The effects of elevated oxygen levels on carbon isotopic fractionation in the marine diatom *Phaeodactylum tricornutum*.

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Abstract

The carbon isotopic composition of the marine diatom *Phaeodactylum tricornutum* ($\delta^{13}C$) was measured over a series of continuous culture systems with a constant growth rate ($\mu$) and varying O$_2$/CO$_2$ ratios. The $\delta^{13}C_{\text{CO}_2}$ and [CO$_2$]$_{\text{in}}$ were determined for each system. By comparing the fractionation ($\varepsilon$) to the $\mu$/CO$_2$ it is shown that there is still a relationship between the two factors. The $\mu$/CO$_2$$_{\text{in}}$ ranged from 0.030 to 0.163 kg mol$^{-1}$ d$^{-1}$ and $\varepsilon$ ranged from 21.74 to 24.48. The results from this experiment show that high levels of O$_2$ affect the carbon isotopic fractionation in *Phaeodactylum tricornutum*. It was shown that there was a variation in the $\delta^{13}C_{\text{CO}_2}$ with the change in O$_2$/CO$_2$ ratios. One likely explanation for the variation in fractionation could be due to the fixation of the $^{13}$C depleted CO$_2$ formed during photorespiration. Further research would be required to ensure that photorespiration was the cause of the variation in $\delta^{13}C_{\text{CO}_2}$. 