Supplemental Information

Rapid Idea Generation (The Exploratorium)

The Marshmallow Challenge (https://www.marshmallowchallenge.com/)

A design exercise to help small teams quickly experiment with the prototyping process and communication.

- **Objective:** Build the tallest freestanding structure to supporting one complete marshmallow on top
- **Materials per team:** 20 sticks of spaghetti, one yard of masking tape, one yard of string, and one marshmallow.
- **Rules:** Teams consist of about four members, each working at their own table. Once all materials are distributed, teams have 18 minutes to build a free-standing structure that supports a marshmallow on top using the given materials. Teams can break the spaghetti and cut the string and tape to any size. When time is up, the height of each marshmallow from the table is measured. The team with the tallest structure wins.

Intellectual Property Workshop (IBM Research, University of California, San Francisco)

To prepare an invention disclosure, answer the following questions.

- **Background:** What is the problem solved by your invention?
- **Related work/prior art:** List and briefly describe the products, publications, patents, and other works that are most closely related to your invention. If so, what are the drawbacks of the known solution(s)?
- **Summary of invention:** Briefly describe the core idea of your invention. Describe the innovations and advantages of using your invention over prior art.
- **Description:** Describe how your invention works, and how it could be implemented, using text, diagrams, and flow charts as appropriate.

Bromoform Production in Seaweed (Climate Foundation, IBM, San Francisco State University, University of California, San Francisco, and University of California, Berkeley)

Seaweed processing, staining and imaging.

- **Seaweed collection and culture:** *Ulva expansa* and *Fucus distichus* were collected in Tiburon, CA, at the San Francisco State University Estuary and Ocean Science Center during low tide. They were transported and cultured at SFSU. Cold-water seaweed culture was maintained under 14°C, a 16h light / 8h dark photoperiod, and was supplemented with Guillards F2 media (https://link.springer.com/chapter/10.1007/978-1-4615-8714-9_3) in ~35 ppt seawater prepared with Instant Ocean (https://www.instantocean.com/) with aeration. *Asparagopsis taxiformis* was collected from San Diego, CA and isolated and purified over the course of several months in Dr. Jennifer Smith's Lab (https://coralreefecology.ucsd.edu/) and sub-cultured at SFSU. Prior to experiments, *Asparagopsis* was cultured at 23°C, 16h light / 8h dark photoperiod, in ~35 ppt seawater with Guillards F4 media (sea water prepared with Instant Ocean, supplemented with germanium dioxide, filter sterilized and autoclaved) and aeration.

- **DAB staining procedure:** DAB (3’-3-diaminobenzidine) stain was prepared by adding 1 mg of 3'-3-diaminobenzidine (https://www.sigmaaldrich.com/US/en/product/aldrich/d12384) per each mL of pH 5 seawater (pH adjusted with 1M HCL). DAB stain solution was mixed overnight and made fresh for each experiment. A blade of Fucus was removed from the culture, rinsed with deionized water, and dried with a Kimwipe™ (Kimtech Science). The blade was cut into five-millimeter pieces with a razor blade to allow for better DAB infiltration. These pieces were submerged in 1mg/mL DAB, and placed under a vacuum for ten minutes, the vacuum was released and repeated three times. The DAB was aspirated off with a pipette, and deionized water was added to stop the DAB reaction. The sample was submerged in pure ethanol and boiled for ten minutes to remove pigment from the tissue. Negative controls were pre-treated with 10 mM ascorbic acid prior to DAB staining. DAB stained & Negative controls were stored in 100% EtOH until mounting.
- **Sample embedding and cryo-sectioning:** Samples were mounted in Optimal Cutting Temperature Compound (https://www.fishersci.com/shop/products/tissue-plus-o-c-t-compound/23730571) and submerged in an ethanol dry ice bath until fully frozen. OCT-embedded samples were cryo-sectioned into thirty-micron sections to mount on microscope slides.
- **Imaging:** All samples were brightfield imaged at 20X on a Nikon 80i Microscope in the San Francisco State University Cell and Molecular Imaging Center. Images were collected in QCapture Pro as TIFFs (https://www.photometrics.com/support/download/qcapture-pro-7).