The previously held notion that unlike terrestrial plants, submerged plants like algae will not show any response to an increase of atmospheric carbon dioxide.CO2 fixation and ammonia removal rates were estimated as 260 g CO2 m−3.h−1 and 0.92 g NH3 m−3.h−1, respectively, when the alga was cultivated in wastewater supplemented with 460 g PO4−3.m−3 without pH control at 15% (v/v) CO2.Andersen et al. [38] grew specimens of Littorella uniflora, one of the isoetids (small slow−growing evergreen peren−nials that live submerged along the shores of numerous freshwater lakes and rely primarily on sediment−derived CO2 for their photosynthesis) in sediment cores removed from Lake Hampen (Denmark) in 75−liter tanks.In a different study Anderson and Anderson [39] measured the CO2−induced in situ growth response of a mixture of several species of filamentous freshwater al− gae (dominated by Zygnema species, but containing some Mougeotia and Spirogyra), as well as an isoetid commu− nity of macrophytes (dominated by Littorella uniflora, but containing some Myriophyllum alterniflorum and a few other species).In search of a simple method for removing CO2 from high−CO2−concentration stack gases, Yue and Chen [43] isolated and cultured a freshwater microalga of the genus Chlorella for periods of six days in vessels filled with growth media through which air of a variety of different CO2 concentrations was continuously bubbled.Yun, et al., [42] cultivated Chlorella vulgaris in waste− water discharged from a steel−making plant with the aim of developing an economically feasible system to remove ammonia from wastewater and CO2 from flue gas simul− taneously (since no phosphorus compounds existed in wastewater, external phosphate (15.3 − 46.0 g.m−3) was added to the wastewater).Other microalgae species, Chlorella minutissima, grown under extreme carbon dioxide con−centrations (0.036% − 100%), strongly increase the mi−croalgal biomass through photochemical and non−photochemi− cal changes in the photosynthetic ap−paratus [47].These results indicate that the carbon uptake by fresh and saltwater systems may increase more than ex−pected, and that nuisance algal blooms may be aggra− vated at elevated atmospheric carbon dioxide concentra− tions.Most of the stud−ies that have established this fact have historically util−ized CO2 concentration increases on the order of 300 − 400 ppm, which represents an approximate doubling of the air's current CO2 concentration; and they have been conducted on terrestrial plants [36,37].Such significant enhancement of growth rate with en− riched CO2 was also confirmed at different levels of in− organic N and P. The maximal rates of net photosynthe− sis, photosynthetic efficiency and light−saturating point increased significantly in high−CO2−grown cells.In conclusion, these extreme CO2 concen−trations−−about 1,000 times higher than the ambient one−−can be easily metabolized from the unicellular green alga to biomass and can be used, on a local scale at least, for the future development of microalgal photobio−reactors for the mitigation of the point source−produced carbon dioxide.A red seaweed common to the Northeast Atlantic in−tertidal zone, Lomentaria articulata, was grown for three weeks in hydroponic cultures subjected to various at−mospheric CO2 and O2 concentrations to determine the effects of these gases on growth [40].Similar results were obtained by Watanabe et al. [44] for another Chlorella alga, by Hanagata et al. [15] for both Chlorella and Scenedesmus species, and by Kodama et al. [16] for the marine microalga Chlorococcum littorate.The effect of increased CO2 concentration on the growth rate of three planktonic algae (Chlamydomonas reinhard− tii, Chlorella pyrenoidosa, and Scenedesmus obliquus) enhanced significantly [46].The au− thors concluded that increased CO2 concentrations with

decreased pH could affect the growth rate and photosyn-thetic physiology of the three algae species.Moreover, plants grown in elevated atmospheric CO2 environments typically exhibit increased rates of photo-synthesis and biomass production [35].JEP 650 Microalgae Tolerance to High Concentrations of Carbon Dioxide: A Review the elevated CO2: by 220% in early July, by 90% in mid-August, and by a whopping 3,750% in mid-November.Scenedesmus was completely in-hibited by 100% .CO2