

Blue crab (*Callinectes sapidus*) COI haplotype analysis of origins of invasives in the Mediterranean

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Background

- Blue crabs are native to the Western Atlantic but are an invasive species now found across the Mediterranean Sea
- Female blue crabs begin their lives in the ocean before moving to lower salinity estuaries and eventually returning to saltwater to spawn
- Using COI haplotyping, we can identify the maternal lineage of blue crabs, population-level dispersal trends, and potential geographic origins of invasives

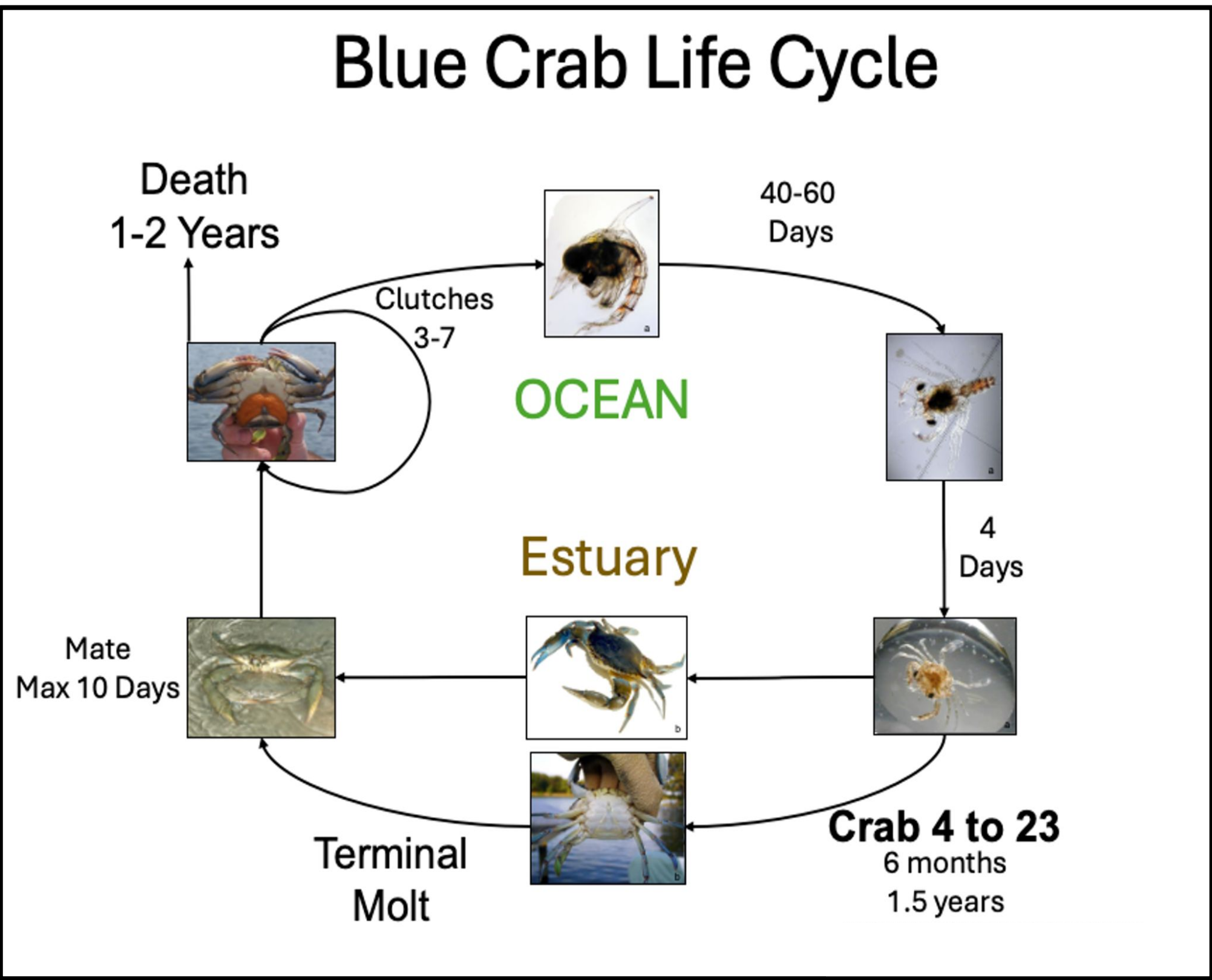


Figure 1: Typical life cycle of a blue crab. Female crabs from various habitats all move offshore into higher salinity water after mating in estuaries

Methods

- Native blue crabs from various locations and invasive Turkish crabs from a freshwater weir were sampled in 2012
- Crabs occupying habitats of differing salinity in North Carolina (NC) were sampled in 2020
- 5 Invasive Sardinian crabs from a saltwater channel were sampled in 2024
- For all crabs, a portion of the COI gene was amplified using PCR and sequenced to build haplotype maps



Figure 2: Invasive crab sampling locations. Blue = Sardinia (saltwater channel), red = Turkey (freshwater weir)

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Integration of Invasive Crabs into Haplotype Networks

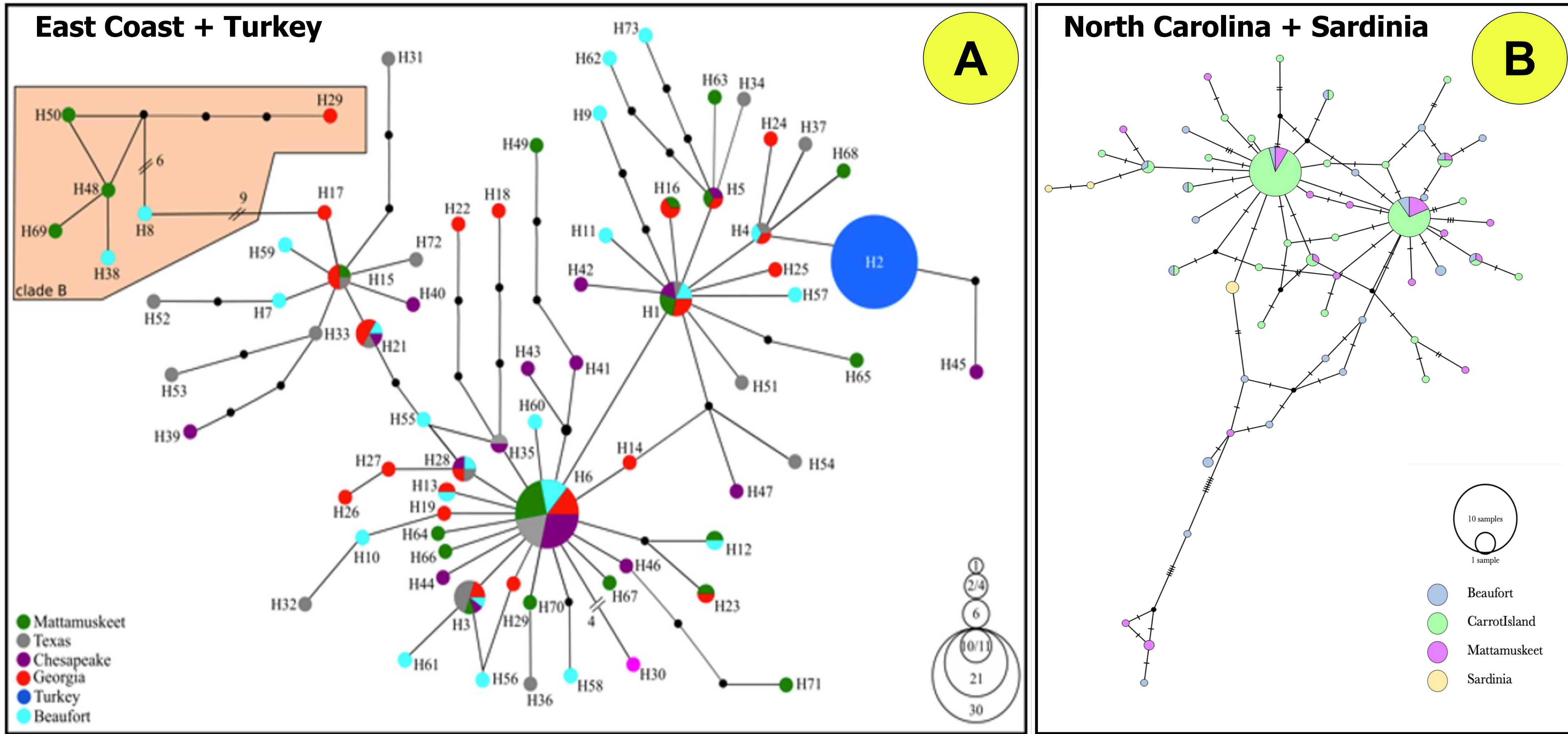


Figure 3: Haplotype maps of blue crabs built using a 552 base pair segment of COI. **(A)** Data from 2012 showing crabs from across their native range and invasive crabs in Turkey. **(B)** Data from 2020 and 2024 showing crabs from Sardinia and various North Carolina habitats, where Mattamuskeet = low salinity females, Carrot Island = high salinity males and females, and Beaufort = spawning females

Conclusions

- Sardinian crabs were all spawning ovigerous females caught in saltwater and had 3 unique haplotypes, these crabs could have occupied multiple different habitats as adults
- Contrastingly, Turkish crabs only had one haplotype, suggesting either invasive crabs in Turkey all have one common maternal origin or only one genotype there migrates to freshwater
- Sardinian crabs likely did not originate from the Neuse River watershed in North Carolina
- Salinity-based habitat selection in blue crabs appears to have a strong genetic component

Future Work

- Combine new data from Sardinia and North Carolina with 2012 data from Turkey and other native crabs to create one shared haplotype map
- Incorporate additional haplotypes from 2022 paper (Schubart et al.) with COI sequences from invasive crabs collected from other locations across the Mediterranean
- Quantify levels of genetic differentiation in Mediterranean vs. native crab populations; existing research suggests strong founder effect in Mediterranean crabs with far lower genetic diversity

References

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