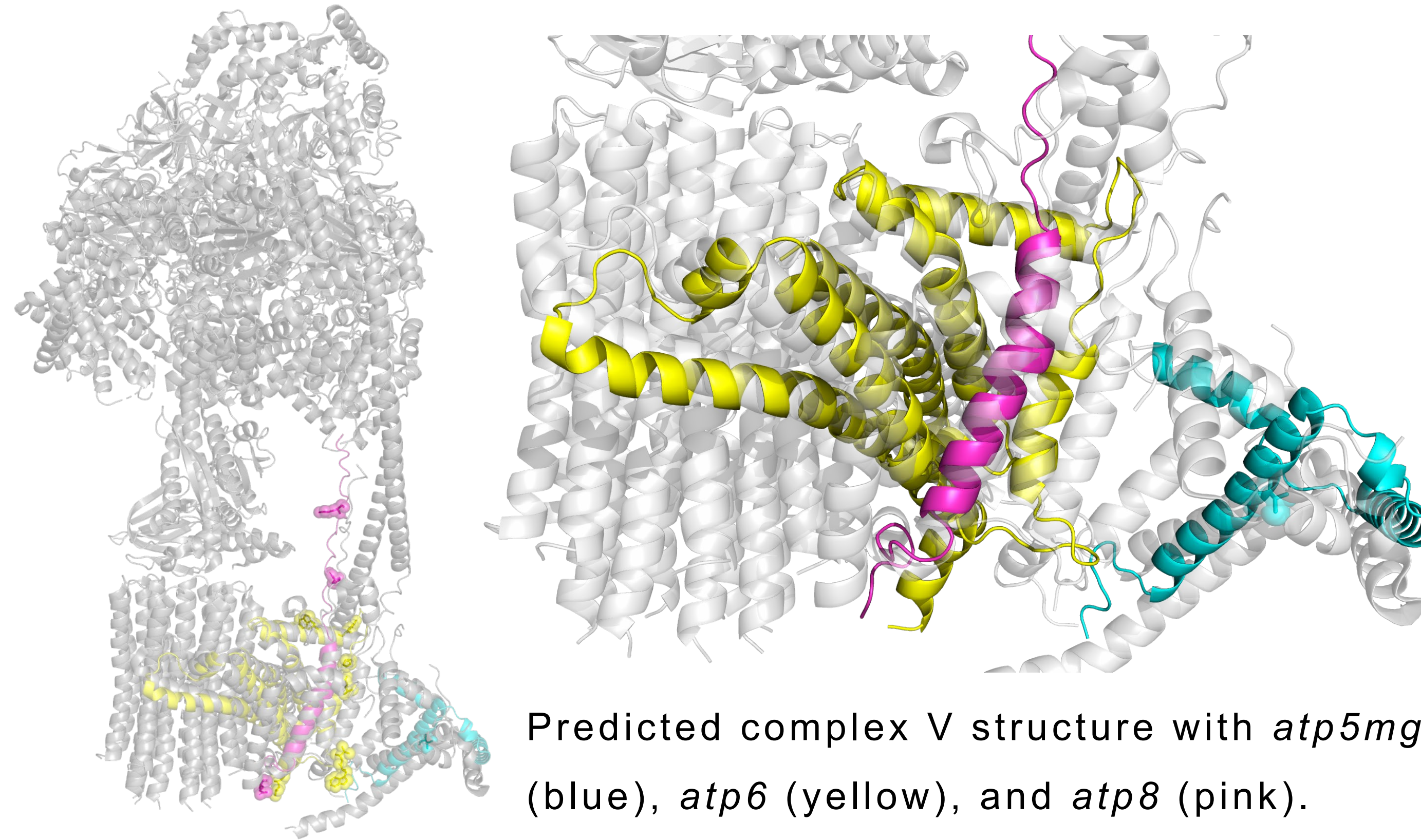
As populations diverge, they accumulate variants which may result in negative interactions in hybrid individuals. Often studied in a laboratory environment, the impact of hybrid incompatibilities on hybrid fitness under natural conditions is poorly understood<sup>1</sup>. Swordtails are freshwater fish with a history of extensive gene flow between species. We identified a lethal mitonuclear incompatibility in F2 hybrids between *X. malinche* and *X. birchmanni*<sup>2</sup>.



Hybrids with only homozygous *X. birchmanni* *ndufa13* survive until birth but are born smaller than their compatible siblings.



F2 hybrids with homozygous *X. birchmanni* ancestry at *ndufa13* and *atp5mg* are incompatible with *X. malinche* mitochondrial ancestry.



While incompatible individuals survive in the lab, we have not found them in the wild despite sampling thousands of individuals. This suggests that their natural environment selects strongly against these hybrid incompatibilities, possibly contributing to the speciation process in this group. We hope to identify how *ndufa13* and *atp5mg* reduce hybrid fitness in different environmental conditions to uncover what selection pressure hybrids face in the wild.

We have also identified another candidate incompatibility involving the *X. birchmanni* version of *atp5mg*.

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<sup>1</sup>Presgraves. *Nature Reviews Genetics*. 2010. <sup>2</sup>Moran et. al. *Nature*. 2024.