The sex-specific transcriptome of the hermaphrodite sparid sharpsnout seabream (Diplodus puntazzo)

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DE Sparidae; Sharpsnout seabream; Diplodus puntazzo; RNA-Seq; Transcriptome; Gonads; Brain; Sex differentiation; Hermaphroditism
ID PROTANDROUS BLACK PORGY; DIFFERENTIAL EXPRESSION ANALYSIS; SEXUALLY DIMORPHIC EXPRESSION; HIGH WATER TEMPERATURE; DM-DOMAIN GENE; ACANTHOPAGRUS-SCHLEGELI; RNA-SEQ; MOLECULAR-CLONING; DESERT-HEDGEHOG; OVARIAN DEVELOPMENT
AB Background: Teleosts are characterized by a remarkable breadth of sexual mechanisms including various forms of hermaphroditism. Sparidae is a fish family exhibiting gonochorism or hermaphroditism even in closely related species. The sparid Diplodus puntazzo (sharpsnout seabream), exhibits rudimentary hermaphroditism characterized by intersexual immature gonads but single-sex mature ones. Apart from the intriguing reproductive biology, it is economically important with a continuously growing aquaculture in the Mediterranean Sea, but limited available genetic resources. Our aim was to characterize the expressed transcriptome of gonads and brains through RNA-Sequencing and explore the properties of genes that exhibit sex-biased expression profiles.

Results: Through RNA-Sequencing we obtained an assembled transcriptome of 82,331 loci. The expression analysis uncovered remarkable differences between male and female gonads, while male and female brains were almost identical. Focused search for known targets of sex determination and differentiation in vertebrates built the sex-specific expression profile of sharpsnout seabream. Finally, a thorough genetic marker discovery pipeline led to the retrieval of 85,189 SNPs and 29,076 microsatellites enriching the available genetic markers for this species.

Conclusions: We obtained a nearly complete source of transcriptomic sequence as well as marker information for sharpsnout seabream, laying the ground for understanding the complex process of sex differentiation of this economically valuable species. The genes involved include known candidates from other vertebrate species, suggesting a conservation of the toolkit between gonochorists and hermaphrodites.
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