

**Abstracts from the 83rd Technical Meeting
Norman, Oklahoma
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This is the second year for this Section. As the title indicates, it contains abstracts from the preceding OAS Technical Meeting. However, it should be noted that *not every* paper presented at the Meeting is represented by an abstract. Only abstracts that were prepared and submitted on a special form, and for which a special processing fee was paid, are reproduced here - exactly as the authors submitted them.

This second experience with reproducing abstracts prepared on a special form was much improved over the first (vol. 74, p. 51). The use by authors of special, printed forms available from the Editor considerably simplified the assembly of abstracts onto camera-ready copy; henceforth, to be accepted, *abstracts must be prepared on the special, printed form.*

If you plan to submit an abstract for publication, *please request a printed abstract form from the Editor.*

SYNTHESIS OF A SERIES OF ENDOTHIOTRIPEPTIDES AND TETRAPEPTIDES.

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Previously, endothiopeptides consisting of two amino acid residues have been easily prepared via selective thionation of an amide bond using thiophosphetane type reagents. However, elongation of these endothiodipeptides particularly from the C-terminus has proven difficult. This difficulty appears to come from the increased nucleophilicity of sulfur in relation to oxygen. In our efforts to prepare longer amino acid chains which contain a thioamide at a specific location, we have modified classical liquid phase peptide techniques. In particular, elongation from the C-terminus of an N-protected endothiopeptide was best accomplished using a mixed anhydride coupling with isobutyl chloroformate and dimethylaminopyridine in a solvent mixture composed of DMF and THF. Using these procedures we have prepared a series of endothiopeptides with the sequences BOC-AA-Ψ(CSNH)-Gly-Pro-Ala-OMe and BOC-Pro-Gly-AA-Ψ(CSNH)-Gly-OMe where AA = Ala, Leu, Ile, Pro, Phe, Val and BOC-AA-Ψ(CSNH)-GIY-Pro-OMe where AA = Leu, Ala. These amino acid sequences were spotlighted due to their structural similarity to collagen and collagenase inhibitors. Future work will involve testing of these compounds as inhibitors of collagenase. (Supported by NIH Grant #S03 GM08003-22.)

GAS PHASE METHYLATION REACTIONS OF MODEL BIOMOLECULES.

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Most carcinogens metabolize to electrophiles that react with DNA causing alkylation. The regioselectivities of the electrophiles dimethyl chlorinium cation and methoxy methyl cation were studied in the gas phase by tandem mass spectrometry using 2-hydroxypyridine as a nucleic acid model. The mass spectrum of the primary ion $[M + CH_3]^+$ for 2-hydroxypyridine revealed structurally diagnostic fragmentations that were indicative of the location of methylation. The spectra for 2-methoxypyridine and N-methyl-2-pyridone revealed that methylation occurs both at the oxygen and the nitrogen. Upon methylation, 2-methoxypyridine and N-methyl-2-pyridone gave the same mass-analyzed ion kinetic energy spectrum (MIKES) for the $[M + CH_3]^+$ daughter ion. D₃-2-methoxypyridine and D₃-N-methyl-2-pyridone were synthesized to test for interchanging of the methyl groups on oxygen and nitrogen. The MIKES of the deuterated compounds revealed that the methyl groups are nonequivalent.

HETEROCYCLIC-2-THIONES AS LIGANDS FOR COMPLEXES OF COPPER(II)

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Commercially available imidazolidine-, oxazolidine-, and thiazolidine-2-thiones and those prepared from diamines or amino-alcohols and carbon disulfide react with copper(II) salts. The heterocyclic-2-thiones ligands are characterized by elemental analysis, FTIR, DSC, ^1H and ^{13}C NMR. The choice of copper(II) salts and the solvent determine the nature of the reaction with the ligands. Soluble complexes of copper(II) are characterized by the method of continuous variation with observed ligand to metal mole ratios which range from 1:2 to 2:1. Potentiometric titrations of ligands solutions are used to calculate pK_a values for the ligands. Titrations of ligands in the presence of copper(II) ion are used to calculate K_f values for the complexes. Crystalline orange products are obtained from reactions of copper(II) sulfate with thiazolidine-2-thiones. Supported by NIH Grant S03 GM08003-22 and S03RR03265-13.

THE PERCY EXPOSURE: A LATE PLEISTOCENE SETTING IN DEWEY COUNTY.

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Erosion of a modern farm pond dam on the Canadian River's first terrace in eastern Dewey County exposed a cross section of buried, fossil-rich, gleyed sediments. To learn more about this watershed's geomorphology, chronology and past environments, the exposure was briefly studied by vertebrate and invertebrate paleontologists, a soils scientist, and an archeologist. A 4m profile was cleaned, studied, and sampled for gastropods, vertebrate bones, pollen, and dating. The darkened, fossil-bearing silt loam to loamy sediments yielded a radiocarbon date of 35,600 +/- 1120 years B.P. (Beta - 66020), a result that indicates this terrace was aggraded before the Wisconsinan glacial maximum. The sediments appear to be an alluviated pond or oxbow lake that existed on this terrace as it was nearly through aggrading. Recovered vertebrate remains are few, but mammoth and examples of rodents and insectivores are represented. A diverse assemblage of terrestrial and aquatic gastropods bear witness to a stable pond setting that existed in a warm climate.

ADRENERGIC RECEPTORS MEDIATING PUPILLARY CHANGES IN AMPHIBIANS.

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Subcutaneous (s.c.) injection of epinephrine (EPI) produced sustained mydriasis whereas s.c. dexmedetomidine (DMET), an adrenergic α_2 agonist, produced sustained miosis in *Rana pipiens*. Topical ocular administration (TOA) of 10 μl of 0.5% EPI or 0.25% DMET also produced sustained mydriasis or miosis, respectively, in treated eyes but not in contralateral eyes. The pupillary effects of systemic and topical DMET were antagonized by TOA of the α_2 antagonist, atipamezole (ATI), but not by the α_1 antagonist, prazosin. Moreover, the miotic effect of DMET was rapidly reversed by TOA of EPI. The effects of EPI were antagonized by TOA of propranolol (PRO), a nonselective adrenergic beta receptor antagonist, but not by adrenergic α_1 or α_2 antagonists. TOA of the selective beta₂ antagonist, ICI 118551, also inhibited the effect of EPI. Alpha receptor antagonists alone had no ocular effect, but PRO produced sustained miosis which was reversed by TOA of EPI. These results are consistent with the hypothesis that endogenous EPI, the principal sympathetic neurotransmitter in amphibians, produces tonic pupillary dilation that is antagonized by postsynaptic beta₂ receptor blockade and by activation of presynaptic α_2 autoreceptors that mediate inhibition of neurotransmitter release.

A LATE QUATERNARY FAUNA FROM THE WASATCH PLATEAU, SANPETE COUNTY, UTAH.

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Montane faunas from the state of Utah are few and far between; the majority of existing localities are at lower elevations. In the summers of 1992-94, a search for Quaternary fossils was undertaken on the Wasatch Plateau of south central Utah. Rock matrix containing fossil microvertebrates were collected each year from Stevens Creek, Sanpete County, on the east side of the Wasatch Plateau. The fossil quarry is greater than 2745 meters above sea level. Approximately 1400 kg of rock matrix containing microvertebrates, charcoal, and snail shells was collected. A sample of unweathered charcoal from deep within the creek bank yielded a date of 8330 +/- 60 Years Before Present. A rather unique mammalian fauna is represented at Stevens Creek. To date the fauna from Stevens Creek consists of 30 isolated molar teeth, several incisors and two reptilian vertebrae. Three partial mammalian jaw fragments containing teeth were excavated as well. The mammalian teeth represent three orders (Insectivora, Rodentia, Lagomorpha) and six families (Soricidae, Sciuridae, Cricetidae, Geomyidae, Dipodidae, and Leporidae) of shrews, rabbits and small rats and mice. The fossil jumping mouse (*Zapus* sp.) is represented by three upper molars and a grooved incisor. The occlusal pattern on the cheek teeth may indicate a primitive pattern. With the occurrence of such fossil montane mammals as the chipmunk, jumping mouse, vole, and shrew from the fossil locality, a boreal assemblage is inferred.

PEROXIDASES OF RIPENING CHILE PEPPER FRUIT.

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Peroxidases were found to increase in chile pepper fruit during ripening and appeared to be localized in the cuticle as the fruit developed, corresponding to cuticle thickening and disease resistance. Fruit harvested throughout the season showed an increase in total peroxidase activity and increased intensity of an acidic isozyme (pI = 4.0). Anion-exchange column chromatography yielded a single acidic peroxidase in both green and red chile fruit and increased purification 65-fold. SDS-PAGE of column fractions containing peroxidase activity showed 1-3 bands in the region of 29 kD. Size-exclusion chromatography indicated that green and red fruit peroxidase were 32.8 kD, and 23.8 kD, respectively. Temperatures above 70 C for 15 minutes decreased peroxidase activity in the fruit. Optimal pH for fruit peroxidase activity was 6. Chile fruit peroxidases are stable at high temperatures, over a broad pH range, and increase in activity with ripening. This increased peroxidase activity may correspond to increased disease resistance at maturity.

STRUCTURE OF PLANT MICRO-COMMUNITIES EMERGING FROM SOIL SEED BANKS.

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In a greenhouse study we examined the role of disturbance (clipping) on the structure of plant communities emerging from soil seed banks collected from four sites (roadside, forest, prairie, and old-field) in the Tallgrass Prairie Preserve, Osage County, Oklahoma. Plant communities emerging from the forest site samples showed significantly higher mean biomass than all other treatments during the first two harvests, but during the third harvest those emerging from the old-field soil samples had high biomass. In the first two harvests, significantly higher species richness than all other treatments was observed for plant communities emerging from the prairie site samples and during the third harvest for those emerging from the old-field soil samples. The species richness and biomass relationship (SBR) of plant communities manifested unimodal curves for all four sites during the first harvest and partially during the second and third harvests. The among-site differences in the SBR can be mainly attributed to variation in soil fertility and seed banks. Similarly, among-harvest differences in the SBR may be assigned to disturbances, and the variation in the life cycles of plant species. In conclusion, these plant communities mimicked many natural plant communities in exhibiting unimodal curves for the SBR.

GROWTH OF NAEGLERIA IN VERO-CELL CULTURES.

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Naegleria is a genus of free-living amoebae which includes 2 pathogenic and 4 nonpathogenic species. Amoebae may be cultivated on nonnutrient agar coated with bacteria or in liquid axenic media. The purpose of this study was to assess the growth and cytopathic potential of the 6 species of *Naegleria* in cultures of African green-monkey kidney (Vero) cells. Amoebae were cultivated in confluent monolayers of Vero cells in MEM at 30 or 37°C. Growth and cytopathogenicity was evaluated daily by phase-contrast microscopy. Amoebae of all 6 species of *Naegleria* grew and were able to destroy Vero-cell monolayers. The length of time required for amoebae to destroy the cell monolayers depended on the incubation temperature and the amoeba:target cell ratio and ranged from 4.0 - 10.7 days for a ratio of 1:100 at 30°C. Amoebae destroyed Vero cells sooner at a lower ratio or a higher temperature. Strains of a species varied greatly in their ability to destroy monolayers. Highly virulent *N. fowleri* destroyed Vero cells more quickly than weakly virulent *N. fowleri*. The cytopathogenicity of a weakly virulent strain of *N. fowleri* was increased by serial passage in Vero-cell cultures. Continuous growth in Vero-cell cultures of the same weakly virulent strain of *N. fowleri* enhanced its virulence for mice. (Supported by EPA grant R-818106).

YEASTS THAT BIOLOGICALLY CONTROL GRAY MOLD OF APPLE.

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Yeasts applied at ca. 10^5 - 10^6 cells per wound per Golden Delicious apple suppressed gray mold caused by *Botrytis cinerea*. Of 27 yeasts tested, *Cryptococcus humicola* Y1266, *C. laurentii* BSR-I-Y22, *Filobasidium floriforme* Y7454, *Rhodotorula aurantiaca* Y1581, *Sporobolomyces albo-rubescens* Y1293 and *S. roseus* strains 24257 and 28988 prevented or greatly reduced (P=0.05) the frequency of decay and the decayed area in treated apples compared to nontreated ones. Yeast cells suppressed the germination of *B. cinerea* conidia by 90 to 100% in buffer. Utilization of 14 C-sucrose by *S. roseus* strains was 4-6 times that of conidia in buffer. Wounding apples increased (P=0.05) ethylene output compared to nonwounded apples. Treatment of wounds with yeasts greatly reduced ethylene rates compared to that from wounded but nontreated apples. Competition for carbon and suppression of ethylene production may be biocontrol mechanisms used by some yeasts.

HOME IMPROVED INTERFEROMETRY

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An interferometer uses a glass pane at 45° to reflect part of a light beam while the other part refracts on through the pane. Both beams are reflected from mirrors to unite on a target screen where they interfere. Waves of the same wavelength but out of phase cancel to produce a dark line.

The simple device I had at my school was designed inexpensively to show an interference pattern. What I couldn't do with my interferometer was calculate a wavelength for the light source. To do this, I needed a moveable mirror. If you could use, but don't have a moveable mirror interferometer, consider buying an inexpensive fixed mirror type and converting it yourself! Scientific companies offer them for about \$40. A moveable mirror can be accomplished by putting a track and mirror cart on the device for one of the fixed mirrors. I use a number eight bolt with thirty two threads per inch to advance my cart. Each revolution of the bolt advances my mirror 794 μ M. Each ten degree mark on my rotation wheel is an advance of about 22 μ M. My device does not compete with a \$1000 interferometer, but it works. I hope to find a more finely threaded bolt for greater control. A laser works well as a light source, but a mercury lamp with a couple of wraps of green cellophane will also work.

ENVIRONMENTAL STUDIES LABORATORY EXERCISES.

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From Title III support for the past three years, environmental studies laboratory exercises have been developed for students from any major. Hence, science and nonscience majors alike may experience the collection, analysis, interpretation and mapping of data related to specific geographical areas. Some of the exercises to be presented are parameters of the Sauk River. This river flows through the heart of Stearns County, Minnesota, the dairy county of the state. The Sauk River sample test results are plotted on a Mapping Information Plotting System (MIPS). The results over time give a picture of the environmental conditions and assists students in "hands-on" learning. Many of the procedures utilized in this work are taken from purchased Hach kits; however, sophisticated analytical instrumentation is also used in specific cases.

IMPROVEMENT OF PHYSICS TEACHING IN OKLAHOMA

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The paper contains observations about teaching physics and science in Oklahoma made over the last thirty years. It lists things that are working toward its improvement and things that are not. The observations are used to support the following conclusions about what needs to be done to improve the teaching of physics in Oklahoma.

1. Educate administrators to the need to adequately equip science labs.
2. Adequately fund schools so that equipment can be purchased.
3. Make real provision that address the training of new teachers in lab skills.
4. Provide funding for continuing education of science teachers using the format of the NSF summer institutes.
5. Find ways to obtain patron and local news media support for needed school improvements.

THE BIOMEDICAL SCIENCES PROGRAM, A PARTNERSHIP OF THE OKLAHOMA CITY PUBLIC SCHOOLS AND THE UNIVERSITY OF OKLAHOMA HEALTH SCIENCES CENTER (405) 425-4605

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The BioMedical Sciences Program is a partnership of public and higher education for rigorous science preparation of high school students for undergraduate and eventual graduate and professional education for careers in medicine, allied health, research science and engineering. Founded in 1981, the program celebrates a multicultural enrollment. Approximately 60% of students are female. The program is located in a comprehensive high school with access to athletics, drama, orchestra/band, and academic competitions such as science fairs. Courses are enhanced by lectureships, mentorships, and a senior year rotation and shadowing program with the OUHSC. Students have privileges at the medical library. Entry requirements include a minimum 3.0 grade average, essay and interview. Currently, 170 students come from the Oklahoma City area and neighboring districts.