

RESEARCH ARTICLE

De novo assembly of a transcriptome from the eggs and early embryos of *Astropecten aranciacus*

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Data Availability Statement: Fastq files of the assembled reads for each samples are now available in ArrayExpress database under the accession number E-MTAB-5679 (<https://www.ebi.ac.uk/arrayexpress/experiments/E-MTAB-5679>).

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Abstract

Starfish have been instrumental in many fields of biological and ecological research. Oocytes of *Astropecten aranciacus*, a common species native to the Mediterranean Sea and the East Atlantic, have long been used as an experimental model to study meiotic maturation, fertilization, intracellular Ca²⁺ signaling, and cell cycle controls. However, investigation of the underlying molecular mechanisms has often been hampered by the overall lack of DNA or protein sequences for the species. In this study, we have assembled a transcriptome for this species from the oocytes, eggs, zygotes, and early embryos, which are known to have the highest RNA sequence complexity. Annotation of the transcriptome identified over 32,000 transcripts including the ones that encode 13 distinct cyclins and as many cyclin-dependent kinases (CDK), as well as the expected components of intracellular Ca²⁺ signaling toolkit. Although the mRNAs of cyclin and CDK families did not undergo significant abundance changes through the stages from oocyte to early embryo, as judged by real-time PCR, the transcript encoding Mos, a negative regulator of mitotic cell cycle, was drastically reduced during the period of rapid cleavages. Molecular phylogenetic analysis using the homologous amino acid sequences of cytochrome oxidase subunit I from *A. aranciacus* and 30 other starfish species indicated that Paxillosida, to which *A. aranciacus* belongs, is not likely to be the most basal order in Asterozoa. Taken together, the first transcriptome we assembled in this species is expected to enable us to perform comparative studies and to design gene-specific molecular tools with which to tackle long-standing biological questions.

Introduction

Starfish (class Asterozoa) represent one of the most successful life forms in the animal kingdom. After their ancestors emerged circa 500 million years ago, as many as 1,890 diverse species of starfish are thriving today on the seabed all over the world [1–3]. As general predators living on bivalves, microalgae and corals, starfish have profound impacts on their ecological