**INTRODUCTION**

Pseudo-nitzschia australis is one of the most problematic toxin-producing diatoms on the west coast of North America (Trainer et al., 2012). It is capable of producing the potent neurotoxin domoic acid (DA), responsible for amnesic shellfish poisoning in humans and impacts marine mammals and birds, as well as commercial and recreational fisheries. Blooms of *P. australis* are common in the nutrient-replete coastal waters of eastern boundary upwelling systems, including those off California, where increased partial pressure of CO₂ (pCO₂) and decreased seawater pH are well known. This is the first study to investigate the potential impacts of ocean acidification on this diatom.

Our study addresses the following issue:

Does reduced seawater pH (due to increased pCO₂) affect rates of growth, photosynthesis, and DA production by *P. australis*?

**METHODS**

**Figure 1.** A schematic illustrating how pH of each culture is independently monitored and controlled throughout the experiment. Four (A) cultures are simultaneously regulated by a single computer and DAQ (data acquisition) interface.

Samples for particulate and dissolved domoic acid were collected during both nutrient-replete exponential growth and nutrient-deplete stationary growth phases. DA concentrations were determined using a competitive enzyme-linked immunosorbent assay (cELISA). Triplicate samples were filtered from each biological triplicate in every pH treatment.

**RESULTS**

**Figure 2.** (A) Exponential growth rates, (B) Silica: Nitrate drawdown rates, and (C-H) domoic acid (DA) production by Pseudo-nitzschia australis (HAB 200) in the four pH treatments. (A) Total DA (particulate + dissolved), (B) particulate DA, and (C) dissolved DA during the exponential growth phase. (D) Particulate DA (particulate + dissolved), (E) particulate DA, and (F) dissolved DA after two days in the nutrient-deplete stationary growth phase. Values are the means ± 1 standard deviation of triplicate cultures.

**CONCLUSIONS**

pH/pCO₂ affects the exponential growth rate of *P. australis* at a specific level:

- Growth rates of cultures maintained at pH 8.0 (1.25 ± 0.01 d⁻¹) and pH 7.9 (1.30 ± 0.02 d⁻¹) grew at the same rate as the control pH of 8.1 (1.33 ± 0.04 d⁻¹).
- However, at pH 7.8 (0.94 ± 0.02 d⁻¹) growth rates declined by 30% compared to all other pH treatments.

pH/pCO₂ affects the total DA production by *P. australis* during the stationary growth phase but not during the exponential growth phase:

- During stationary growth, total cellular DA production increased progressively from pH 8.1 to pH 7.8.
- Total DA was 2.7× greater in cultures at pH 7.8 (3.61 ± 0.09 pg cell⁻¹) compared to cultures at pH 8.1 (1.36 ± 0.18 pg cell⁻¹).
- During exponential growth, no differences in total DA production were observed as a function of pH.

pH/pCO₂ affects the Si: NO₃ nutrient drawdown rate:

- Cultures grown at reduced pH utilized nitrate faster than silicate, compared to cultures grown at higher pH, so potential production of DA may have been limited by nitrate availability.

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**REFERENCES**
