The ecology, diversity, and habitat use of the North-Atlantic deep-sea squat lobster *Munidopsis serricornis* complex (Galatheoidea: Munidopsidae)

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Introduction

Squat lobsters are commonly found in the deep sea, displaying significant diversity and abundance. Individuals within the family Munidopsidae and, specifically, the species *Munidopsis serricornis*, present morphological complexity; they are often found on scleractinian (stony/hard) coral colonies (*Desmophyllum pertusum*) showing a potential symbiotic relationship. The species has a wide geographic distribution with multiple localities across the Atlantic Ocean, suggesting the existence of a species complex.

Objectives

1. Distinguish different species within *M. serricornis* species complex and separate them into their respective lineages.
2. Assess the relationship between individuals within the *M. serricornis* complex and deep-sea corals.

Methods

Environmental

- ROV video analyses

Genetic

- DNA Barcoding
- DNA Quantification
- Gel Electrophoresis
- MAFFT Alignment
- Construction of Phylogeny (n=99)

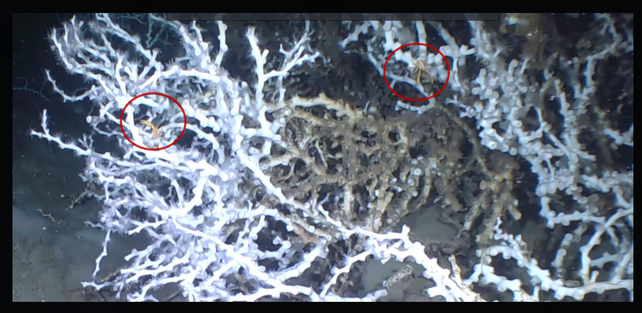

Image 1. In-situ picture of individuals within the *M.serricornis* species complex and coral association, *Desmophyllum pertusum.*

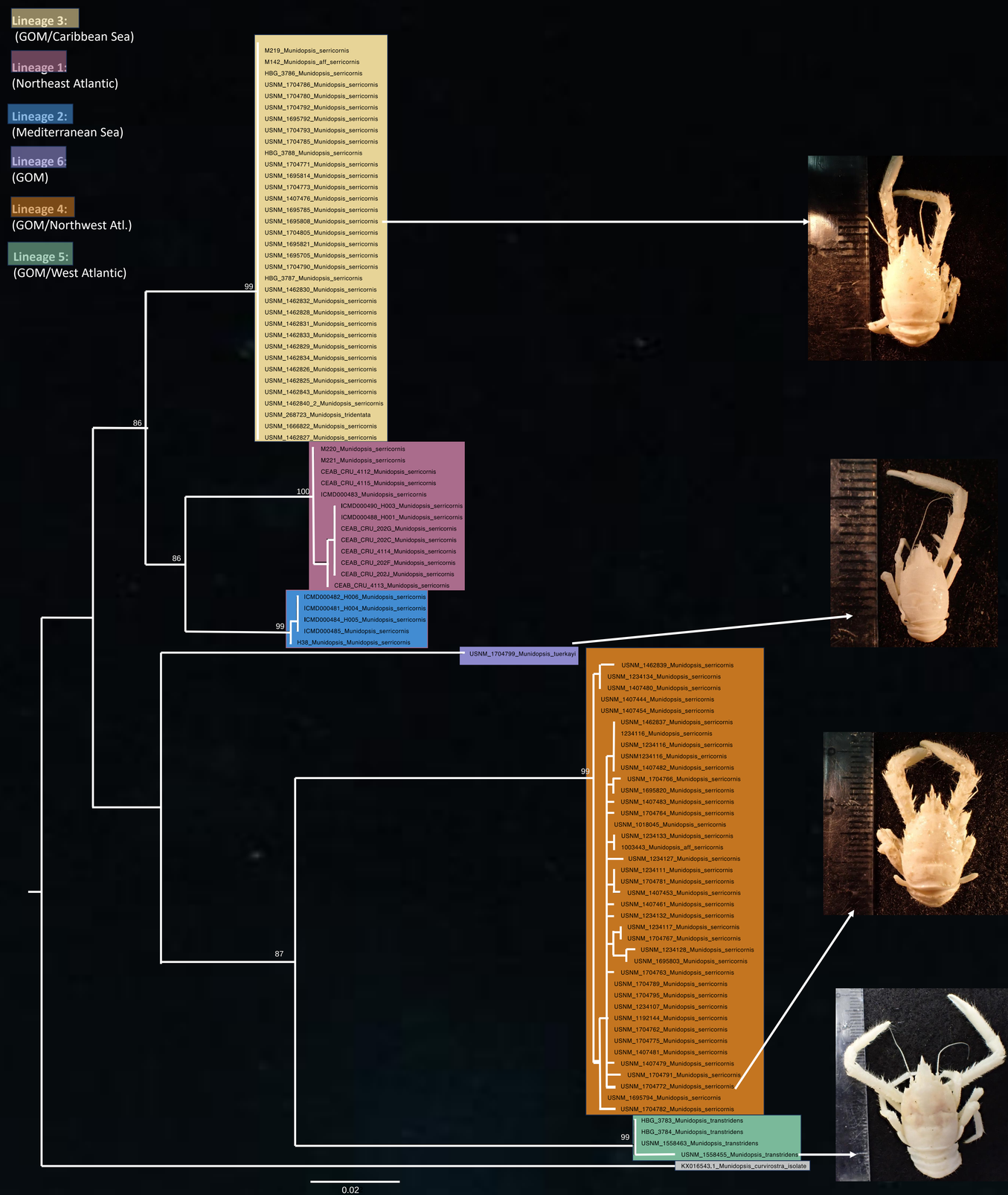

Figure 1. Maximum likelihood phylogeny based on the analysis of the mitochondrial genome, CO1 region. Values at nodes represent bootstrap support values (>70 support branches). Pictures of individuals at the end of tree represent their respective lineage.

Figure 2. Distribution of *Munidopsis serricornis* species complex throughout the North Atlantic Ocean. Each lineage is represented by an icon and color.

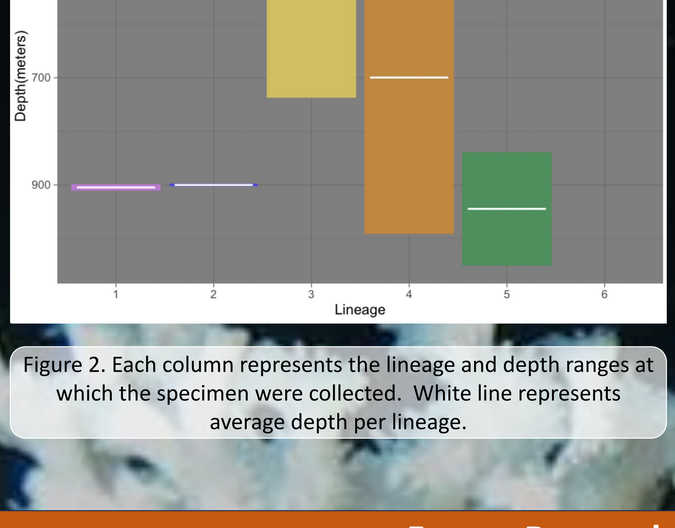

Figure 2. Each column represents the lineage and depth ranges at which the specimen were collected. White line represents average depth per lineage.

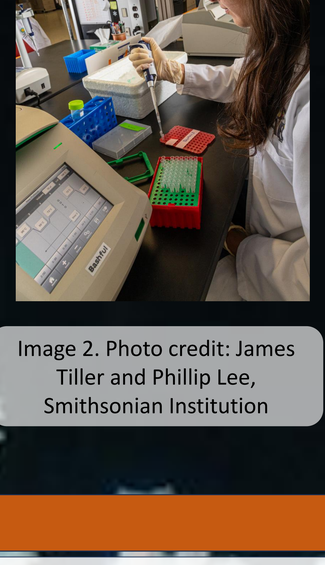

Image 2. Photo credit: James Tiller and Phillip Lee, Smithsonian Institution

Results and Discussion

- The diversity of *Munidopsis serricornis* species complex is represented by 6 lineages with each lineage representing a specific geographic range. *M. serricornis* sensu stricto is restricted to the Northeast Atlantic including populations near the type locality (Weather Islands, Sweden) where the species was originally described[1]. Preliminary identification suggests *M.serricornis* includes more than one species-level lineage and two other lineages that are *M. tuerkayi* and *M. transtridens*. But, there is still taxonomic confusion between these species: *M. tridentata, M. tuerkayi, M. transtridens,* and *M. serricornis.*
- Out of the 6 lineages some show a wide distribution, while some are more restricted throughout the North Atlantic Ocean ; mainly appearing in the Northeast and Northwest. Different depth ranges were observed for each lineage, suggesting they may occur at different depths with some overlapping.
- Limited evidence was gathered that supports squat lobster-coral symbiosis, but collection data describes most of the specimens were collected from coral habitat. Within the genus *Munidopsis* all symbionts inhabit depth shallower than 2,220m. [2] All of the 99 specimens used for this study show depths shallower than 2,220m with Lineage 5 showing the deepest range of depth (1,050m). Previously found, the main hosts of *M. serricornis* consist of *Desmophyllum pertusum* with gorgonian (*Acanthogorgia sp.)* in the Northeast Atlantic. [2] The two specimen that showed traits of *M. serricornis* species complex, that were observed during ROV video analyses, inhabited a colony of *Desmophyllum pertusum* (Image 1). Although little evidence was retrieved from ROV video analyses, a connection could be made to previous literature and the *Munidopsis serricornis* species complex in this research.

Future Research

- The remaining lineages may represent different species but further ecological, morphological, and genomic nuclear data will help in deliminating these species. Future research integrating extensive morphological analyses will likely reveal the morphological differences in each lineage.
- Further video analyses is needed to strongly support if there is a true symbiotic relationship (squat lobster-coral) and if a species-specific pattern is present on coral habitat. All of these factors will help us increase our knowledge of the diversity, ecology, and habitat use of squat lobsters, as well as coral symbioses in the deep sea.

References and Acknowledgments

1 Coykendall, D.K., Nizinski, M.S., Morrison, C.L., 2017. A phylogenetic perspective on diversity of Galatheoidea (Munida, Munidopsis) from cold-water coral and cold seep communities in the western North Atlantic Ocean. Deep-Sea Res. Part II 137, 258–272
2 Baeza, J.A. 2011. Squat lobsters as symbionts and in chemo-autotrophic environments. In: Poore G.C.B., Ahyong S.T., and Taylor J. (Eds.), *The Biology of Squat Lobsters*. CSIRO Publishing: Melbourne and CRC Press: Boca Raton. Pp. 249-270.
Background Image by: NOAA Office of Ocean Exploration and Research.

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