

Genetic Insights into the Morphology and Reproductive Development of the Critically Endangered Smalltooth Sawfish (*Pristis pectinata*)

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Samples

male

3 testis

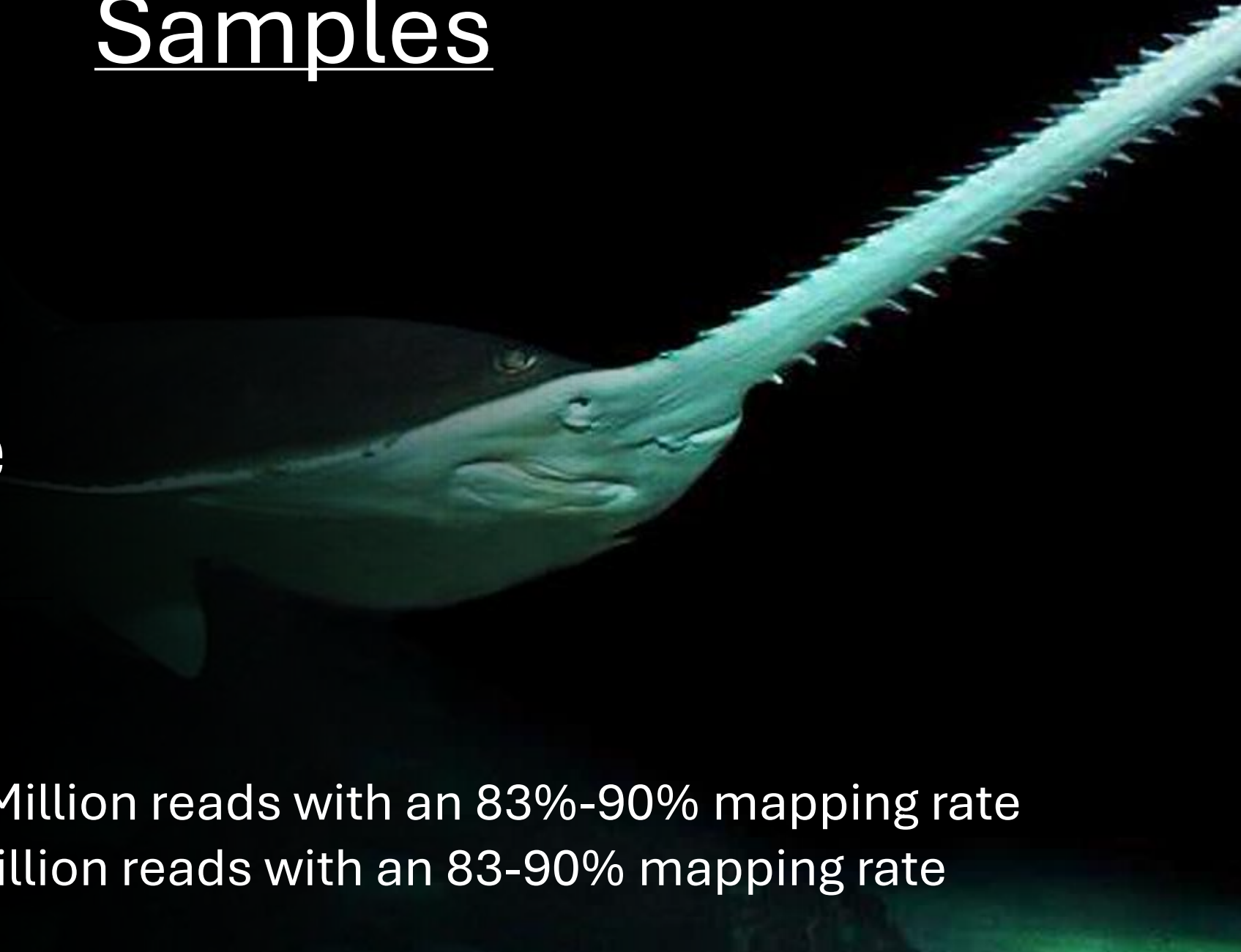
3 ovary-like

female

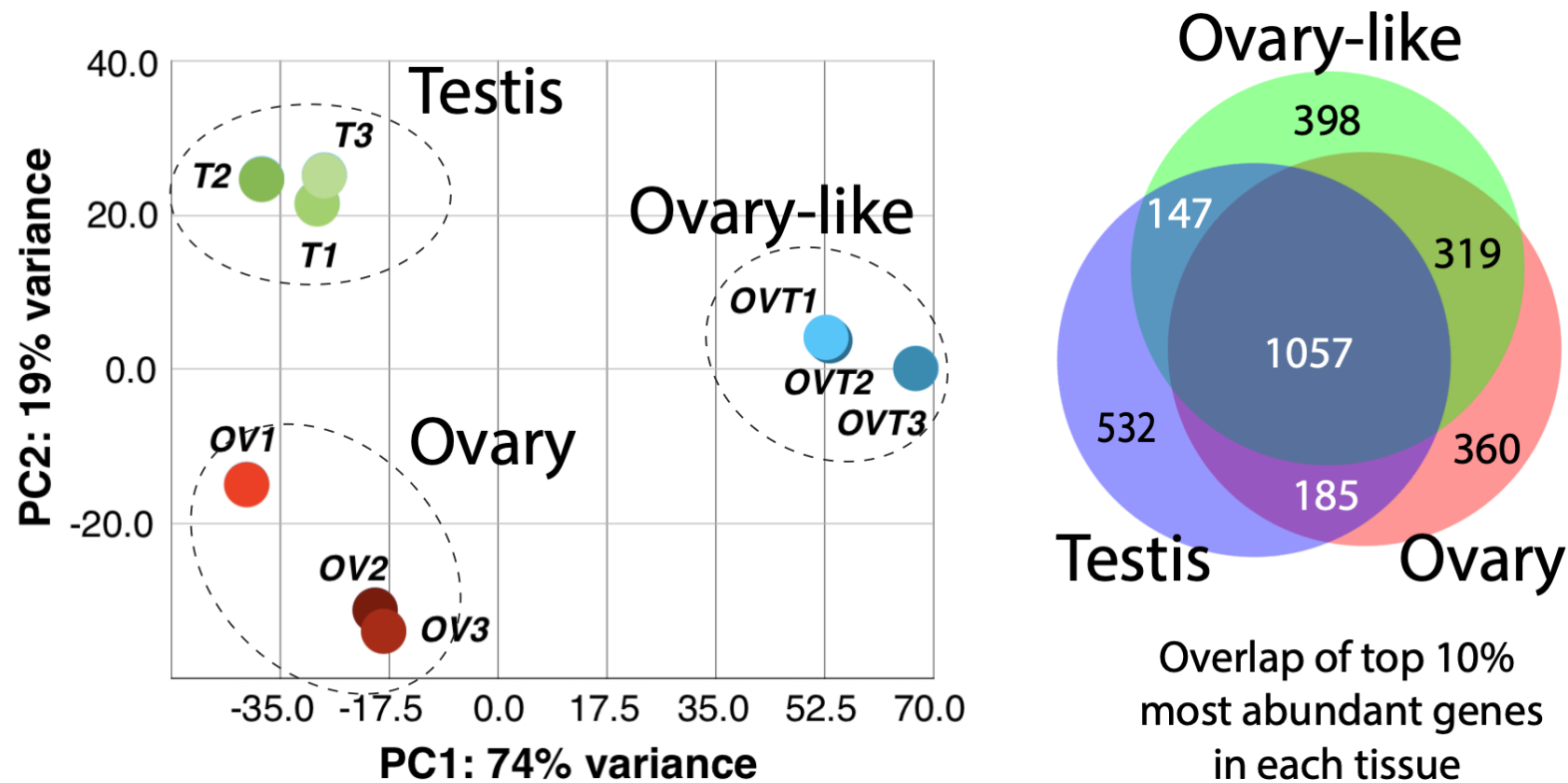
3 ovary

mRNA: ~193 Million reads with an 83%-90% mapping rate

Small RNA: ~85 Million reads with an 83-90% mapping rate

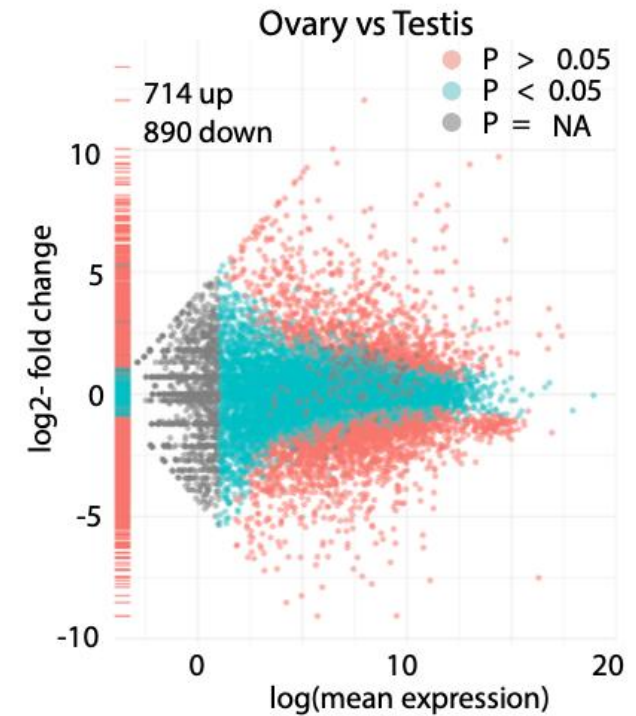
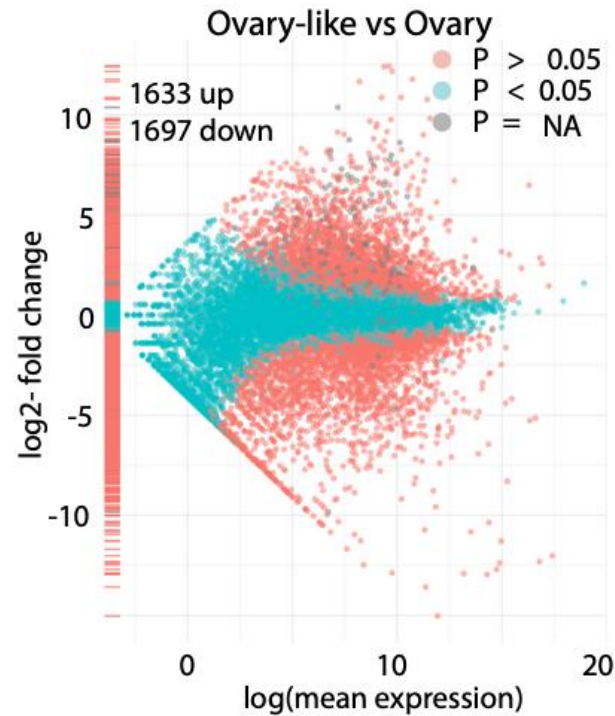
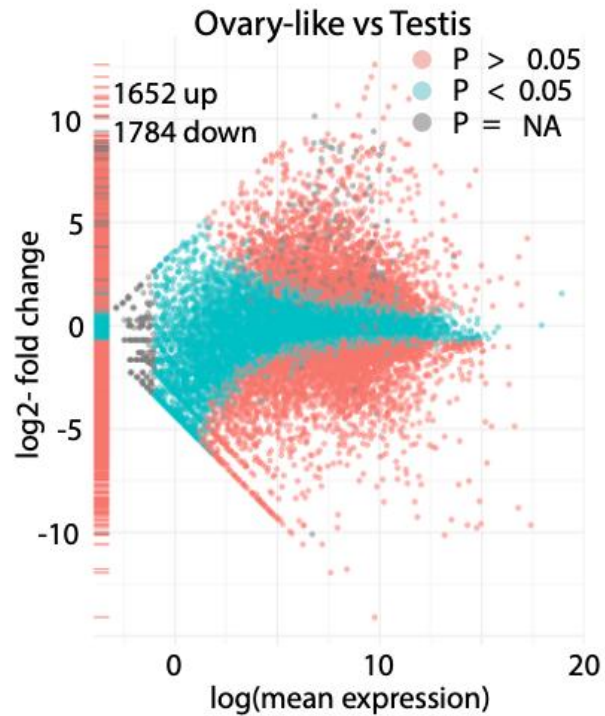


Distinct Profile of Male Ovary-like Tissue



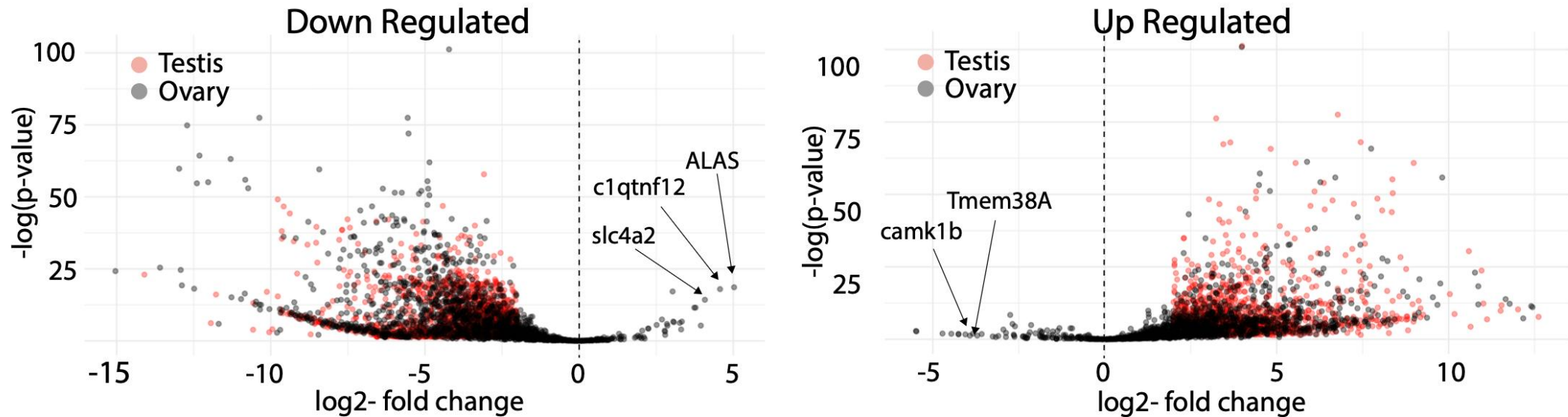
- Expression profile of male ovary-like tissue is highly distinct from functional gonad

Divergence in Transcriptome Expression



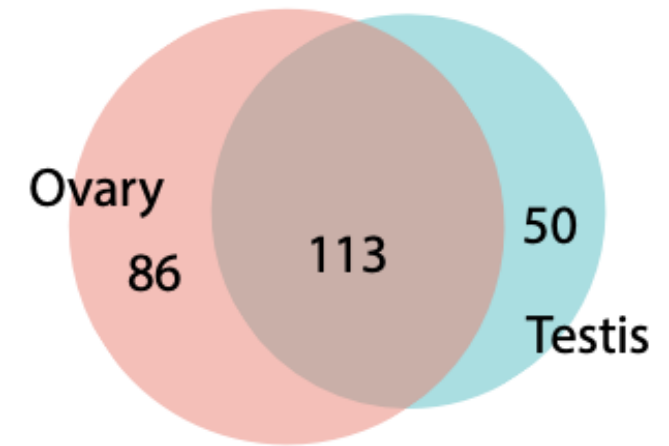
- ~24% of the transcriptome was differentially expressed
- Bigger difference between Ovary-like to either functional type vs Testis to Ovary

A Distinct Set of Genes Define Male “Ovary”

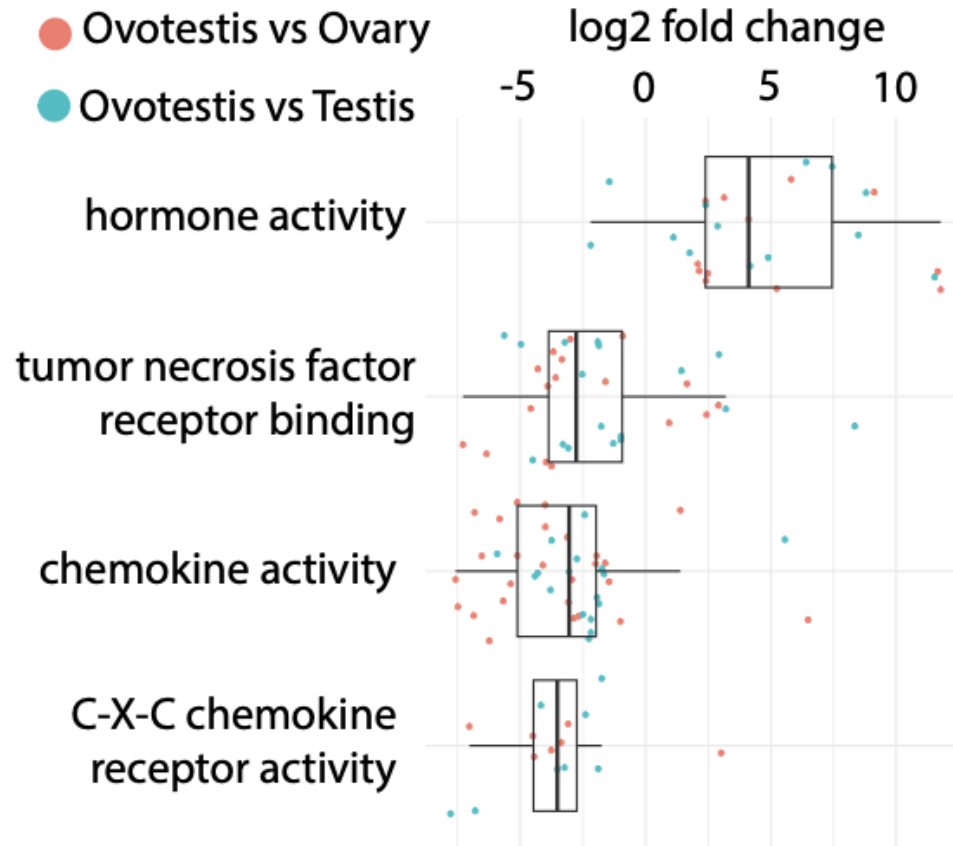


- Only a handful of genes related to gametogenesis are outliers

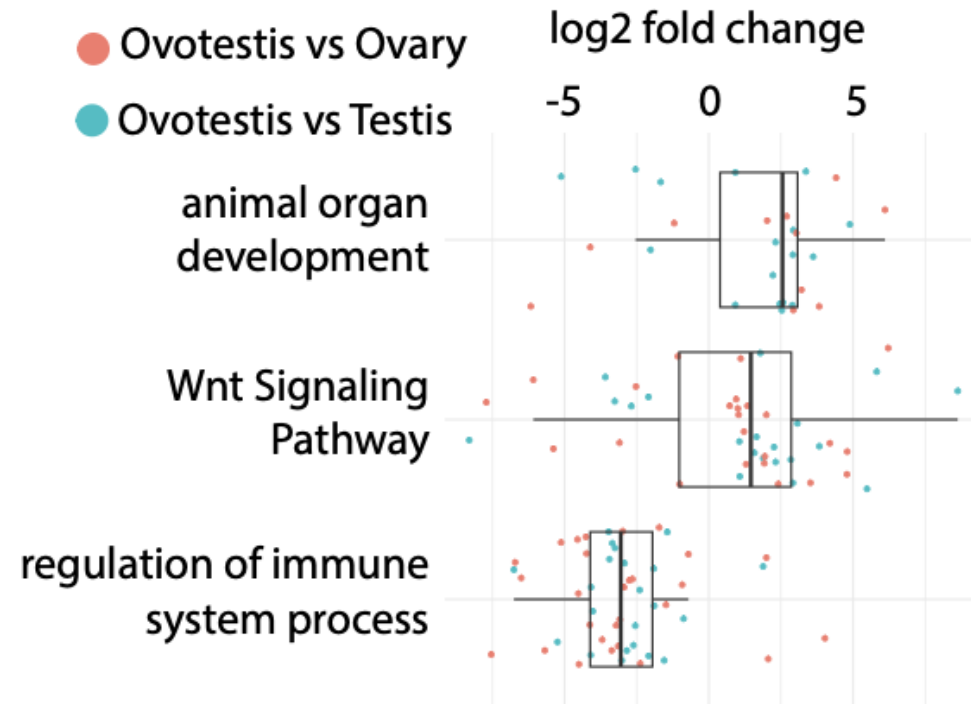
Gene Ontology Analysis



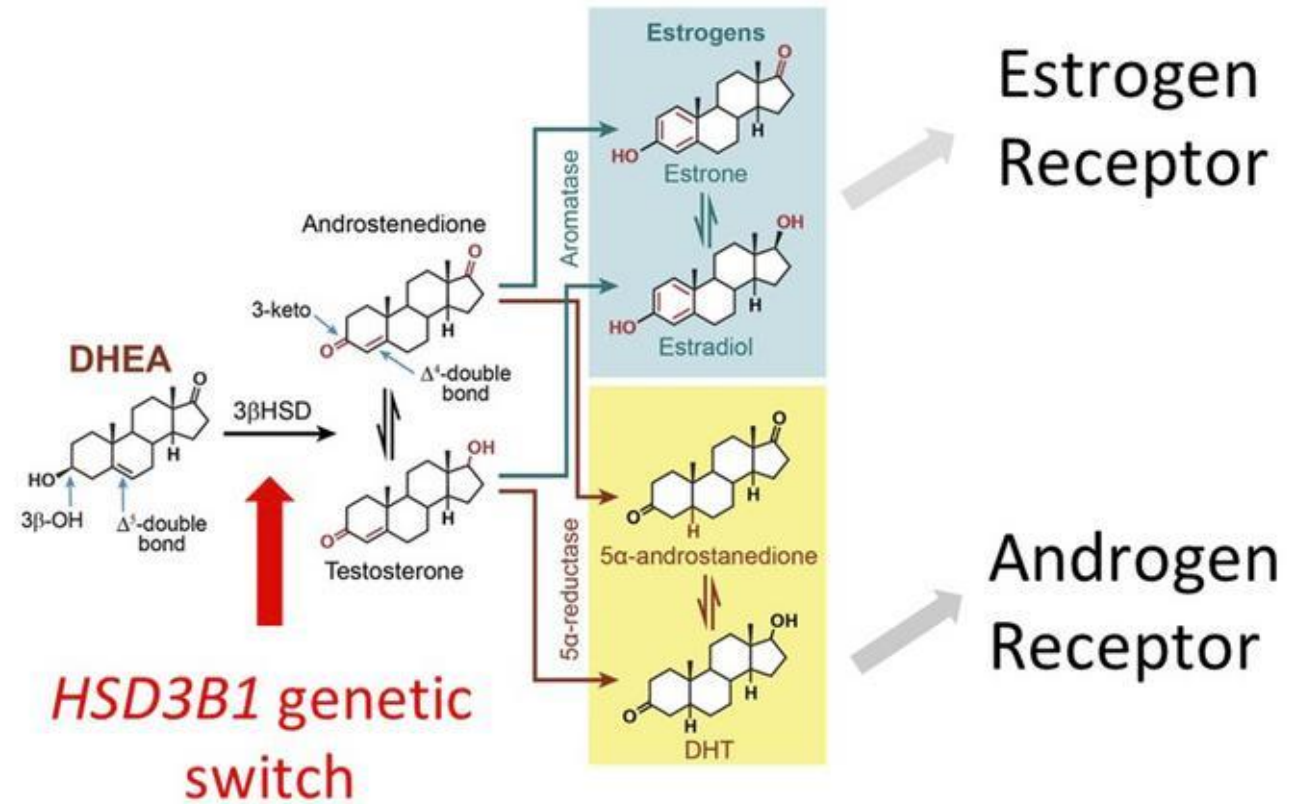
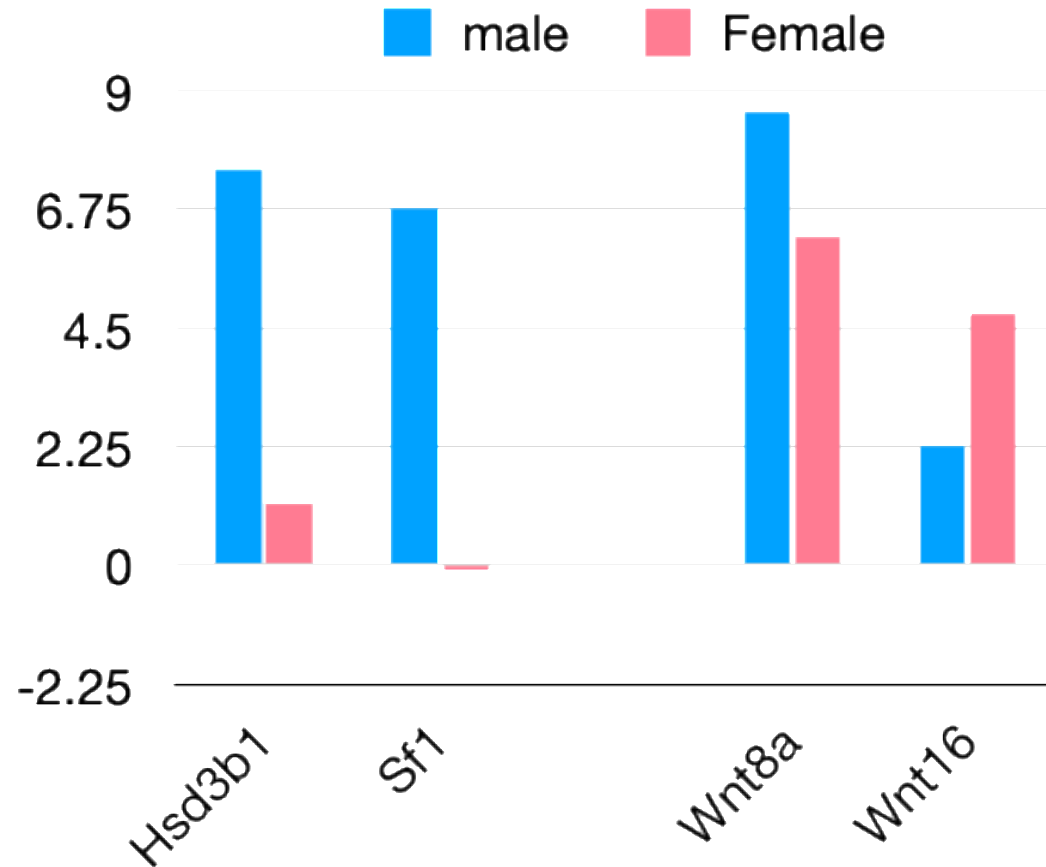
Molecular Function



Biological Process



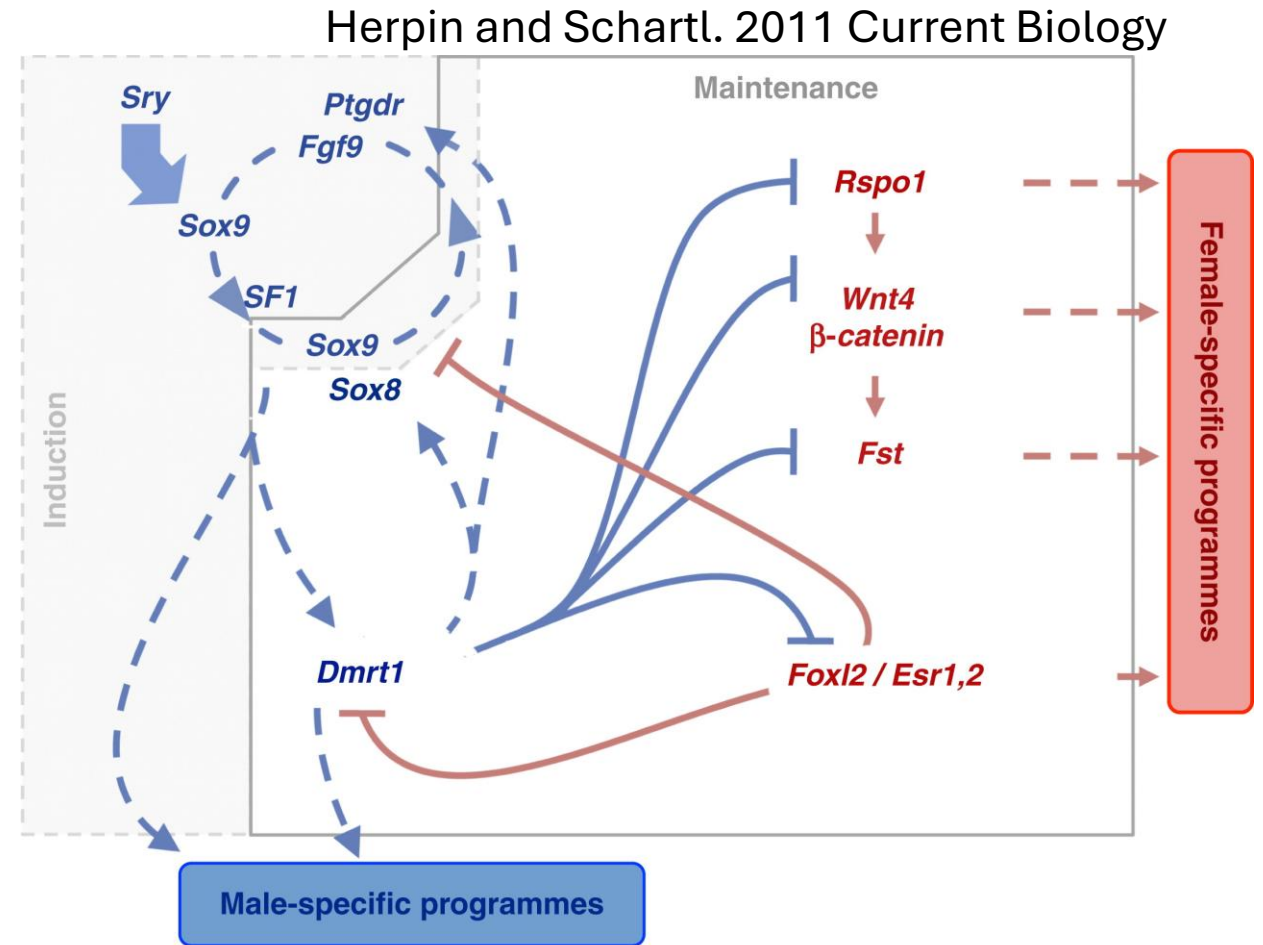
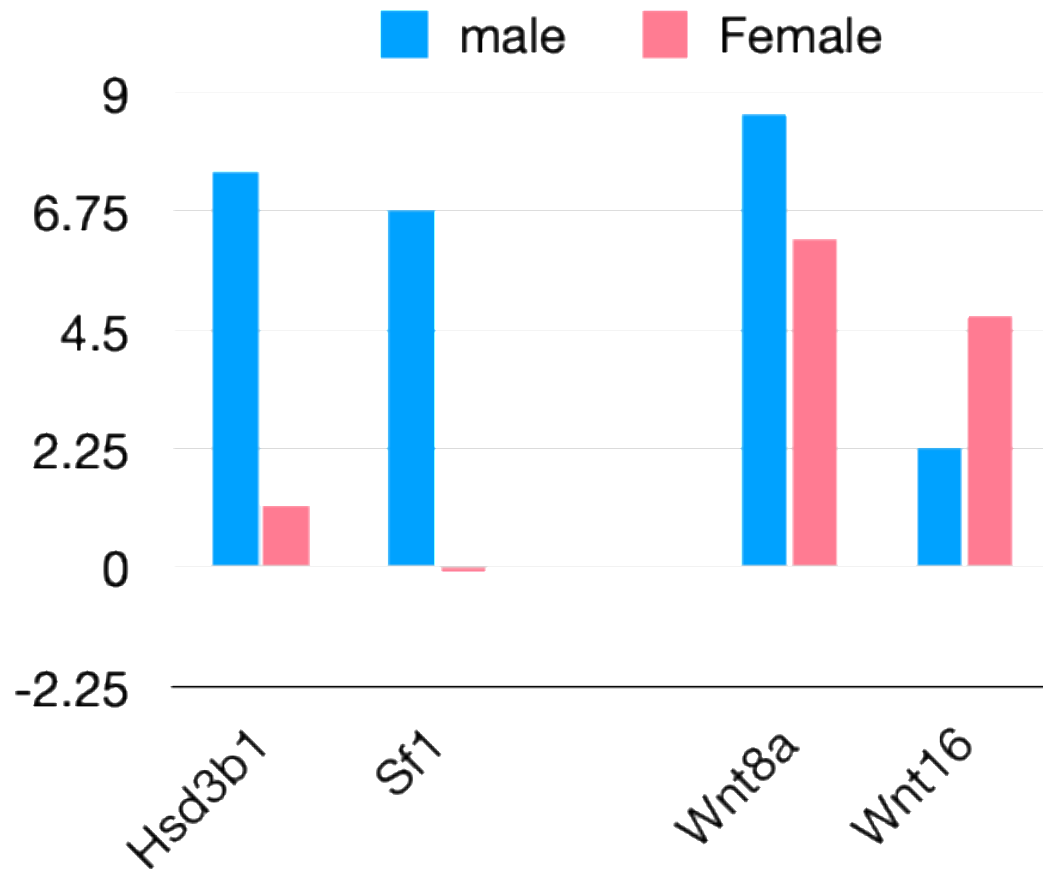
Genes of Interest



Kruse et al. JCI insight

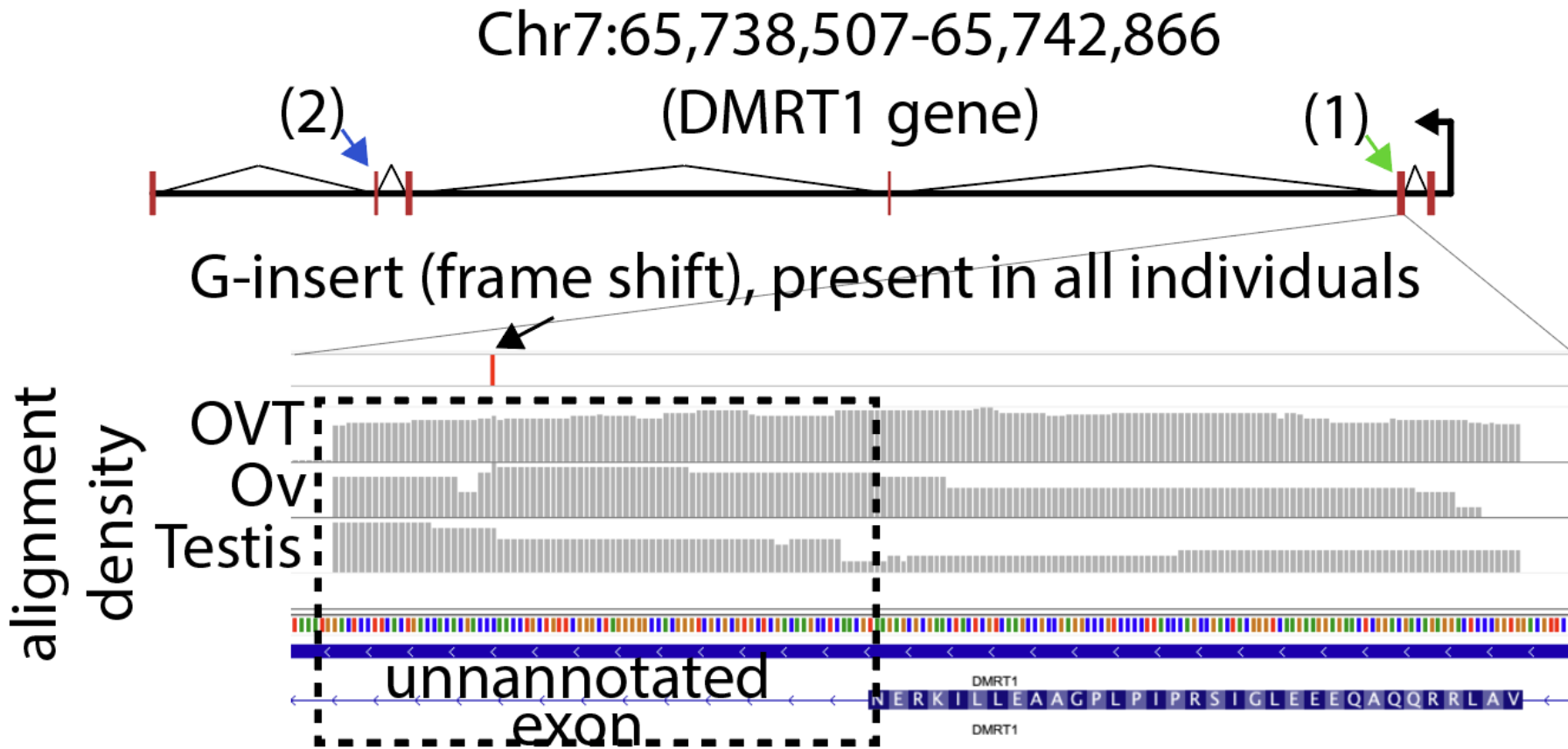
- Male ovary-like tissue is a source of hormone biogenesis

Genes of Interest



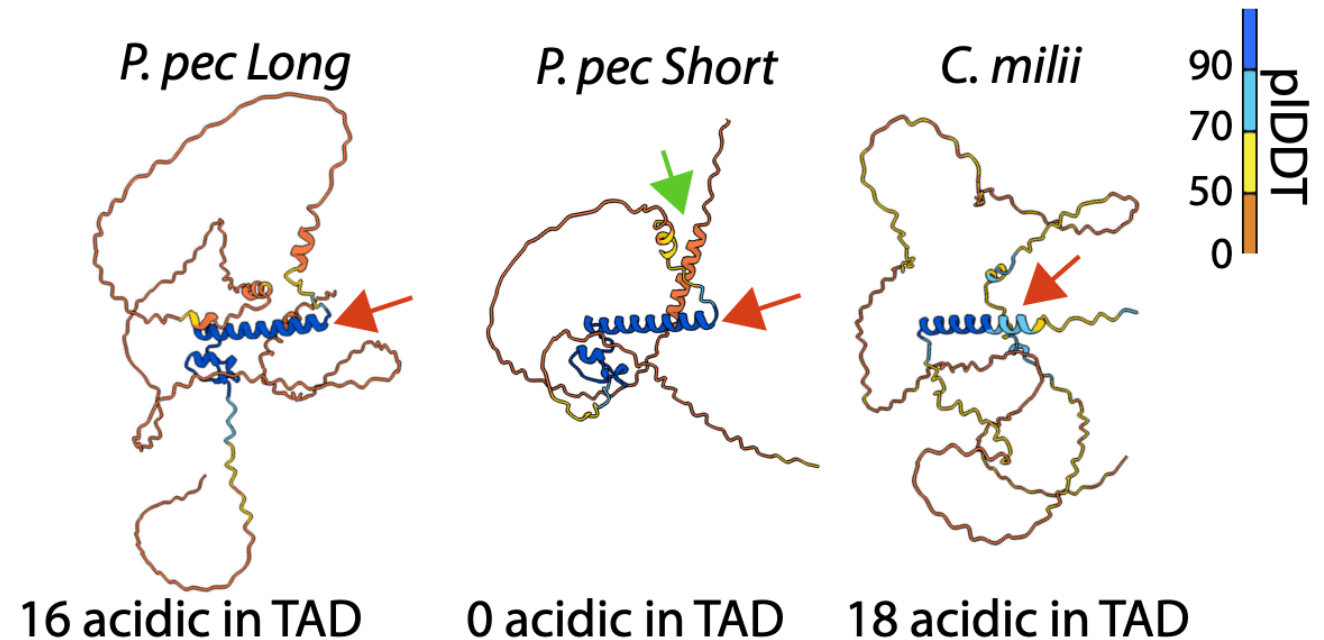
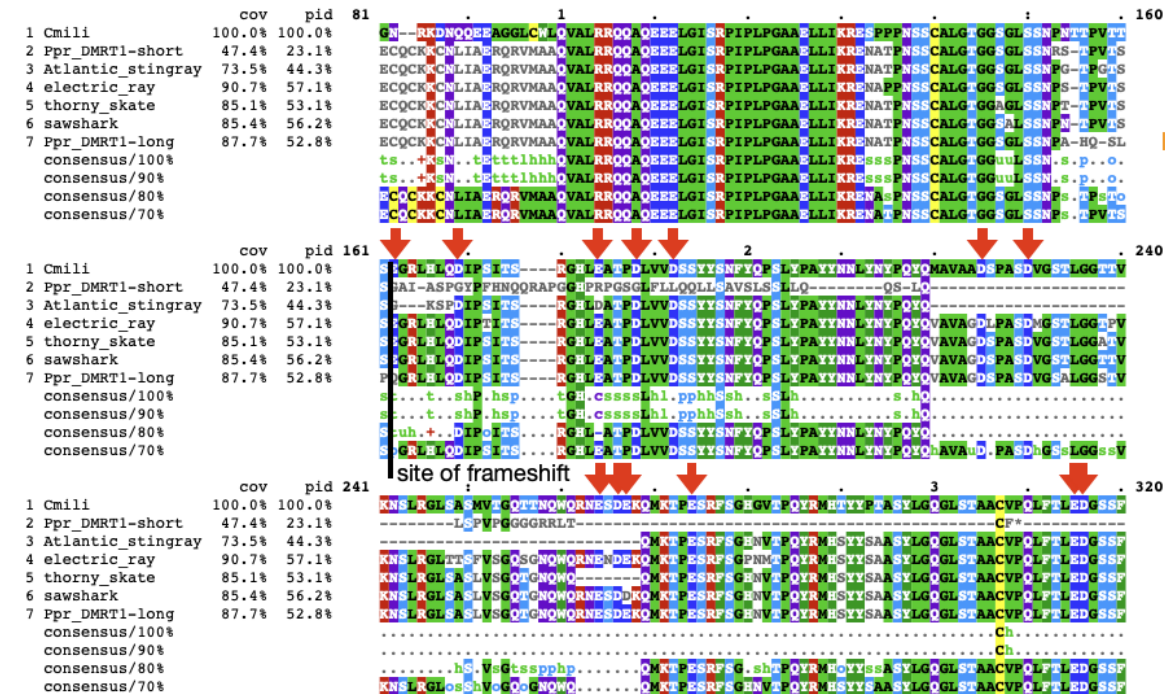
- **Early, fundamental disturbance of sexual development**

Single base insertion in DMRT1

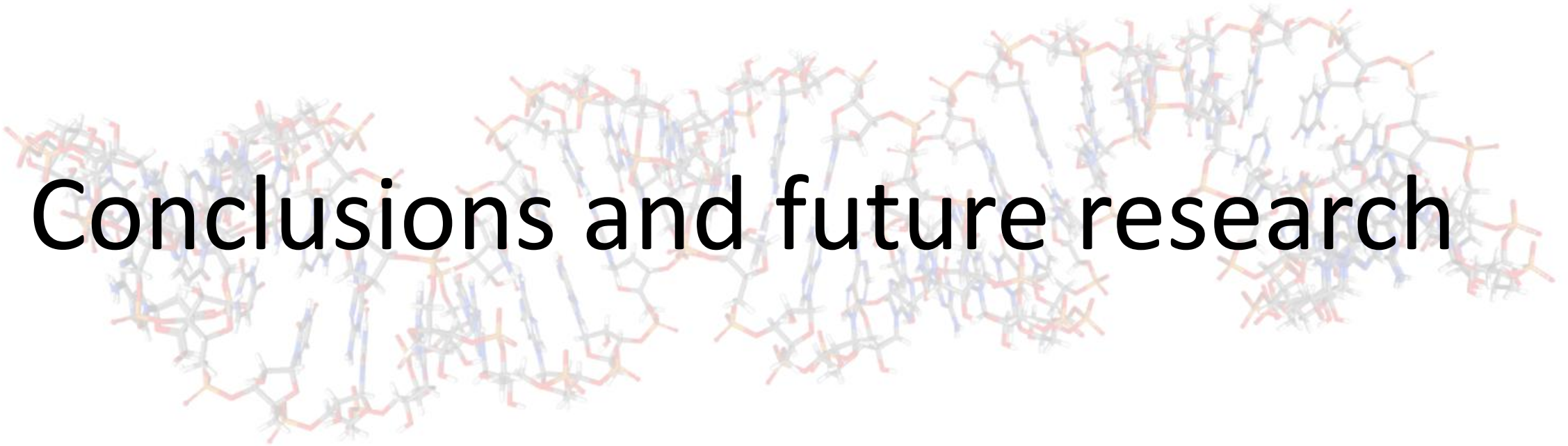


- A single “G” insert into misannotated part of DMRT1 exon 2

Allele creates a frameshift that disruption TAD



- The mutated protein appears to retain DNA binding but will not be able to activate target genes



Conclusions and future research

- DMRT1 allele is observed in all (5) public genomic (2) or transcriptomic data (3)
- Selection for: aggressive mating behaviors?, production of “higher quality” sperm?, earlier maturation?
- Need population-level screening for frame-shift allele
- Do extant Bahamian and pre-decline museum specimens have ovotestes?
- Do males of the other 4 sawfish species have ovotestes?

Acknowledgements

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**NOAA
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Thank you!

Questions?

Small RNA analysis

