

SIO278: TARA Oceans, Microbial Diversity, Plankton Interactomes and Ocean Omics

Course Information:

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Office hours: By appointment in Sverdrup or at JCVI

Spring 2016, Wed: 10:00-11:50, Eckart Sea Cave (door code **2418**)

2 units credit, P/NP or letter grade

The TARA expedition has sampled 410 stations worldwide in marine waters and conducted OMICS analyses on a new global scale. Data from these expeditions is contributing to a new view of the diversity, distribution and associated interactions of protists, bacteria and viruses. In 2015 and 2016 numerous papers have been published in Science, Nature and PNAS. In this SIO278 seminar we will read the emerging TARA literature and discuss associated methodology and results. Other related studies which address important new findings in microbial diversity and ocean ecology will be discussed as well.

Course format and evaluation:

There are two ways for you to earn your grade in this class. The first is that you present a paper(s) and lead the class in discussion. The second option is to conduct a short project in the area of microbial omics and/or diversity. At the end of the class you will submit a 2 page (not including refs) report and give a short presentation about your project. Your project should be an aspect of your ongoing research. Attendance and participation are the primary requirements for the course.

April 13:

TARA overview

Background:

Sunagawa S, Karsenti E, Bowler C, Bork P. (2015) Computational eco-systems biology in Tara Oceans: translating data into knowledge. *Mol. Syst. Biol.* 11(5) doi: 10.15252/msb.20156272

April 20:

de Vargas, C., et al. (2015). Eukaryotic plankton diversity in the sunlit ocean. *Science* **348**(6237). (**Angela**)

Hug, L. A., et al. (2016). "A new view of the tree of life." *Nature Microbiology*: 16048. doi:10.1038/nmicrobiol.2016.48 (**Jesse**)

April 27:

Sunagawa, S., et al. (2015). Structure and function of the global ocean microbiome. *Science* **348**(6237). **(Bethany)**

Brum, J. R., et al. (2015). "Patterns and ecological drivers of ocean viral communities. *Science* **348**(6237) **(Logan)**

May 4:

Lima-Mendez, G., et al. (2015). Determinants of community structure in the global plankton interactome. *Science* **348**(6237). **(Mark)**

Fuhrman, J. A., J. A. Cram and D. M. Needham (2015). Marine microbial community dynamics and their ecological interpretation. *Nat Rev Micro* **13**(3): 133-146. **(Rachel)**

May 11:

Villar, E., et al. (2015). Environmental characteristics of Agulhas rings affect interocean plankton transport. *Science* **348**(6237). **(Raffie)**

Guidi, L., et al. (2016). "Plankton networks driving carbon export in the oligotrophic ocean." *Nature* published online 10 February 2016, doi:10.1038/nature16942 **(Mark)**

May 18:

Alexander, H., et al. (2015). Metatranscriptome analyses indicate resource partitioning between diatoms in the field. *Proceedings of the National Academy of Sciences* **112**(17): E2182-E2190. **(Jesse)**

Alexander, H., et al. (2015). "Functional group-specific traits drive phytoplankton dynamics in the oligotrophic ocean." *Proceedings of the National Academy of Sciences* **112**(44): E5972-E5979. **(Ali)**

May 25:

Malviya, S., et al. (2016). "Insights into global diatom distribution and diversity in the world's ocean." *Proceedings of the National Academy of Sciences* **113**(11): E1516-E1525. **(Raffie)**

Bertrand, E. M., et al. (2015). Phytoplankton–bacterial interactions mediate micronutrient colimitation at the coastal Antarctic sea ice edge. *Proceedings of the National Academy of Sciences* **112**(32): 9938-9943. **(Angela)**