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# Abstract

This project was to observe the different aquatic macroinvertebrates off of Pier 101. Of 27 specimens sequenced, data from 20 were recovered, 16 of the 20 sequenced organisms were visually identified correctly. The researchers established that all of the organisms found were extracted from eco-concrete blocks or from other examples of spatial complexity.

# Introduction

Looking out over the New York Harbor, one would never expect to find it teeming with life. Below the surface, there is an entire ecosystem of aquatic life and invertebrates that are essential to the ecosystem. Unfortunately, there are no ongoing monitoring programs to trace the species of these invertebrates in NYC waters. This study, to further investigate the lower levels of the food chain - benthic invertebrates in the Upper New York Bay.

## Materials & Methods

Specimens were collected from their environment from Pier 101 on Governors Island; invertebrates were removed from the benthic layer and placed in collection tubes; forceps and scissors were used to cut a sample from the specimen; sample were placed into a 1.5 ml eppendorf tube. 1 ml solution A and 10 $\mu$ l RNase A were then added. After adding 200 $\mu$ l-saturated NaCl. Then 500 $\mu$ l of the supernatant were transferred to a new tube and precipitated isopropanol. Once that was completed, the solution was washed with 100 $\mu$ l of 70% Ethanol. Then unpurified primer mix was added to the final sample of DNA and this was sent to another lab for the retrieval of the DNA sequences. These DNA sequences were then processed by a bioinformatics database, in which the organisms were matched to organisms that have similar DNA sequences.

## Tables & Figures

Team Spineless			Sequenced Identification					2015-2016	
Date	Location	Sample #	Common Name	Phylum	Class	Order	Family	Genus	Species
July 6th	Pier 101	P1	Ragworm	Annelida	Polychaeta	Phyllodocida	Nereidae	Hediste	diversicolor
July 6th	Pier 101	P2	Tunicate	Chordata	Ascidacea	Stolidobranchia	Styelidae	Botrylloides	violaceus
July 6th	Pier 101	P3	No data						
July 6th	Pier 101	P4	Mediterranean mussel	Mollusca	Bivalvia	Mytiloidea	Mytilidae	Mytilus	galloprovincialis
July 6th	Pier 101	P5	No data						
July 6th	Pier 101	P6	Blue mussel	Mollusca	Bivalvia	Mytiloidea	Mytilidae	Mytilus	edulis
July 6th	Pier 101	P7	No data						
July 6th	Pier 101	P8	Mollusk	Arthropoda	Maxillopoda	Sessilia	Balanidae	Amphibalanus	variegatus
July 6th	Pier 101	P9	No data						
July 6th	Pier 101	P10	Sea Grape	Chordata	Ascidacea	Stolidobranchia	Molgulidae	Molgula	manhattensis
July 6th	Pier 101	P11	Worm	Annelida	Polychaeta	Phyllodocida	Nereidae	Hediste	diversicolor
July 6th	Pier 101	P12	No data						
July 6th	Pier 101	P13	No data						
July 6th	Pier 101	P14	Breadcrumb Sponge	Porifera	Demospongiae	Halichondrida	Halichondridae	Halichondria	panicea
July 6th	Pier 101	P15	Breadcrumb Sponge	Porifera	Demospongiae	Halichondrida	Halichondridae	Halichondria	panicea
July 6th	Pier 101	P16	Tunicate	Chordata	Ascidacea	Stolidobranchia	Styelidae	Botrylloides	violaceus
July 6th	Pier 101	P17	Bay Barnacle	Arthropoda	Maxillopoda	Sessilia	Balanidae	Amphibalanus	improvisus
July 6th	Pier 101	P18	Golden Star Tunicate	Chordata	Ascidacea	Pleurogona	Styelidae	Botryllus	schlosseri
July 6th	Pier 101	P19	Tunicate	Chordata	Ascidacea	Stolidobranchia	Styelidae	Botrylloides	violaceus
July 6th	Pier 101	P20	Cauliflower Coral	Cnidaria	Anthozoa	Scleractinia	Pocilloporidae	Pocillopora	verrucosa
July 6th	Pier 101	P21	Ragworm	Annelida	Polychaeta	Phyllodocida	Nereidae	Hediste	diversicolor
July 6th	Pier 101	P22	Shrimp	Arthropoda	Malacostraca	Amphipoda	Caprellidae	Caprella	penantis
July 6th	Pier 101	P23	Tunicate	Chordata	Ascidacea	Stolidobranchia	Styelidae	Botrylloides	violaceus
July 6th	Pier 101	P24	Tunicate	Chordata	Ascidacea	Stolidobranchia	Styelidae	Botrylloides	violaceus
July 6th	Pier 101	P25	No data						
July 6th	Pier 101	P26	Golden Star Tunicate	Chordata	Ascidacea	Pleurogona	Styelidae	Botryllus	schlosseri
July 6th	Pier 101	P27	Sea Grape	Chordata	Ascidacea	Stolidobranchia	Molgulidae	Molgula	manhattensis

## Discussion

In the gel electrophoresis, there were several samples that had too little DNA for analysis. This may have contributed to the absence of data in 7 of the 27 samples that were originally collected. In BLAST (the bioinformatics site), some samples (P8) had a top match that was not possible considering the location where the samples were collected – in P8, the DNA suggested that the sample was a sand fly, *Lutzomyia peruensis*, that was a native to Peru. The team later determined that the fly was actually a barnacle *Amphibalanus Variegatus* - further down the BLAST given species list.

## References

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## Acknowledgements

We would like to thank Alberto Stolfi, NYU, Mauricio Gonzalez and The New York Harbor School for believing in Team Spineless and in our Harbor.