Seadragon genome analysis provides insights into its phenotype and sex-determination locus

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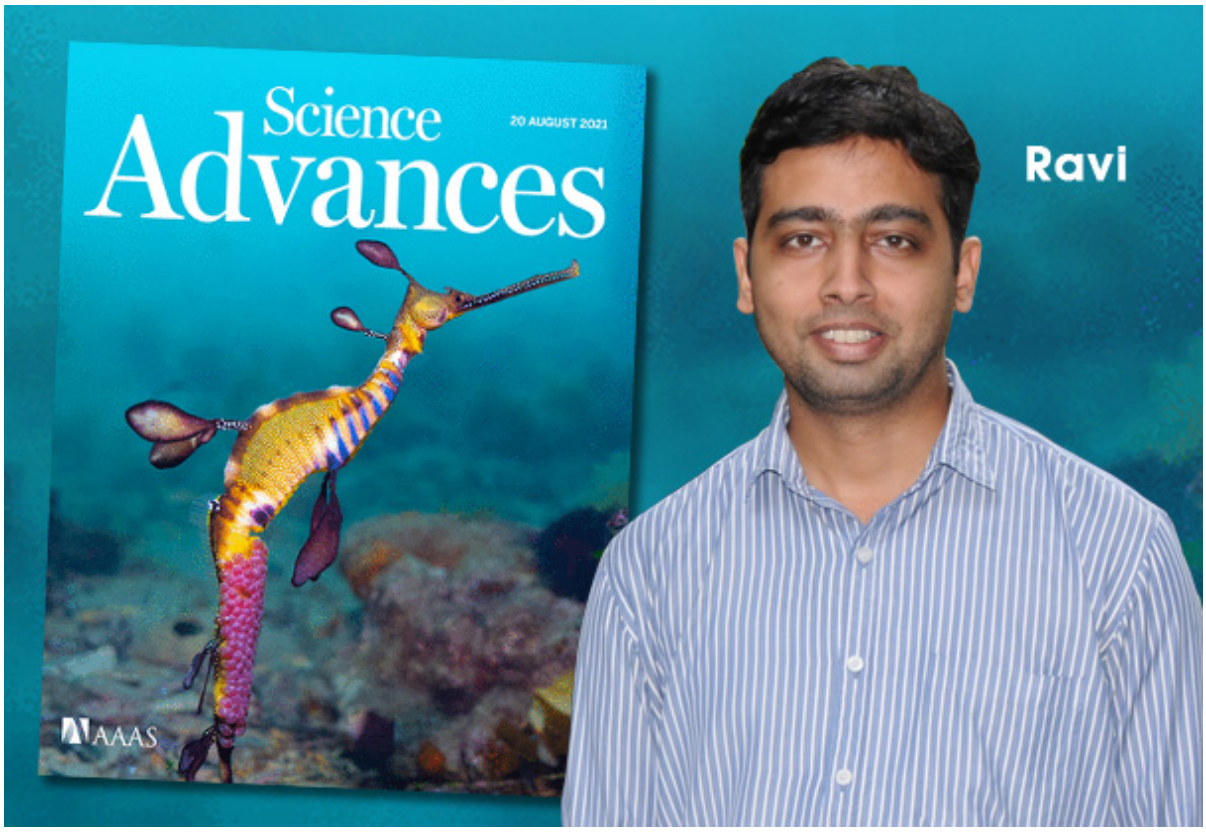

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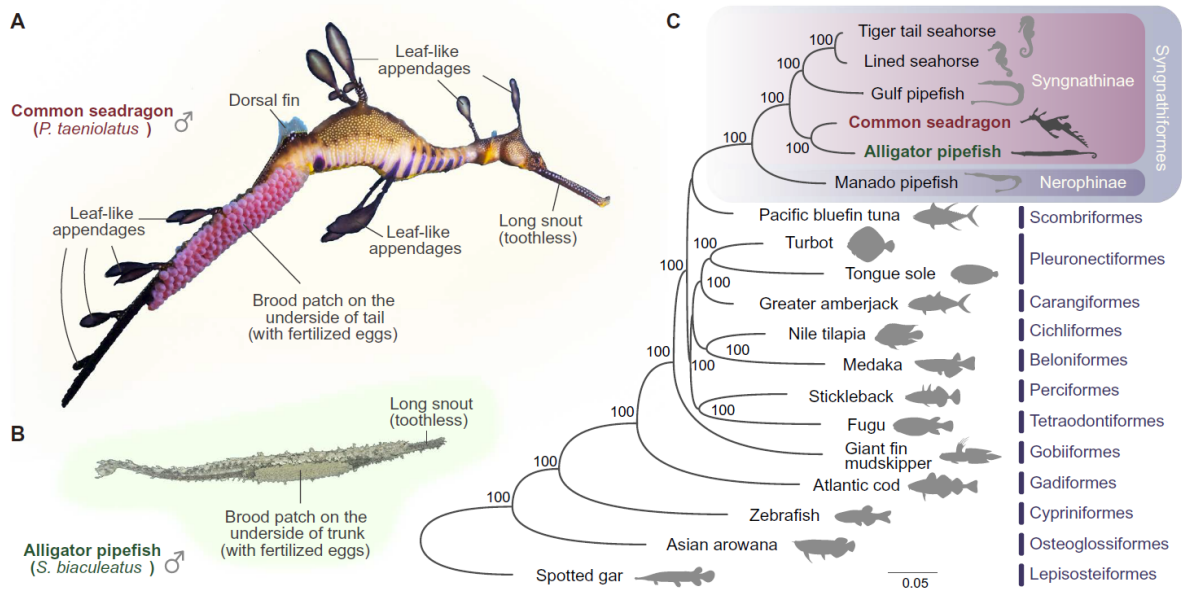
Abstract

The iconic phenotype of seadragons includes leaf-like appendages, a toothless tubular mouth, and male pregnancy involving incubation of fertilized eggs on an open "brood patch". We de novo sequenced male and female genomes of the common seadragon (*Phyllopteryx taeniolatus*) and its closely related species, the alligator pipefish (*Syngnathoides biaculeatus*). Transcription profiles from an evolutionary novelty, the leaf-like appendages, show that a set of genes typically involved in fin development have been co-opted as well as an enrichment of transcripts for potential tissue repair and immune defense genes. The zebrafish mutants for *scpp5*, which is lost in all syngnathids, either lacked teeth or displayed deformed pharyngeal teeth, supporting the hypothesis that the loss of *scpp5* has contributed to the loss of teeth in syngnathids. A putative sex–determining locus encoding a male-specific *amhr2y* gene shared by common seadragon and alligator pipefish was identified.

Figure



Key features of the common seadragon (*P. taeniolatus*) and the alligator pipefish (*S. biaculeatus*) and their phylogenetic positions. (**A**) The seadragon has a dragon-shaped body with many special leaf-like appendages, and a long tubular snout lacking teeth. Seadragon males incubate eggs on a brood patch on the underside of the tail. (**B**) A male alligator pipefish showing eggs incubated on a brood patch on the underside of the trunk. (**C**) Phylogenetic tree of 19 ray-finned fishes. Bootstrap values below 80 are not shown.