

Tunicate Eco-Evo-Devo laboratory in IMS-METU

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Summary

I completed my undergraduate education in Atatürk University, Education Faculty, Biology Department. Then pursued my graduate education at the Biology Department of Mersin University. Both my master's and PhD theses were on the biological and population genetics features of various fish species. My initial encounter with tunicates dates back to my Postdoc at Israel Oceanographic and Limnologic Research Institute (IOLR) in 2011, where I was working on a DNA barcoding project. During that time, the entire institute was actively engaged in research on tunicates, and discussions during lunchtime often revolved around this fascinating group of organisms. Prof. Rinkevich usually only spoke seriously about tunicate biology but 1 day he told me “You know *Botryllus schlosseri* is riding horse in Black Sea coasts of Turkiye.” I was totally surprised and was trying to understand the meaning of this comment from a scientific perspective. He then showed me the picture of a *B. schlosseri* colony attached to a seahorse. Following several more Postdoc experiences, I began working as a Principal Investigator at Institute of Marine Sciences, Middle East Technical University (IMS-METU) in 2017. Since then, my team and I have been working on tunicate biodiversity, evolutionary biology, genomics, DNA barcoding, metabarcoding, metabolomics, whole-body regeneration (WBR) and aging related pathways.

KEYWORDS

early development < process, evolution < process, genomics < process, genetics < process, invertebrate

Tunicates are invertebrates and classified under the Phylum Chordate. They possess unique features such as the ability to regenerate themselves from fragments of blood vessels, not showing senescence in the same way as other chordates, and having high mutation rates (Ballarin et al., 2021; Karahan et al., 2016). Additionally, being the closest invertebrate relatives of vertebrates makes them excellent models for studying evo-devo, WBR, aging and many other areas (Karahan et al., 2022). These reasons, coupled with the lack of studies on ascidian species in Turkish

coastlines, have motivated me to focus our researches on tunicates (Figure 1).

During the initial years of my Principal Investigator position, my research primarily focused on studying the biodiversity of ascidians along the Turkish coastlines. I aimed to get information about the tunicates species and determine their cultivability under the aquaculture conditions at IMS-METU. Once I obtained sufficient data on these aspects, I expanded my research to explore other fields in collaboration with Prof. Baruch Rinkevich, Dr. Amalia Rosner, and

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FIGURE 1 A picture with my graduate students. From left to right; Esra Öztürk, Begüm Ece Tohumcu, Arzu Karahan, İrem Bekdemir, Fatıma Nur Oğul Ünal.

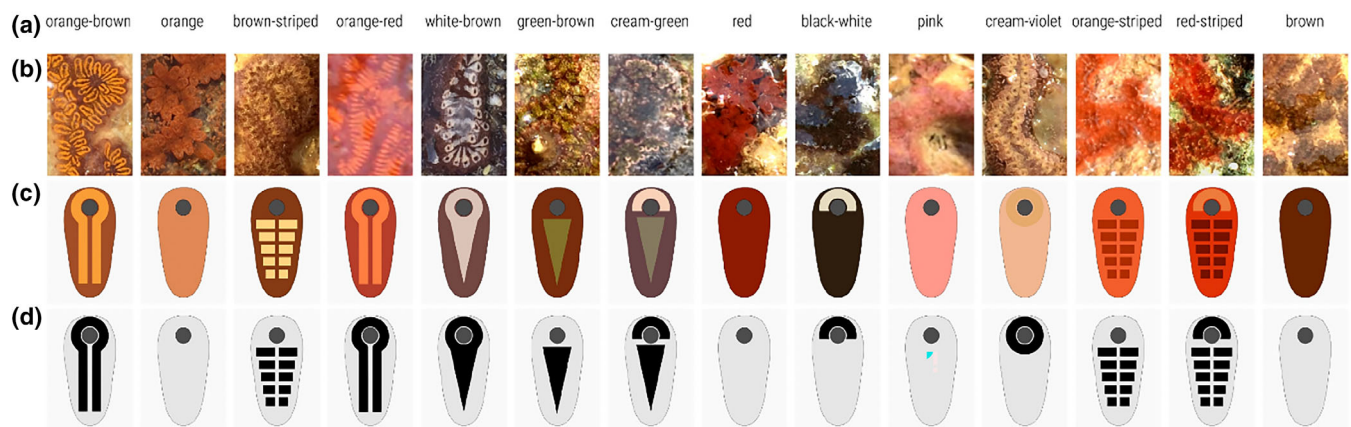


FIGURE 2 *Botrylloides niger* morphotypes along the Turkish coast of the Mediterranean Sea (a) morphotype name, (b) sample image, (c) schematic representation of a typical zooid, (d) typical pattern of the morphotype (from Temiz et al., 2023).

Dr. Ziva Lapidot from IOLR, Dr. Marie Nydam from Soka University and Dr. Simon Blanchoud from Fribourg University.

So far, our main accomplishments on tunicate are recording eight botryllid ascidians in Mediterranean coastline of Türkiye using molecular techniques (Karahan et al., 2023) and assembling the whole genome of *Botryllus* sp. (*humilis*), which we are using as a model organism for eco-evo-devo studies for the first time in the world. Additionally, we are working on blastogenetic stage and symbiont related

metabolomics analysis on different botryllid species, which have potential medical and industrial applications. We are also making phylogeographic and morphological analyses of *Botrylloides niger* through the Mediterranean coast of Türkiye (Figure 2).

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All the graduate students who continue their work in the Tunicate Eco-Evo-Devo laboratory under my supervision

PhD student Fatıma Nur Oğul Ünal: Working on tunicate WBR related pathways.

PhD student Esra Öztürk: Working on tunicate aging related pathways.

PhD student Begüm Ece Tohumcu: Working on tunicate ecogenomics.

Master student İrem Bekdemir: Working on tunicate biodiversity.

DATA AVAILABILITY STATEMENT

No data available.

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