A Comparison of Macroalgae in the Little Hell's Gate Salt Marsh vs. the East River

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Introduction

- Hypothesis: the **salt marsh will contain more species than the East River**
- 6000 species of macroalgae but **3 main categories**: red algae, brown algae, green algae (Pereira, 2021)
- Algae need **brackish water** to survive - includes salt marsh (Sandrin, 2009)
- Algae **requires a substrum** - makes Little Hell Gate Salt Marsh a favorable place (Editor's of Randall's Island Website, Edited 2023)
  - East River is moving body of water so less favorable
- Increased pollution in East River which could have **negative effect on biodiversity**
- Aim to determine the **difference between species** in East River vs Salt Marsh on Randall's Island

Fucus vesiculosus *Ulva lactuca* *Phylum rhodophyta*

Materials and Methods

- Twenty-five algae samples collected along **two 20-meter transects,** one at **East River,** one along the **Salt Marsh**.
- **Flags** were placed at **4 m intervals**, and samples were collected at ¼ **square meter quadrats** placed at each flag interval.
- DNA isolated by **centrifuging, lysis solution**, **silica resin**, and an **ice-cold wash buffer**
- Isolated DNA then amplified via PCR with **UBP-issued TUFA primer** specific to algae
- PCR results analyzed by **gel electrophoresis**, positive samples to **Azenta for sequencing**
- Returned sequences entered in **BLAST** on **Cyverse DNA Subway** database to identify the species of algae
- Identified species entered into **MUSCLE** program to **align DNA sequences**
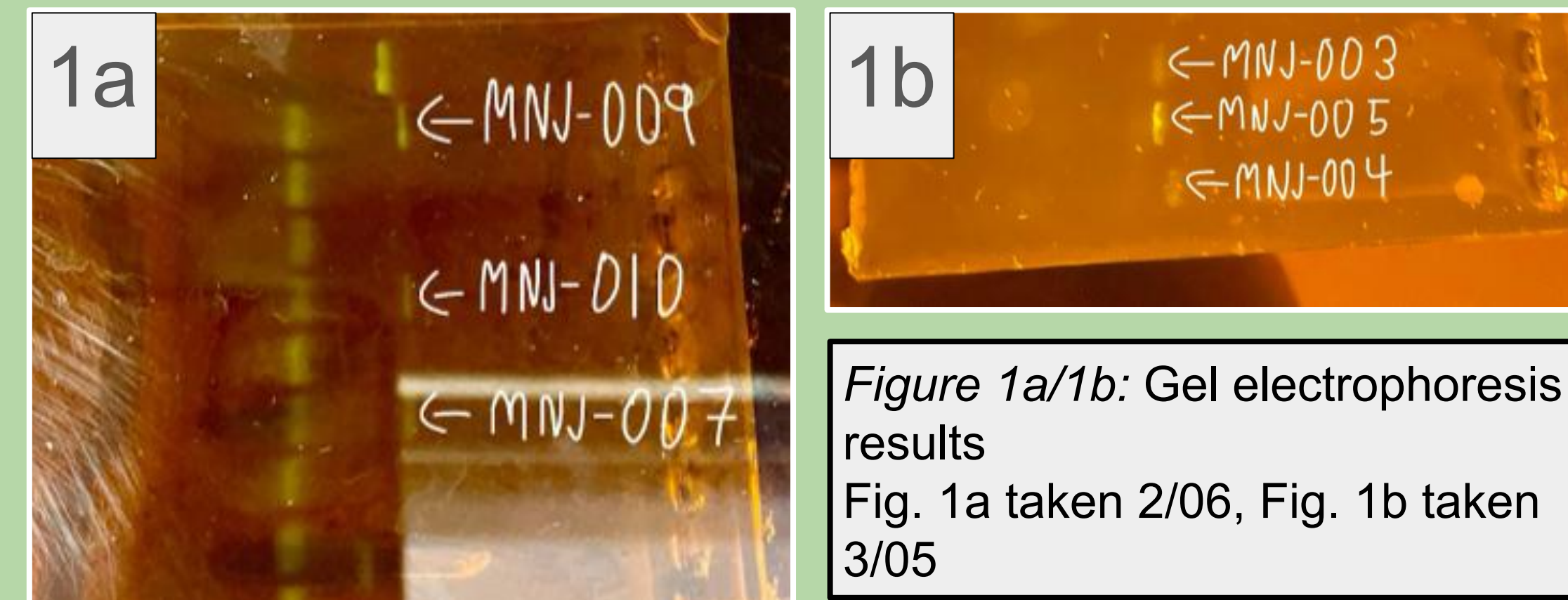- Then entered in **NJ PHYLIP** to create a maximum likelihood **phylogenetic tree**

Figure 1a/1b: Gel electrophoresis results
Fig. 1a taken 2/06, Fig. 1b taken 3/05

East River or Salt Marsh	Closest Match	Alignment Length
East River	*Ulva compressa*	753
East River	*Ulva compressa*	650
East River	*Ulva lacinulata*	774
East River	*Ulva lacinulata*	799

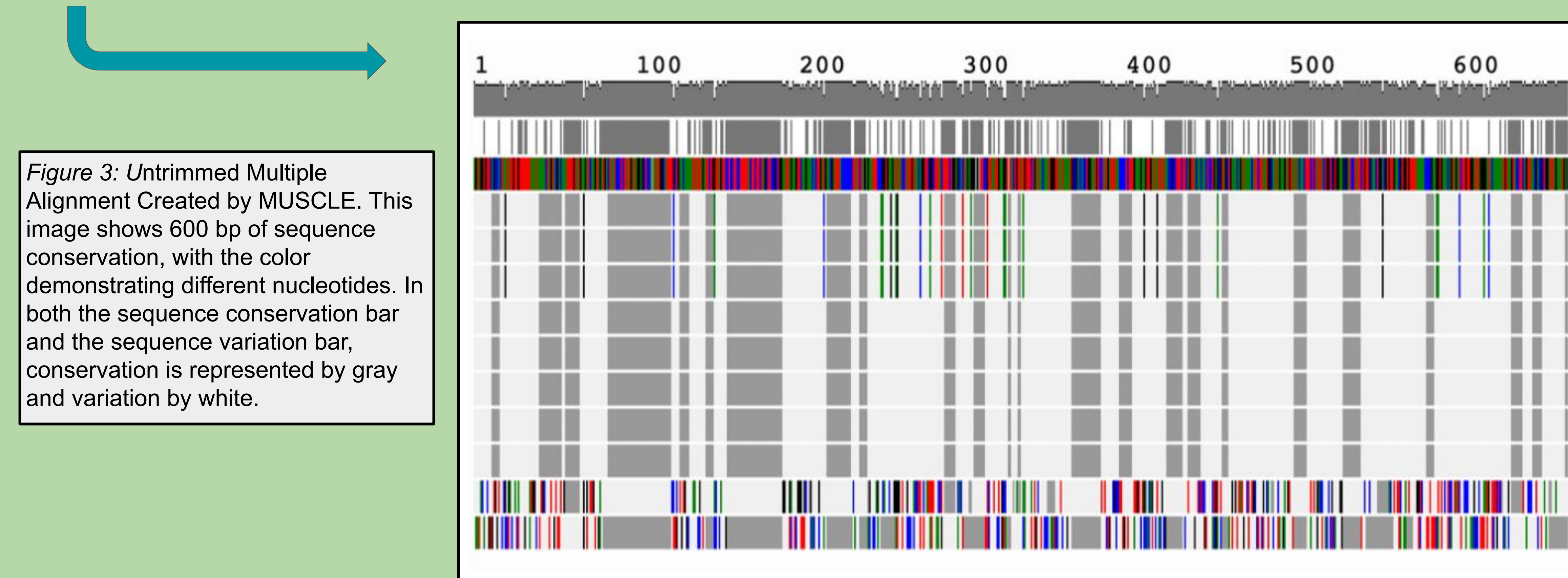| East River or Salt Marsh	Closest Match	Alignment Length
Salt Marsh	Unsuccessful	N/A
Salt Marsh	Unsuccessful	N/A
Salt Marsh	Unsuccessful	N/A
Salt Marsh	*Ulva compressa*	751
Salt Marsh	*Ulva compressa*	763
Salt Marsh	*Ulva compressa*	726
Salt Marsh	Unsuccessful	N/A

Figure 2: Results of DNA sequencing

Figure 3: Untrimmed Multiple Alignment Created by MUSCLE. This image shows 600 bp of sequence conservation, with the color demonstrating different nucleotides. In both the sequence conservation bar and the sequence variation bar, conservation is represented by gray and variation by white.
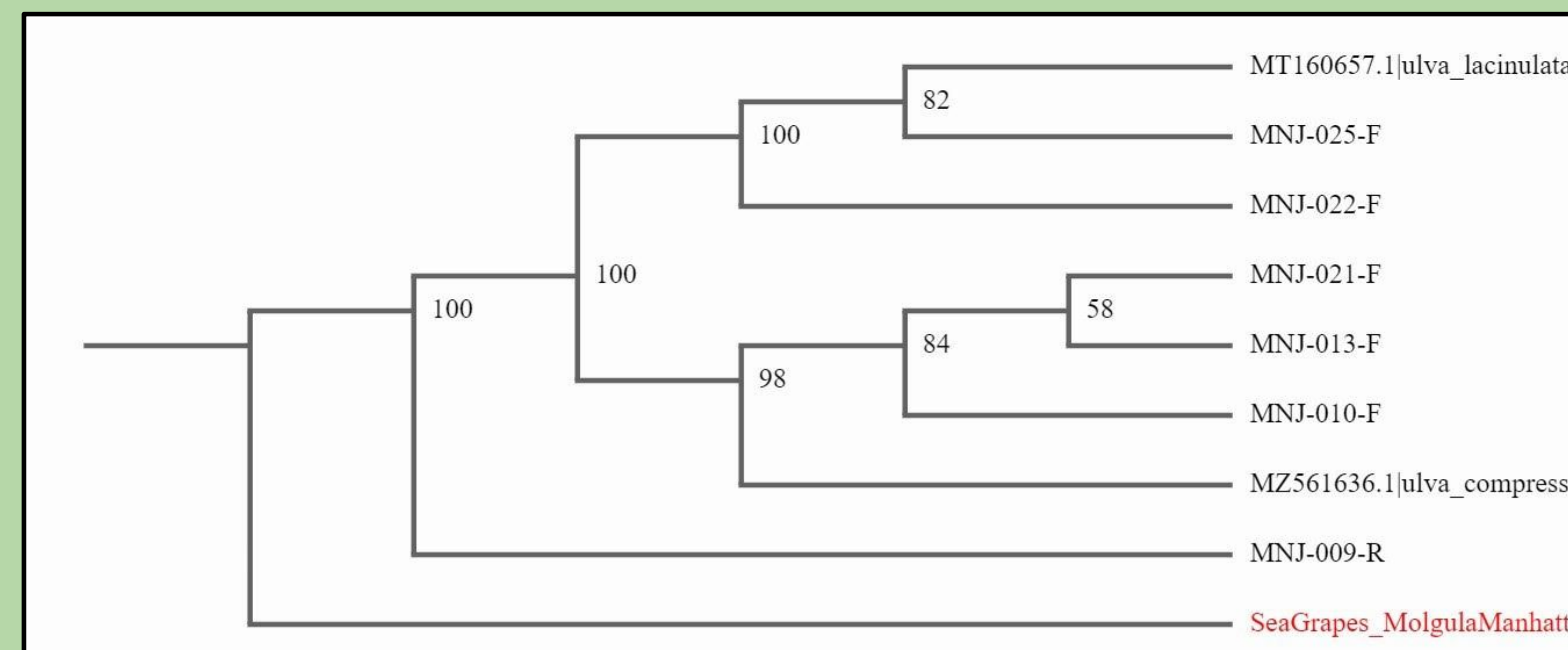

Figure 4: Phylogenetic Tree of Sequencing Results. Neighbor Joining (NJ) phylogenetic tree displaying the evolutionary relationships between the identified species. The species highlighted in red has the least genetic commonalities with the rest of the species.

Discussion

- The results we obtained **contradicted** our hypothesis
- Hypothesis: the **salt marsh will contain more species than the East River**
  - increased rocks to attach to, slow-moving water, and less pollution
- One found species in the salt marsh and two found species in the East River
- These results do not support a specific conclusion due to a **small sample size**
- **MUSCLE** ⇒ high similarities between samples found to be the same species
- **PHYLIP** ⇒ high **similarities** between *Ulva compressa*, **similarities** between *Ulva lacinulata*
- **No red algae** was sequenced successfully likely due to the an incorrect primer
  - The **tufA primer** used is intended for green algae, it may not be as effective with red algae
- The school laboratory had never processed algae samples of any kind

References

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REFERENCES CONTINUED ON BACK OF POSTER

Acknowledgements