

## **Bivalve larval and juvenile growth and survival in response to temperature and carbon dioxide**

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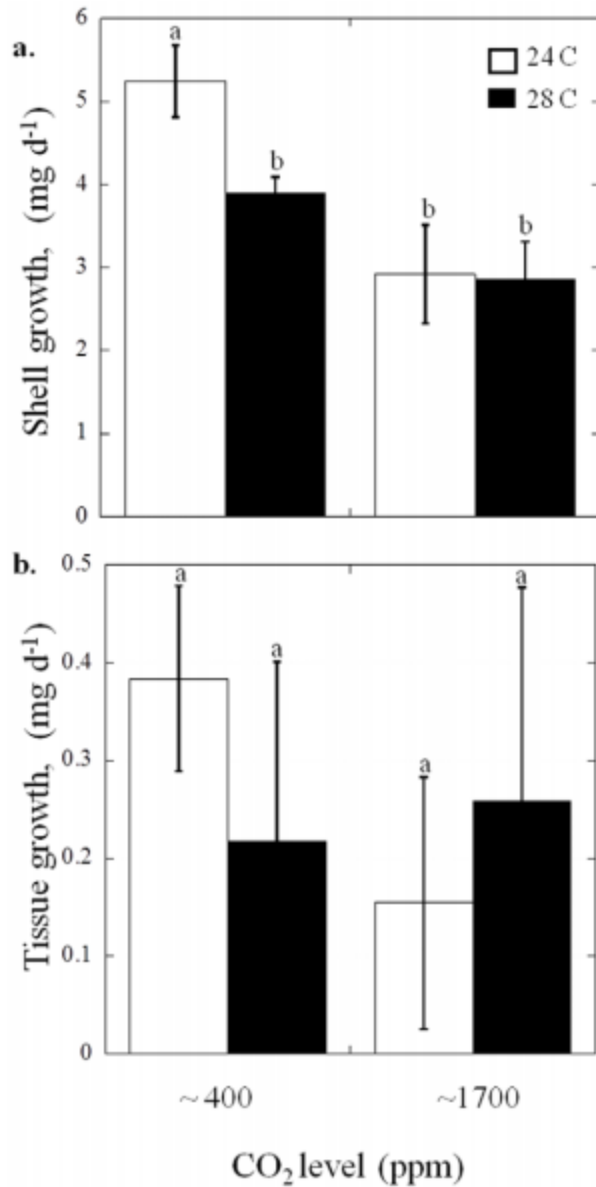
Talmage SC and Gobler CJ (2011) Effects of elevated temperature and carbon dioxide on the growth and survival of larvae and juveniles of three species of Northwest Atlantic bivalves. PLoS ONE 6(10): e26941. doi:10.1371/journal.pone.0026941.

Few scientists can deny the worrying signs of global climate change. The surface temperature of the ocean has risen by one degree Celsius in the past one hundred years, and it is expected to keep rising. As we burn more fossil fuels, carbon dioxide enters the atmosphere and is subsequently absorbed by the ocean. Rising temperature and carbon dioxide levels are expected to have an effect on many marine organisms. Talmage and Gobler (2007) used the Eastern oyster (*Crassostrea virginica*) as a model organism to study these effects.

In their experiment, they exposed juvenile oysters (collected from the wild) to two temperatures (24 and 28 °C) in combination with two carbon dioxide levels (400 and 1700 ppm), which represented “normal” and “above average” values for each. They observed growth over a period of 45 days and then dried and combusted the juveniles to obtain tissue weights.

The most rapid shell growth was observed at normal temperature and carbon dioxide levels; in all other treatments, growth was significantly slower (Fig. 4). Although no significant differences in tissue growth were observed (note the high degree of variation within treatments), the most rapid tissue growth again took place at normal temperature and carbon dioxide levels (Fig. 4).

The data from this study clearly show that temperature and carbon dioxide levels have significant effects on the growth and weight of the Eastern oyster. Several more questions about the effects of high temperature and high carbon dioxide levels are brought up by these data. Is fecundity of these animals affected as well? Is lifespan affected? Are these oysters easier prey under these conditions? And, perhaps most importantly, are other shelled molluscs affected in the same way?



**Figure 4. Growth of *Crassostrea virginica* juveniles at two levels of CO<sub>2</sub>, approximately 400 and 1700 ppm, and two temperatures 24°C (white bars) and 28°C (black bars; see Table 2 for carbonate chemistry). a. Shell growth and b. Tissue growth. Error bars represent standard deviation of replicated vessels per treatment (n=3 per treatment).**  
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