



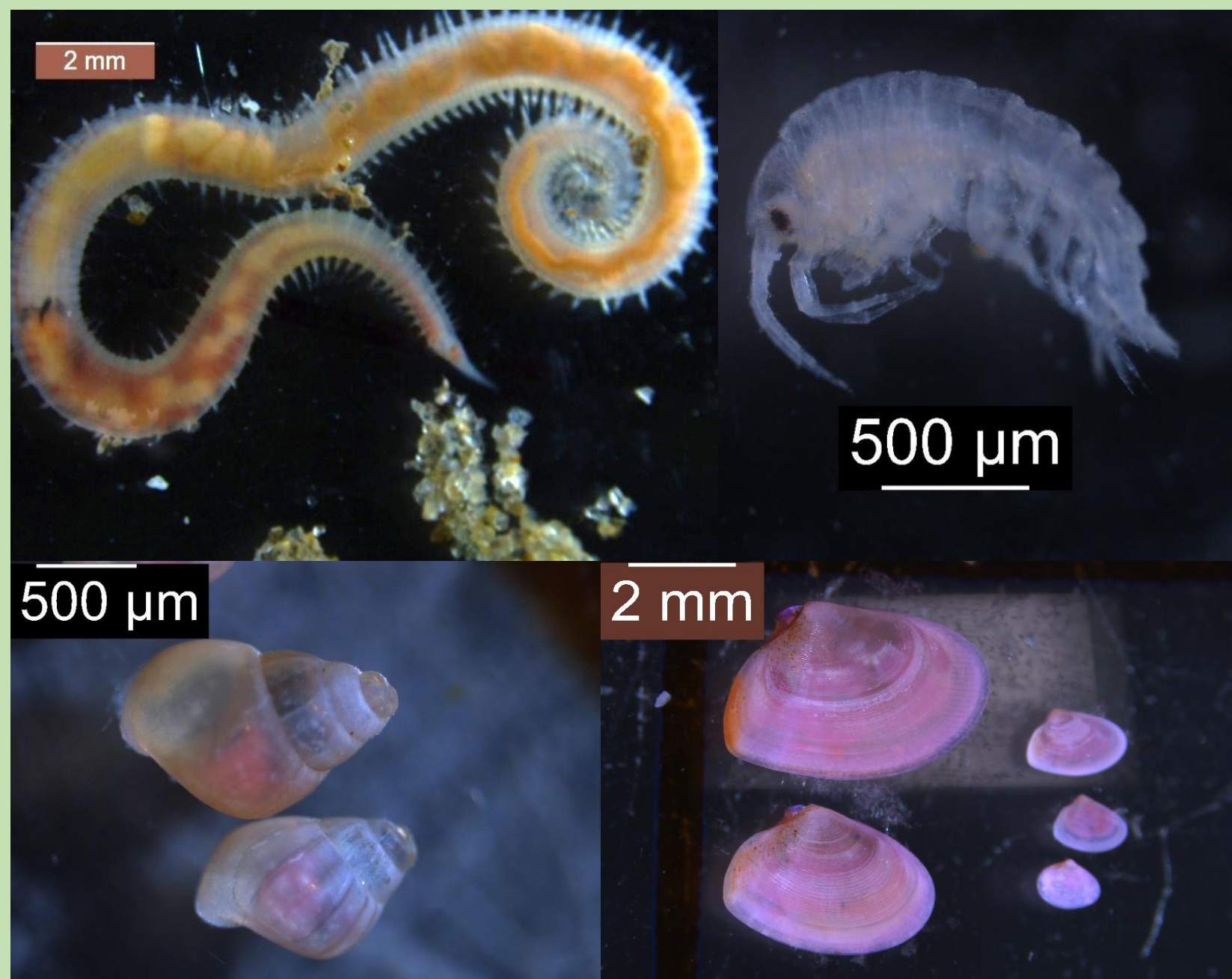
Using Marine Benthic Macroinvertebrates to Assess Ecosystem Health

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Background

- Benthic macroinvertebrates make good ecosystem indicators due to their sedentary nature and trophic position. (Warwick et al. 1990, Wang et al. 1998)
- Benthic macroinvertebrates accumulate pollution from the sediments (Warwick et al. 1990)
- Benthic biotic indices take abundance and distribution data from macroinvertebrate communities to calculate a ranking of ecosystem health. (Pinto et al. 2009)



Study Site

- Istanbul Strait, Turkey
- The area is known to have high concentrations of heavy metals and polycyclic aromatic hydrocarbons
- Contaminants in the strait are primarily caused by human actions, particularly industrial activities

Objective

- Assess the health of the ecosystem of the Istanbul Strait
- Determine the accuracy of the three common biotic indices (AMBI, BENTIX, and M-AMBI)
- Compare the index results between two sites of different contamination levels within the Istanbul Strait

Hypothesis

- Index rankings will correlate with data we have on each site's pollution levels
- There will be variation among the results provided by the three indices
- The two sites tested will have different index results, based on the differences in pollution

Methods

- Divers collected sediment cores from the strait in May 2018
- The cores have been fixed in 4% buffered formalin, sieved with a 500 µm mesh screen, stained with Rose Bengal and fixed in 70% ethanol
- Organisms have been sorted from the sediment using a stereomicroscope
- Using a microscope, we will use morphology to identify organisms to species level
- Using previous literature organisms will be organized into categories based on sensitivity to pollution
- We will then be using the information with the AMBI, M-AMBI and BENTIX indices to calculate a ranking of ecosystem health



Expected Results

- It's expected that the sites overall will have lower index rankings, i.e., lower health status
- The site with the higher pollution levels will have a lower index ranking compared to the other site

Conclusions

- Knowing the health of the ecosystem is important for making conservation decisions
- We will be able to analyze variation among indices, this will allow us to find potential strengths and weaknesses with biotic indices
- Our understanding of biotic indices and their use will be further developed through this study
- Biotic indices should be consistently used to address ecosystem change over time
- Future studies should aim to identify possible issues with biotic indices and make improvements upon them

References

- Pinto, R., Patrício, J., Baeta, A., Fath, B.D., Neto, J.M., and Marques, J.C. 2009. Review and evaluation of estuarine biotic indices to assess benthic condition. *Ecol. Indic.* **9**(1): 1–25. doi:10.1016/j.ecolind.2008.01.005.
- Wang, W.X., Stupakoff, I., Gagnon, C., and Fisher, N.S. 1998. Bioavailability of inorganic and methylmercury to a marine deposit-feeding polychaete. *Environ. Sci. Technol.* **32**(17): 2564–2571. doi:10.1021/es971034i.
- Warwick, R.M., Platt, H.M., Clarke, K.R., Agard, J., and Gobin, J. 1990. Analysis of macrobenthic and meiobenthic community structure in relation to pollution and disturbance in Hamilton Harbour, Bermuda. *J. Exp. Mar. Bio. Ecol.* **138**(1–2): 119–142. doi:10.1016/0022-0981(90)90180-K.
- Images: Dr. Ramey-Balci