Gum trees, possums and high CO_2

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The predicted rise in the concentration of atmospheric carbon dioxide (CO_2), as part of the greenhouse effect, will have vital implications for the fauna that rely upon plants for food. Currently folivorous marsupials must compromise the necessity of obtaining sufficient energy from foliage with that of not consuming an excess of plant defence compounds. Increasing the amount of carbon available to plants enhances photosynthesis and changes patterns of resource allocation in leaves. There are two primary responses of plants to elevated concentrations of CO_2 which have the potential to influence plant-herbivore interactions. The first of these is that plants produce more secondary compounds and the second is a decrease in leaf nitrogen. Together these alterations to leaf chemistry will render leaves less palatable and less nutritious for herbivores. This project is specifically interested in the common ringtail possum (*Pseudocheirus peregrinus*), the smallest of only four mammals to regularly consume eucalypt foliage, and swamp gum (*Eucalyptus ovata*) which is a preferred food source of ringtail possums in Victoria, Australia. The primary aims of the research was to characterise changes to leaf composition, relevant to herbivory, under conditions of elevated CO_2 and to assess any changes in feeding preference and/or ability to digest foliage from conditions of elevated CO_2. *Eucalyptus ovata* individuals were grown from seed in glasshouses controlled for temperature, humidity, irrigation and CO_2 concentration. Analysis of leaf samples from these saplings has produced results consistent with predicted changes in leaf composition (*i.e.* phenolic concentration of foliage was greater and leaf nitrogen concentrations were lower in those plants grown under elevated CO_2 compared to ambient CO_2). The saplings were grown for 12 months in the glasshouse and then fed to ringtail possums. The animals did not appear to have a preference between *E. ovata* foliage grown at ambient or elevated CO_2, although there are metabolic costs associated with a diet of leaves grown at concentrations of CO_2 that are above ambient.

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This colloquium was held at Cargills Hotel, 13th October 2000. Support by the University of Otago Botany Department and the Botanical Society of Otago is gratefully acknowledged.