



## **The Estrogen Connection in Syngnathid Sexual Selection**

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**Abstract:** Sexual selection acts more strongly on females than on males in many syngnathid taxa. Consequently, females evolve secondary sexual traits, and, at least in Gulf pipefish, these traits are regulated by estrogen. Estrogens bind to two estrogen receptors, ER-alpha and ER-beta. These receptors, in turn, bind to DNA to regulate transcription. Here, we use comparative data from next-generation sequencing to test the hypothesis that sexual selection has affected the evolution of estrogen receptors and their binding sites in syngnathid lineages. Our results show that perfect estrogen receptor binding sites are surprisingly rare in the Gulf pipefish genome, calling for an approach in which partial sites are weighted by their expected binding affinity to identify regions with high potential to bind estrogen receptors. Empirical data regarding differential expression because of estrogen exposure show that some, but not all, differentially expressed loci seem to reside in genomic regions with enhanced estrogen receptor binding. Additional analyses show that the genomic response to sexual selection is probably complex and subtle, so a variety of approaches will be necessary to ascertain how sexual selection affects genomes.

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