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TRANSFER OF HYDROGEN FROM AN α-CARBON POSITION DURING FORMATION OF A SEQUENCE ION BY COLLISION-INDUCED DISSOCIATION

Reactions to produce sequence ions during collision-induced dissociation of peptides involve the transfer of one or more H atoms from amino or amide positions across the amide bond cleaved. We examined the dissociation of protonated oligomers tri, tetra and penta-glycine in which specific residues contained deuterium isotope labels at the a-carbon position. The peak corresponding to the b_3^+ species split into discrete isotopic peaks for tetraglycine that contained the D label within the amino acid adjacent to the N-terminus, but not when the deuterium labeled glycine residue was positioned either at the N-terminus or adjacent to the C-terminus. Splitting of b_2^+ and b_4^+ from protonated, deuterium labeled versions of triglycine and pentaglycine, respectively, was not observed. This suggests that the phenomenon is unique to the formation of b_3^+ ions from protonated tetrapeptides.

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THERMAL STUDIES AND PHYSICAL STRUCTURE OF POLY(METHYL METHACRYLATE)/VAPOR GROWN CARBON NANOFIBERS COMPOSITES PREPARED THROUGH IN SITU BULK POLYMERIZATION

Poly(Methyl Methacrylate) (PMMA)/Vapor Grown Carbon Nanofibers (VGCNFs or CNFs) reinforced composites were obtained through free radical in situ bulk polymerization. Thermogravimetric analysis (TGA) indicated an increase of 15°C in the onset decomposition temperatures of the composites with CNFs concentrations as low as 3.2% weight/weight. Furthermore, composites containing 1.6% and 3.2% CNFs afforded materials that resembled a lightweight foam, but higher CNFs concentrations provided brittle materials. Scanning electron microscopy (SEM) revealed different regions of CNFs dispersion within the polymer matrix.

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DETERMINING GLUCOCORTICOID RECEPTOR ACTIVITY IN AMERICAN DIETARY COMPONENTS USING S-GAL AS A NOVEL REPORTER SUBSTRATE

Glucocorticoids are steroid hormones that are often released in the body during periods of stress. A yeast reporter construct was used to measure glucocorticoid receptor activity of select compounds using S-gal as a novel reporter substrate. A variety of common American dietary components were tested: soda, corn oil, olive oil, coffee, and soy milk. Both corn oil and soda are common components of today's American diet, but neither transactivated the glucocorticoid construct. Soy milk was used since it is known to contain phytoestrogens and it therefore could exhibit glucocorticoid receptor activity. Soy milk did not transactivate the glucocorticoid construct, but it did not block glucocorticoid activity either. Both hydrocortisone-21-acetate and deoxycorticosterone did transactivate the glucocorticoid construct using S-gal as a reporter substrate so the system is not glucocorticoid species specific. Additional dietary components for future evaluation could include topiramate (dietary supplement) or selenium rich foods such as wheat bread.

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The role of ethylene in photoperiodic control of flowering in *Pharbitis nil* 'Violet' (Japanese morning glory)

Determining when to flower is one of the most important decisions a plant must make in its lifetime, and plants rely on environmental signals to select the optimal flowering time. These include temperature, availability of water, and photoperiod-the relative length of day and night. In photoperiodic plants, a flower-inducing photoperiod is perceived by the leaves, while the flower buds are formed at the shoot apical meristem. The existence of a chemical signal ("florigen") that mediates this flowering response has been postulated for decades. Previous results from our lab suggested that the model photoperiodic plant *Pharbitis nil* 'Violet' (Japanese morning glory) may utilize a volatile (gaseous) florigen. Using several inhibitors of the biosynthesis and function of the volatile hormone ethylene, we have shown that endogenous ethylene is required for flowering in *P. nil* 'Violet' in response to photoperiod. Whether ethylene is indeed florigenic in *P. nil* remains to be determined.

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INFLUENCE OF TEMPERATURE-INDUCED UNFOLDING ON THE ABSORPTION AND FLUORESCENCE SPECTRA OF TRYPTOPHAN AND TYROSINE CONTAINING PROTEINS

Influence of folding/ unfolding transitions on the absorption and fluorescence spectra of three tryptophan containing and one tyrosine containing proteins was investigated. It was found that while folding/unfolding of tryptophan containing proteins drastically changes the shape and the intensity of their fluorescence spectra, no significant changes in the absorption spectra were detected. In opposite, folding-unfolding of a tyrosine containing protein (bovine pancreas ribonuclease b) led to a small, but detectable and reversible change in the position of the maximum of its absorption spectrum. This suggests that absorption spectroscopy can be used as a folding/unfolding detection technique of ribonuclease b and, possibly, other tyrosine containing proteins.

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β-HEMATIN POLYMERIZATION INHIBITION OF PLANT EXTRACTS

The antimalarial activities of chloroquine and other quinolines are believed to be due to their capacity to inhibit β-hemazoin polymerization under physiological conditions. β-hematin, spectrometrically identical to β-hemazoin, can be produced in acidic solution and used as an assay to screen for antimalarial compounds. Fifty extracts from twenty five North American plant species were investigated for b-hematin polymerization inhibition. Nine extracts were found to be weak inhibitors. Two weak inhibitors, α-tocopherol and β-carotene, were isolated from an EtOAc extract of *Strophostyles helvola*. β-carotene was also determined to be present in a number of other weakly active extracts.

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CONSTRUCTION OF SPIROCYCLIC ETHERS

Effective generation of heterocyclic compounds is extremely important in organic synthesis. Our study has demonstrated that the photodecomposition of a cyclic derivative of Barton PTOC [((1H)pyridine-2-thione)oxycarbonyl] ester in the presence of allyl alcohol formed a C-O bond and gave rise to a spirocyclic ether in very good yield. The complete synthesis of the cyclic ester as well as its photochemical decomposition reaction is presented. Results from this study demonstrate the versatility of this methodology towards the construction of spirocyclic ether compounds of varying sizes.

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ENHANCED AND SYNERGISTIC ANTIBACTERIAL ACTIVITY OF SOME COMMON ESSENTIAL OIL COMPONENTS WHEN COMBINED WITH THE ANTIBIOTICS AMPICILLIN AND PENICILLIN

Monoterpenes commonly found in *Cymbopogon* species exhibited enhanced and/or synergistic antibacterial activity against the microbes *Bacillus subtilis* and *Staphylococcus aureus* when combined with the antibiotics ampicillin and penicillin. The compounds citral, *(R)*-citronellal, *(S)*-citronellal, geraniol, *(R)*-limonene, *(S)*-limonene, and myrcene were tested for their ability to enhance the bioactivity of antibiotics against the two bacteria. Citral (as a mixture of isomers), exhibited synergistic bioactivity against *B. subtilis* when combined with both ampicillin and penicillin and against *S. aureus* when combined with ampicillin. *(S)*-citronellal exhibited modest synergistic activity and *(S)*-limonene showed slight enhancement of bioactivity when combined with ampicillin against *B. subtilis*.

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