Volume 76, Number 1

WVAS

West Virginia
ACADEMY of SCIENCE

Founded 1924

Proceedings of the West Virginia Academy of Science

2004

Abstracts of the Seventy-Ninth Annual Session

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ACADEMY of SCIENCE
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Member
American Association for the Advancement of Science

Proceedings of the
West Virginia Academy of Science
2004

Vol. 76 No.1
ABSTRACTS OF THE SEVENTY-NINTH ANNUAL SESSION

Concord College
Athens, WV
April 24, 2004

Printed by
Ralston Press
Buckhannon, WV
October 2005

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Proceedings of the West Virginia Academy of Science
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BIOCHEMISTRY/CHEMISTRY

JUSTIN M. SANDERS and PETER M. GANNETT. Computer-aided design of a novel antibiotic: staphylococcal protein A inhibitors. 1

PHILIP GALAPON, DARLA WISE and JOHN RUSH ELKINS. An Examination of the Effects of Methylxanthines on DNA Replication under PCR Conditions. 1

ROBERT SEEBER Jr. Extraction and isolation of hypericine and hyperforin from various sources of St. Johnswort. 1

BIOLOGY

CHRIS HAAS, CLIFFORD STARLIPER, and BARNABY WATTEN. Preliminary water decontamination involving the inhibitory effects of carbon dioxide on the fish pathogen *Aeromonas salmonicida*. 2

CLIFFORD E. STARLIPER. A prevalent antimicrobial resistance (R-) plasmid noted in the aquatic environment from various bacteria, hosts and geographic origins. 2

JILL TAYLOR and ALBERT MAGRO. Comparative gene expression in CRL-2610 cells upon the induction of apoptosis. 3

L. MICHAEL PETERSON and TONY E. MORRIS. Examination of mutagenic potential of common combusted hydrocarbons as measured by bacterial reverse mutation (Ames test). 4

JILL TAYLOR and ALBERT MAGRO. Gene expression in MCF-7 and CRL-2610 upon induction of apoptosis. 4

JOHN C. LANDOLT, STEVEN L. STEPHENSON, and JAMES C. CAVENDER. Distribution and ecology of dictyostelid cellular slime molds in the Great Smoky Mountains National Park: An update... 5

ECOLOGY

RONALD A. CANTERBURY and JOSEPH T. MANZO. Bringing environmental education into the public classrooms with the goal of contributing to a better educated generation of voters. 5

JAMES S. RENTCH and RONALD H. FORTNEY. Dynamics of coarse woody debris in oak-dominated old-growth forests. 5

RYAN l. WARD, JAMES T. ANDERSON, RONALD H. FORTNEY, STEVE KITE, PARTICK KISH, J. TODD PETTY, IRA POPLAR-JEFFERS, and JOSH WHITE. Preventing breaks in the stream channel substrate to reduce impacts of road culverts on stream communities. 6

BRUCE EDINGER, MANDY SEITZ, JENNIFER SIMMONS, BRADY GUTTA, ALVAN GALE and LOU SCHMIDT. Chemical, physical and benthic macroinvertebrate status of mine-drainage impacted Lamberts Run: candidate for wetland and aeration heavy metal remediation. 6

EDUCATION

ALAN D. SMITH. Project characteristics associated with Bloom's taxonomy of learning objectives. .. 6

KARL D. FEZER. Corollaries of Methodological Naturalism. 7

RONALD A. CANTERBURY and JOSEPH T. MANZO. This project was designed to bring environmental education into the public classrooms with the goal of contributing to a better educated generation of voters. 7

ENGINEERING

BRAD MESSENGER, DONALD D. GRAY, and RONALD FORTNEY. Evaluation of a vertical hydraulic barrier as a wetland creation method using a three-dimensional groundwater model. 8

GEOLOGY AND MINING

MELISSA L. FARMER, and JOSEPH L. ALLEN. Subsurface imaging of Late Mississippian normal faults and associated paleoseismic (?) soft -sediment deformation in Mercer County, WV, using ground-penetrating radar. 9

SOCIAL SCIENCE

NICOLE M. SERENE and JOHN H. HULL. U.S. women's magazines and the bodies they present. 9

JESSICA M. SHAFFER and JOHN H. HULL. Obesity and muscularity ratings of males pictured in U.S. men's fashion, fitness, and health magazines. 10

MIKITA A. WEAVER and JOHN H. HULL. Women's body sizes in fashion magazine articles and advertisements: a cross-cultural study. 10

POSTER SESSION

BIOLOGY

STEVEN L. STEPHENSON, JOHN C. LANDOLT, DONNA M. POWERS, LINDSAY A. DILLION, and CERIDWEN A PEARCE. Eumycetozoans associated with tropical forests in northern Queensland, Australia. 11

MELINDA E. VARNEY, CURTIS J. PRITZL, SHIVAJI RIKKA, and PATRICK K. LAI. Sub-cloning, expression, and partial purification of Borna Disease Virus p40 as a recombinant fusion protein in prokaryotes. 11

BIOTECHNOLOGY

LAURA DEBELLIS, ELIZABETH MORRIS, TONI RILEY,CRISTINA CLARK, MARK FLOOD, SARAH HESSON, POORANI SEKAR, JEAN CHAPPELL, BOWIE KAHLE, and ELIZABETH MURRAY. Analysis of the Factor V Leiden (FVL) polymorphism in two West Virginia groups. 12

CHEMISTRY

TRAVIS LAWSON and MATTHEW SCANLON. the binding constants of bithiophene and bithiophese derivatives with hydroxypropyl -cylcodextrin in water, methanol and ethanol, via fluorescence spectroscopy. 12

MELINDA HUFF, and ANDREAS BAUR. Synthesis and characterization of alkylisatins as precursors to novel tetrathiafulvalenes. 13

ECOLOGY

JOHN C. LANDOLT, JAMES C. CAVENDER, and STEVEN L. STEPHENSON, Dictyostelid cellular slime molds of Australia. 13

WILDLIFE

WAYNE H. WEAVER, JAMES T. ANDERSON, JOHN W. EDWARDS and THOMAS DOTSON. Biological and behavioral analysis of nuisance and non-nuisance black bears in southern West Virginia. 14

Proceedings of the
West Virginia Academy of Science
2004
Abstracts of the Seventy-Ninth Annual Session
Volume 76:1

BIOCHEMISTRY/CHEMISTRY

JUSTIN M. SANDERS, Dept. of Bioscience, Salem International University, Salem, WV 26426, jsanders@student.salemiu.edu and **PETER M. GANNETT**, Basic Pharmaceutical Sciences, West Virginia University Robert C. Byrd Health Sciences Center, Morgantown, WV 26506, pgannett@hsc.wvu.edu. **Computer-aided design of a novel antibiotic: staphylococcal protein A inhibitors.**

The purpose of this project is to derive an antibiotic, potentially with a novel mechanism of action, against *Staphylococcus aureus* using computationally based, molecular modeling techniques. The computer program SPROUT is a *de novo* drug design program developed at the University of Leeds, UK. It is used in the pharmaceutical industry and academia to design potential drugs for target proteins. The structure of the F_c-binding protein Staphylococcal Protein A bound to human IgG F_c was obtained from the Protein Data Bank, loaded into SPROUT, and processed for ligand design. An important aspect of this process was the selection of binding sites in the active site. Seven sites were selected; four were hydrophobic and three were H-donor sites. After constraint optimization, the first drug activity predictions were computed using standard fragment templates and only hydrophobic interactions. The top ranking ligand in affinity was labeled Hphobe-1. To improve water solubility and, potentially, binding to the active site, three hydrogen bond donor sites were added and resulted in PABS-1. PABS-1 is predicted to be less active than the Hphobe-1. A customized template was used in the preceding runs. This led to PABS-2/3 that differ only in the orientation of a phenyl ring. PABS-2/3 are predicted to be more active than either Hphobe-1 or PABS-1 (ca $x10^3$).
In the next phase, derivatives of structure PABS-2/3 are going to be synthesized and affinities tested against human IgG control.

PHILIP GALAPON and **DARLA WISE**, Dept of Biology, Concord College, Athens, WV, 24712, and **JOHN RUSH ELKINS**, Dept of Chemistry, Concord College, Athens, WV, 24712. **An Examination of the Effects of Methylxanthines on DNA Replication Under PCR Conditions.**

Caffeine is widely consumed in mass amounts everyday. Most people don't realize that the chemical they use as an energy booster may also be an inhibitor of DNA replication. Caffeine, as a methylxanthine, may either replace guanine or stop the function of DNA polymerase by allosteric interference. For this experiment, DNA from the D1S80 locus of the p arm of chromosome 1 was used. Primers to the D1S80 locus were used to amplify this region of the DNA template in the presence of various concentrations of caffeine or theophylline. Polymerase chain reaction product of less than 400 base pairs in length was observed in the positive control and identical patterns in the 0.02 mg/ml and 0.1 mg/ml lanes of theophylline. PCR product was not visible for all concentrations of caffeine tested and the higher concentrations of theophylline tested. These results suggest that both theophylline and caffeine have inhibitory or interruptive effects on DNA replication *in vitro*.

Previous studies have shown that the presence of methylxanthines inhibits DNA replication. Furthermore, methylxanthines will bind to RNA and DNA sequences with relatively high binding affinities. Further investigation would serve to elucidate the mechanism of methylxanthine inhibition and the amounts of caffeine or theophylline necessary for inhibition of DNA replication to occur.

ROGER SEEBER, Jr., Biology Division, West Liberty State College, West Liberty, WV

26074. **Extraction and isolation of hypericine and hyperforin from various sources of St. Johnswort.**

St. Johnswort (*Hypericum perforatum*) has been, and is currently, a very widely used over the counter medication for many things, most notably mild to moderate depression. The use of this herbal medication has come into question regarding its possible interactions with prescription drugs. A rapid and simple assay for hypericine and hyperforin, the most commonly sited compounds in this plant, has previously been developed. These two chemicals are separated in a 20 min. HPLC run using a mobile phase of 90/10 % 10mM ammonium acetate buffer with a flow rate of 0.2 ml/min and detection at 290 nm. The separation of these chemicals is seven minutes apart and verified by mass spectroscopy. These techniques are applied to filtered methanolic extracts of various St. Johnswort sources. Materials being used for extraction include: over the counter pills, dried and fresh plant material and eventually plant tissue culture callus clones being prepared from cuttings of different plants. Data collection continues with comparisons of sources and a systematic survey of these two chemicals the ultimate goal.

BIOLOGY

CHRIS HAAS, Dept. of Biology, Shepherd College, Shepherdstown, WV 25443, **CLIFFORD STARLIPER**, USGS National Fish Health Research Laboratory, Leetown, WV 25430 and **BARNABY WATTEN**, USGS Restoration Technologies Branch, Leetown, WV 25430. **Preliminary water decontamination involving the inhibitory effects of carbon dioxide on the fish pathogen *Aeromonas salmonicida*.**

The significant bacterial pathogens of captive-reared and free ranging fishes are primarily transmitted horizontally and via the water column. Therefore, an effective means to prevent introduction and transmission of pathogens is to decontaminate the hatchery incoming and effluent waters. Water decontamination methods such as ozonation, UV irradiation and chlorination are effective, but operational costs are high and there are environmental and human safety issues with chlorination. Also, effective concentrations of ozone may be toxic to rainbow trout, an important cultured species. A safer and cheaper, yet effective alternative method would be beneficial to fisheries. In other research at our laboratory, a relatively low-pressure carbon dioxide treatment has been developed and is effective for killing exotic and invasive invertebrates, including Asian clams. Carbon dioxide offers several advantages over the aforementioned methods. Namely, about 70 % may be recycled (which greatly reduces cost), residual in water is simply driven off mechanically and it is environmentally safe. With this study, we expanded the research on invertebrates to evaluate the efficacy of carbon dioxide to kill *Aeromonas salmonicida*, a major fish pathogen, to determine whether this method shows promise for bacterial pathogens. We selected *A. salmonicida* because its cell surface A-layer protein, which is requisite for virulence, yields blue colonies on differential media. Loss of this protein (i.e. white colonies) gave us a carbon dioxide effect to measure in addition to cell death. We designed and constructed a manifold system with hyperbaric chambers to ensure equal treatments and to offer replication. We have developed this model by testing various cell inoculum densities, cell diluents and volumes, pressures, and durations. We have shown 100 % *A. salmonicida* cell death with carbon dioxide treatment, while untreated systems are unaffected. These results demonstrate that carbon dioxide has promise for decontamination of water.

CLIFFORD E. STARLIPER, National Fish Health Research Laboratory, U.S. Geological Survey, 11649 Leetown Road, Kearneysville, WV 25430. **A prevalent antimicrobial resistance (R-) plasmid noted in the aquatic environment from various bacteria, hosts and geographic origins.**

In the United States, the two antimicrobial agents that are predominantly used to combat bacterial diseases in cultured fishes destined for human consumption are Terramycin® (oxytetracycline) and Romet® (5 parts sulfadimethoxine plus 1 part ormetoprim). These antimicrobials have been employed to treat the major diseases furunculosis, pasturellosis, enteric septicemia of catfish which are caused by the bacteria, *Aeromonas salmonicida*, *Photobacterium damselae* subsp. *piscicida*, and *Edwardsiella ictaluri*, respectively, in various trout species, Atlantic salmon, hybrid striped bass and channel catfish. An unfortunate side effect to therapy with these two antimicrobials, often attributable to misuse, has been the development of resistance in the targeted bacterial pathogens. Resistant strains, including those displaying multiple resistances, of each of the bacterial species listed have been isolated. A resistance R-plasmid was determined to be the molecular basis for the resistance in strains from nearly 20 different fish-rearing facilities throughout the eastern United States extending from Mississippi north through Maine. R-plasmids from the various origins were similar (55 kilobase in size), if not identical and were readily transferable to recipient, antimicrobial-sensitive bacteria via simple conjugation. Similarities of the R-plasmids from various origins were demonstrated by conjugal mating transfers of the plasmids, their encoded resistances, and plasmid mobilities in agarose gels of the newly formed transconjugates. Interestingly, this 55 kb R-plasmid was previously shown to be homologous with a Tribrissen®-resistant *Escherchia coli* from an equine cystitis case in the early 1980's. Tribrissen® and Romet® are chemically similar compounds. These results suggest a very prevalent R-plasmid in the aquatic environment, which is readily available to pathogens, and judicious use of antimicrobials is imperative.

JILL TAYLOR and **ALBERT MAGRO**, Dept. of Biology, Fairmont State College, Fairmont, WV 26554. **Comparative gene expression in CRL-2610 cells upon the induction of apoptosis.**

When compared to untreated controls, the data show that upon the induction of apoptosis by MK886, CRL-2610 glioma cells manifested a precipitous drop in the steady state gene expression of Myb. Correspondingly, there was a drop in the expression of CDH1, ITGB5, and ITGB8. In MCF-7 breast cancer cells, however, there was not a substantial drop in the gene expression of Myb, CDH1, ITGB5, nor ITGB8 when apoptosis was induced. Gene expression was measured by real time RT-PCR using gene specific primers and fluorescent probes. These data raise the question of whether there is a link between the drop in the expression of Myb and the expression of integrins and cadherins when apoptosis is induced in the brain cancer cells. Various reports in the literature show that Myb has an important role in both apoptosis and regulating integrin expression. Focal adhesions generated by the integrin subunits alpha/beta, when bound to an extracellular matrix, rescue cells from apoptosis through the autophosphorylation of the transduction protein FAK. The MK886/ CRL-2610 cell apoptotic model provides a unique system in which to obtain important information about the interrelationship of Myb to the cadherins and integrins and the mechanisms of this interrelationship in regulating the FAK-Akt/ PKB apoptotic rescuing pathway.

L. MICHAEL PETERSON and **TONY E. MORRIS**, Dept. of Biology, Fairmont State College, Fairmont, WV 26554. **Examination of mutagenic potential of common combusted hydrocarbons as measured by bacterial reverse mutation (Ames test).**

The objective of this study was to examine common, every-day exposure to hydrocarbons following combustion. The Ames test is commonly used to evaluate the mutagenic potential (and therefore the carcinogenic potential) of environmental substances. The Ames test is often the initial method of examining mutagenic potential. Ames test kits were purchase commercially (Presque Isle Cultures, Presque Isle, PA). The negative control was distilled water. The positive control was 4-nitro-o-phenylenediamine (4-NOPD) at a concentration of 100 mg mL^{-1}. Glucose-minimal salts agar was inoculated with *Salmonella typhimurium* (TA98, Ames strain). This strain of *S. typhimurium* has a mutant gene in the biosynthesis pathway of histidine, but in the presence of a mutagen will revert and begin histidine biosynthesis. Since glucose-minimal salts agar has no histidine, the presence of colonies indicates that a back mutation has occurred. Substances to be tested (as well as controls) were autoclaved and applied to a sterile paper disc in the center of the petri dish. Revertant colonies grew around the paper disc and were counted and compared to controls. Increased numbers of revertant colonies were observed for many substances examined. The test substances include gasoline, liquid propane gas, diesel fuel, kerosene, combusted wood by-products and coal oil. The combustion by-product of each hydrocarbon was examined. The results indicate that combustion by-products may contribute to mutagenesis and carcinogenesis. Avoiding exposure to these by-products may contribute to better health.

JILL TAYLOR and **ALBERT MAGRO**, Dept. of Biology, Fairmont State College, Fairmont WV 26544. **Gene expression in MCF-7 and CRL-2610 upon induction of apoptosis.**

Apoptosis is a form of cell death that is genetically programmed to follow definite steps. Programmed cell death is a normal process that occurs at a very high frequency within the body. The cells are able to determine if there are abnormalities, whereupon the cell actively initiates pathways to kill itself. If there are abnormalities in a cell and the cell does not go into apoptosis, the cell is likely to become cancerous. Within the human body, breast and brain cancer cells can be found in a matrix with other cells. These cells attach to one another and communicate via proteins. Two groups of proteins that were of interest to this project involved integrins and cadherins. The integrins are known to be involved in cell attachment to culture vessels and have been documented as playing an important anti-apoptotic role. Cadherin proteins are mainly utilized for cell adhesion. When cells begin the process of apoptosis, they typically detach from the matrix. This detachment may result from the lack of gene expression for specific integrins and cadherins and may be linked to the expression of the Myb protein. The expression of the Myb protein is associated with the formation of tumors within the body. This research project focused on determining whether the change in the expression of Myb protein upon the induction of apoptosis by the 5-lipoxygenase activating protein (FLAP) inhibitor, MK886, was accompanied by a drop in the expression of specific integrins and cadherins in the MCF-7 and CRL-2610 cells. Apoptosis by the reagent, MK886, was quantified in previous experimentation. The level of gene expression for Myb and the specific integrins and cadherins were determined by quantitative RT-PCR using a DNA Fluorometric Thermal Light Cycler. In preliminary data, it was found that the reason why the cell halts gene expression of specific integrins or cadherins could be mediated by a decrease in the expression of Myb protein.

JOHN C. LANDOLT, Dept. of Biology, Shepherd College, Shepherdstown, WV 25443, **STEVEN L. STEPHENSON,** Dept. of Biological Sciences, University of Arkansas, Fayetteville, AR 72701, and **JAMES C. CAVENDER**, Dept. of Environmental and Plant Biology, Ohio University, Athens, OH 45701.
Distribution and ecology of dictyostelid cellular slime molds in the Great Smoky Mountains National Park: An update.

The Great Smoky Mountains National Park encompasses an area of 2,080 km^2 in eastern Tennessee and western North Carolina between 35° 28' and 35° 47' N latitude. Elevations range from approximately 270 to 2,000 m above sea level, and the topography and vegetation are as diverse as any region of eastern North America. During the period of 1998 to 2003, soil/litter samples for isolation of dictyostelid cellular slime molds were collected throughout the Park. Collecting sites included examples of all major forest types along with the more common types of non-forest vegetation. More than 2,200 clones of dictyostelids were recovered from 387 samples. These clones included representatives of 20 described species together with at least 10 species new to science. This total is higher than those reported for other temperate regions of the world. In general, both numbers of species and numbers of clones/g of sample material decreased with increasing elevation, and several species displayed a distinct preference for either the low or high end of the elevation gradient. For example, *Polysphondylium tenuissimum* and *Dictyostelium discoideum* are more common towards higher elevations, where soils are relatively more acidic, whereas *D. lacteum*, *D. minutum* and *D. purpureum* tend to be associated with lower elevations, where soils are less acidic. Overall, *D. mucoroides* was the most abundant species.

ECOLOGY

JAMES S. RENTCH, Div. of Forestry, West Virginia Univ., Morgantown, WV 26506, jrentch2@wvu.edu, and **RONALD H. FORTNEY**, Dept. Civil and Environmental Engineering, West Virginia Univ., Morgantown, WV 26506. **Dynamics of coarse woody debris in oak-dominated old-growth forests.**

This study examined coarse woody debris (CWD) in five oak-dominated old-growth stands in Ohio, Pennsylvania, and West Virginia. CWD (snags and downed logs $\geq$ 10 cm) was inventoried and mapped in two 60m x 75m plots for each stand. Three questions were posed: 1) what were physical characteristics of CWD, 2) what was the relationship of dead to live stems, and 3) how was the distribution of CWD related to the disturbance regime. Mean volume of downed logs and snags was 64.3 m^3 ha^{-1} or 17% of total live volume. Oak species comprised 74.4% of total CWD volume. Snag density averaged 3.2 m^2 ha^{-1} and 22 snag ha^{-1} or 10% of the total live basal area. Oaks also constituted the majority of standing snags. Diameter distributions of CWD were not significantly different from distributions of live trees (K-S test, $KS < 0.45$, $p > 0.336$, $df = 8$). Densities were highest in the smallest size class (10-20 cm) and lowest in the largest size classes (80-100 cm), however an intermediate peak occurred in the 40-70 cm size classes, suggesting differential rates of mortality. Ratios of numbers of dead logs and snags to live stems were fairly constant across size classes, suggesting that these stands are in equilibrium with respect to CWD. The spatial distribution of downed logs and snags was influenced by the size of the sampling unit. At 15 and 30 m, the spatial distribution of downed logs and snags was clumped (Morisita index of dispersion > 1.0); however distribution was random at 45 and 60 m scales. The orientation of fall of downed logs appeared to be independent of slope aspect and direction of prevailing, SW winds. These characteristics suggest a disturbance regime

dominated by small events involving the mortality of one or two trees.

RYAN L. WARD, JAMES T. ANDERSON, RONALD H. FORTNEY, STEVE KITE, PARTICK KISH, J. TODD PETTY, IRA POPLAR-JEFFERS, and **JOSH WHITE**, Dept. Civil and Environmental Engineering, West Virginia University, Morgantown, WV 26506. **Preventing breaks in the stream channel substrate to reduce impacts of road culverts on stream communities.**

Culverts have higher water velocities compared to the rest of the stream in which they are located. This often results in a break in the channel substrate of a streambed. Corrugated steel pipe is the most common material used in the construction of culverts in circular or pipe arch (oval or half circle) shapes. Proper placement and alignment of culverts to prevent breaks in channel substrate may reduce the impacts of the culvert on stream fauna such as fish and salamanders. Data analyses were performed on 56 circular and 30 pipe arch culverts on streams in Randolph and Tucker counties in West Virginia. Among circular culverts continuous substrate occurred more often where culverts had larger diameters and in streams with lower gradients and a lower percent slope ($p < 0.05$ for all comparisons). For both circular culverts and pipe arches continuous substrate occurred more often where the stream had a lower mean ratio of culvert slope to stream gradient ($p < 0.05$). Stream communities can benefit from the correct placement and alignment of culverts that create a more natural channel.

BRUCE EDINGER and **MANDY SEITZ**, Dept. of Bioscience, Salem International University, Salem, WV 26426, **JENNIFER SIMMONS** and **BRADY GUTTA**, National Mine Land Reclamation Center, West Virginia University, Morgantown, WV 26506 and **ALVAN GALE** and **LOU SCHMIDT**, WV Dept. of Environmental Protection, Charleston, WV 25301. **Chemical, physical and benthic macroinvertebrate status of mine-drainage impacted Lamberts Run: candidate for wetland and aeration heavy metal remediation.**

Leaking underground coal mines damage hundreds of streams in north central West Virginia through acid and heavy metal pollution. Lamberts Run, a subwatershed of the West Fork River near Clarksburg, was listed as impaired in the EPA's 2002 Total Maximum Daily Load report by excessive loads of iron, manganese, and aluminum. The purpose of this study was to locate Lambert Run's pollution sources, quantify the stream's metal loads and acidity, and conduct baseline surveys of benthic macroinvertebrates to complete a watershed-based implementation plan and explore options for remediation. During 2003 complete sampling sweeps were conducted between May and October. Standard field and lab methods were used at eight sites to determine stream flows, conductivity, pH, acid loads, and iron, manganese and aluminum loads. These data confirm that three sources had cumulative iron, aluminum and manganese loads of about 45,000, 2,300 and 12,000 pounds per year, respectively. Parts per million measurements for each metal at each site were often above maximums permitted by the EPA for warm water fishery streams and contact recreation. Only two sites had moderate acid loads, suggesting aeration treatment methods would be appropriate. Benthic macroinvertebrates were virtually non-existent at five sites, although repeat sampling this spring is needed. Aerobic wetland and aeration methods of remediation will be discussed.

EDUCATION

ALAN D. SMITH, Department of Management and Marketing, Robert Morris University, Pittsburgh, PA 15219 (smitha@rmu.edu).

Project characteristics associated with Bloom's taxonomy of learning objectives.

Critical thinking skills have traditionally played an important part in solving the unique and demanding tasks associated with project management (PM). Higher-order thinking skills usually involve the top three levels of Bloom's (1956) Taxonomy, which includes analysis, synthesis, and evaluation. A survey of practicing project managers in the Pittsburgh, PA area revealed several significant groups or clusters through principal-components and factor analysis techniques. These constructs help defined some of the major concerns of PM practitioners. These constructs related to higher levels of critical thinking and PM tasks/ problems include the following constructs: Quality Assurance and Response, Quality and Training, Project Resource Concerns, Project Goals and Team Concerns, Project Data Base and Resources, Computer Tools, Internet and Computerized Scheduling, Outsourcing and Prototyping, Project Acceleration and Design, and Co-Locating Project Personnel. These learning levels and related tasks/problems should provide useful insight into the PM discipline in order to develop the required critical thinking skills.

KARL D. FEZER, Div. of Natural Sciences, Concord College, Athens, WV 24712.
Corollaries of Methodological Naturalism.

Creationists (including advocates of Intelligent Design) accuse evolutionists of unfairly claiming the mantle of science for their own naturalistic worldview and of denying it to challengers of naturalism. The First Amendment, arguably, prohibits agencies of government from promoting one worldview at the expense of another. I argue that science is not a worldview. Rather, it is a system of thought with limited goals and standards that require it to be methodologically naturalistic. In contrast, a metaphysically naturalistic worldview is not a requirement for doing science. Like every other worldview, metaphysical naturalism entails at least some highly controversial presuppositions. These disqualify metaphysical naturalism from serving as a foundation for a reliable body of assertions. Methodological naturalism insists that scientific descriptions of phenomena of nature be well-documented and that scientific explanations of those phenomena invoke only well-established principles of cause and effect. In this respect, methodological naturalism resembles the demand, in criminal trials, that guilt of the accused be demonstrated beyond a reasonable doubt. Evolution, defined as diversification from shared ancestors, is well-documented. So are mechanisms known to play a significant role in the process, such as mutation, genetic recombination, and natural selection. However, there are few generally accepted standards as to when an explanation should be judged adequate. Such judgments belong to private worldviews. The private judgment that existing explanations of the mechanisms of evolution are inadequate may generate the search for other natural mechanisms, as well as efforts to justify invocation of supernatural agents.

RONALD A. CANTERBURY, Dept. of Biology and **JOSEPH T. MANZO**, Dept. of Geography, Concord College, Athens, WV 24712. **Using human-avian interactions as a tool for environmental education.**

This project was designed to bring environmental education into the public classrooms with the goal of contributing to a better educated generation of voters. Across southern West Virginia, we worked with secondary education teachers and their students to study the impacts of suburban sprawl on bird populations. Specifically, we used standardized avian sampling methods to study birds in an urban corridor and pristine habitats. We studied bird populations as farms and open lands were changed to exurbia. We used geography, GIS

mapping, and environmental science to explore the relationships among bird species and habitats, tested for indicator species of ecosystem structure, and developed model predictions of bird populations. Path analysis was used to develop models to predict changes in bird populations due to human-induced landscape alterations. Lectures on sprawl as a local and national phenomenon were presented to students and teachers. Analyses of data, as well as mapping and modeling, disclosed predictive indicator species and fluctuations in bird populations with replacement of flycatchers, vireos, warblers, and thrushes with catbirds, sparrows, cowbirds, and cardinals as landscapes became urbanized. Some bird species (e.g., downy woodpecker, Carolina wren) did not change much as undisturbed habitats were converted to suburban landscapes. However, sprawl negatively affected most bird species and produced landscapes with low native species diversity and dominance of urban-adapted birds. Further studies are needed to identify important bird and wildlife habitats in major avian flyways such as the Appalachians, and to target these for preservation as sprawl advances and continues to fragment the landscape.

ENGINEERING

BRAD MESSENGER, DONALD D. GRAY, and **RONALD FORTNEY,** Dept. of Civil and Environmental Engineering, West Virginia University, Morgantown, WV 26506. **Evaluation of a vertical hydraulic barrier as a wetland creation method using a three-dimensional groundwater model.**

Suitable sites for wetland creation using current wetland design methods are relatively rare in the central Appalachian Mountain region due to the rugged topography. In order to increase the number of potential wetland creation sites, a new construction technique was evaluated. This is the installation of a vertical hydraulic barrier to act as a subsurface dam by impeding groundwater flow. A three-dimensional groundwater model was developed to evaluate the elevation of the piezometric surface after the installation of a low hydraulic conductivity vertical barrier. A topographic survey, completed in spring 2001 using traditional survey techniques and an arbitrary coordinate system, was used to obtain ground surface elevation data. The irregularly spaced topographic data were interpolated to a regularly spaced grid by kriging using Surfer® 8.0. The location of an agricultural drainage tile network was based on a 1979 Soil Conservation Service map acquired from the Natural Resources Conservation Service in January 2001. Soil texture and profile data were collected by the West Virginia Division of Highways during borehole drilling in August 2002. Soil texture data were used to estimate specific yield, specific storage, and hydraulic conductivity from tabulated values. Soil profile data were combined with the topographic data to determine the top and bottom elevation of each of the three model layers. Meteorological data were acquired from the National Weather Service station located in Elkins, WV. These data were used in conjunction with the REF-ET computer program to determine the net surface infiltration of water into or out of the site for each day of the study. The MODFLOW-2000 simulation was run daily from 1 May 2001 through 10 May 2002 and was calibrated using monthly field-measured groundwater table elevation data collected at the research site from June 2001 through May 2002. The Horizontal Flow Barrier (HFB6) package was used to simulate the installation of a vertical barrier from the ground surface to the bedrock with a hydraulic conductivity of 1×10^{-13} m s^{-1}. Post-barrier installation simulation results predict approximately half of the research site would have been inundated as a result of the barrier on the data collection dates from June to August 2001 and March to May 2002.

GEOLOGY AND MINING

MELISSA L. FARMER, and **JOSEPH L. ALLEN,** Dept. of Physical Sciences, Concord College, Athens, WV 24712. **Subsurface imaging of Late Mississippian normal faults and associated paleoseismic soft-sediment deformation in Mercer County, WV, using ground-penetrating radar.**

Ground-penetrating radar (GPR) is a subsurface geophysical tool that uses electromagnetic waves to image changes in electrical conductivity, magnetic permeability, and other physical properties that can be used to interpret changes in bedrock lithology. Use of GPR on a heterogeneous outcrop of Late Mississippian strata (Hinton Formation) in Mercer County, WV aided in the interpretation of a broad zone of soft-sediment deformation that is partially exposed in a surface road cut. The study area is located on U.S. Route 460 between Princeton and Oakvale, WV, and synsedimentary deformation in these strata previously have been interpreted as a response to Late Mississippian paleoseismicity. The exposure includes penetrative structures such as normal faults, fractures, and clastic dikes as well as channel-form sandstones, and internal features such as nodular and convoluted bedding. GPR has been widely used to delineate deformed unconsolidated sediments associated with recent paleoseismicity; however, it has not been previously applied to sites associated with pre-Quaternary earthquake-induced deformation. Our goal is to test the applicability of GPR to lithified strata that may be of paleoseismic origin. Results delineate several radar facies within the soft-sediment deformation zone. Overlying all the radar facies in outcrop is a red shale unit of the upper Hinton Formation, which is overlain by the Princeton Formation. On the basis of radar and outcrop data we define two deformation zones. Both deformation zones are underlain by the strong undulose reflector facies, which we intepret to be a cross-bedded sandstone (~5 to 6.5 m thick). This sandstone pinches out at the eastern boundary of the eastern deformation zone and may have served as a rigid block that controlled the distribution and origin of overlying soft-sediment deformation. The results of this study thus indicate that GPR can be successfully used to image subsurface strata associated with ancient paleoseismicity.

SOCIAL SCIENCE

NICOLE M. SERENE and **JOHN H. HULL,** Dept. of Psychology, Bethany College, Bethany, WV 26032 nserene@bethanywv.edu. **U.S. women's magazines and the bodies they present.**

Thirty-nine female and 24 male research participants viewed 158 pictures of women taken from the February, 2004 issues of six U.S. women's magazines: fashion (*Glamour*, *Cosmopolitan*), fitness (*Fitness*, *Shape*), and body-building (*Muscle and Fitness* [women's version] *Oxygen*). Pictures were taken from all usable pages, and included pictures from articles and from advertisements. Participants rated each picture for body size by comparing it first to a set of nine line drawings of women's bodies ranging from 1 = very thin, to 9 = very obese, then comparing it to a set of nine line drawings of women's bodies ranging from 1 = very thin, to 9 = very muscular. Overall, pictures from the three types of magazine did not differ significantly from one another on the obesity scale. On the other hand, advertisement and article pictures of women from the three magazine types differed significantly from one another on the muscularity scale (fashion $\underline{M}$ = 3.12; fitness $\underline{M}$ = 3.48, body-building $\underline{M}$ = 4.67), indicating the obesity and muscularity scales actually measure different aspects of body size. Also, women pictured in body-building magazine articles were rated significantly more muscular than those in body-building magazine advertisements. Finally, female participants' ratings of their own bodies were significantly

larger than all three magazine types' obesity scale averages, perhaps helping to explain body dissatisfaction found in many women.

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Obesity and muscularity ratings of males pictured in U.S. men's fashion, fitness, and health magazines.

Thirty-five female and 21 male research participants looked at a total of 62 pictures of men taken from February, 2004 editions of men's fashion magazines (*Gentlemen's Quarterly*), a fitness magazine (*Muscle and Fitness*), and a health magazine (*Men's Health*). Pictures were rated separately for obesity and muscularity by participants comparing each picture to a set of line drawings of males ranging from 1 = very thin, to 9 = very obese, then to a set of line drawings of males ranging from 1 = very thin, to 9 = very muscular. Overall, magazine types differed significantly among themselves in both mean obesity (fashion $\underline{M} = 2.79$, fitness $\underline{M} = 4.13$, health $\underline{M} = 4.63$) and mean muscularity (fashion $\underline{M} = 3.94$, fitness $\underline{M} = 7.59$, health $\underline{M} = 5.97$) ratings. Although mean obesity and muscularity ratings for the fashion magazine correlated significantly ($\underline{r} = 0.636$), they did not correlate significantly either for fitness ($\underline{r} = -0.080$) or health ($\underline{r} = 0.091$) magazines, indicating that obesity and muscularity scales can indeed measure different aspects of body size, contrary to earlier research reports. Male participants' ratings of their own levels of obesity and muscularity were significantly larger and more muscular than picture means from the fashion magazine, but significantly less muscular than the picture means from the fitness and health magazines.

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Women's body sizes in fashion magazine articles and advertisements: a cross-cultural study.

Research participants looked at a series of 152 pictures of women selected from fashion magazine articles and advertisements published in January or February, 2003 and produced primarily for African American women (*Ebony*), European American women (*Elle*), Spanish-speaking women of the Americas (Spanish language version of *Vogue*), and Chinese women (*Ray*). Participants rated each picture for body size by comparing it to a set of nine line drawings of female figures ranging from 1 = very thin, to 9 = very obese. Overall, women pictured in the African American magazine were rated significantly larger ($\underline{M} = 3.47$) than women pictured in European American ($\underline{M} = 2.36$), Spanish language ($\underline{M} = 2.28$), or Chinese ($\underline{M} = 2.29$) magazines, which did not differ significantly from each other. Women pictured in articles in African American and European American magazines were significantly larger than women pictured in advertisements, while women pictured in articles in Spanish language and Chinese magazines were significantly smaller than women pictured in advertisements. Women's self-ratings of their own body sizes ($\underline{M} = 3.78$) did not differ significantly from the African American magazine mean, confirming earlier findings that African American fashion magazines more closely represent typical U.S. women's body sizes than do European American magazines. Furthermore they showed that fashion magazines for cultures other than European Americans feature unusually—even unhealthily—slender women.

POSTER SESSION

BIOLOGY

STEVEN L. STEPHENSON, Dept of Biological Sciences, University of Arkansas, Fayetteville, AR 72701, **JOHN C. LANDOLT,** Dept. of Biology, Shepherd College, Shepherdstown, WV 25443, **DONNA M. POWERS and LINDSAY A. DILLION,** Biology and Chemistry Division, Corning Community College, Corning, NY 14830, and **CERIDWEN A. PEARCE,** Australian Tropical Mycology Research Centre Ltd., Kuranda, QLD, Australia. **Eumycetozoans associated with tropical forests in northern Queensland, Australia.**

Biotic surveys for eumycetozoans were carried out in northern Queensland during the 2003 field season to document more completely the species associated with tropical forests in this region of the world. Primary emphasis was on myxomycetes (plasmodial slime molds); more limited data were obtained for dictyostelids (cellular slime molds) and protostelids (protostelid slime molds), two other groups of eumycetozoans that share some of the same microhabitats as myxomycetes. Microhabitats examined for myxomycetes included coarse woody debris, forest floor leaf litter, aerial litter (dead but still attached plant parts), dead lianas, and inflorescences of large tropical herbs. Dictyostelids were isolated from samples of the soil/humus layer on the forest floor and aerial soil (the mass of "soil-like" organic matter often found in association with bases of vascular epiphytes in the forest canopy), whereas samples of soil and aerial litter (both natural substrates and sterile straws, introduced into selected study field sites to assess colonization rates of these organisms) were examined for protostelids. Data obtained thus far suggest that all three groups of organisms exhibit levels of biodiversity and patterns of occurrence not unlike those already known from studies carried out in the Neotropics of Central America.

MELINDA E. VARNEY, Dept. of Natural Sciences and Mathematics, West Liberty State College, West Liberty, WV 26074 MEVarney@yahoo.com, **CURTIS J. PRITZL, SHIVAJI RIKKA** and **PATRICK K. LAI,** Dept. of Bioscience, Salem International University, Salem, WV 26426 Lai@salemiu.edu. **Sub-cloning, expression, and partial purification of Borna Disease Virus p40 as a recombinant fusion protein in prokaryotes.**

Borna Disease Virus (BDV) is a non-segmented, negative-stranded RNA virus that infects a broad spectrum of warm-blooded species, including humans. The nucleoprotein, N (p40), is the most prevalent BDV protein found in virus-infected cells. It is one of the major BDV immunogens. The purpose of this experiment was to obtain a substantial amount of purified p40 protein as antigen, to detect antibodies in immunoblotting experiments, and to stimulate T-cells from animals after DNA-immunization against BDV N. These experiments will allow for the assessment of DNA vaccines specific to the nucleoprotein. To obtain the nucleoprotein in abundance as a prokaryotic recombinant protein, the open reading frame encoding N was amplified from a recombinant eukaryotic expression plasmid by polymerase chain reaction (PCR). The amplified product was inserted into a prokaryotic expression plasmid. The protein was expressed in *E. coli*, and partially purified by use of a 6X His tag nickel-binding system. The partially purified protein was verified by electrophoresis in denaturing gel (SDS PAGE) and immunoblotting.

BIOTECHNOLOGY

LAURA DEBELLIS, ELIZABETH MORRIS, TONI RILEY, CRISTINA CLARK, MARK FLOOD, Dept. of Biology, Fairmont State, Fairmont, WV 26554, **SARAH HESSON, POORANI SEKAR, JEAN CHAPPELL, BOWIE KAHLE,** and **ELIZABETH MURRAY**, Integrated Science and Technology Dept., Marshall University, Huntington WV 25755. **Analysis of the Factor V Leiden (FVL) polymorphism in two West Virginia groups.**

Factor V is an important component in the clotting mechanism. A single nucleotide polymorphism (SNP) called the Factor V Leiden (FVL) mutation at residue 1691 causes a resistance to activated Protein C, which leads to an increased risk for venous thrombosis. The risks for venous thrombosis increase dramatically in patients with hyperhomocysteinemia. Since FVL plays such a significant role in blood clotting, it will be extremely beneficial to study the gene variations within populations that may lead to explanations in the susceptibility to cardiovascular disease. The objective of this study was to analyze the polymorphic FVL genotypes in an anonymous West Virginia sample and in a clinical population (patients were initially enrolled in a study conducted by Bowie Kahle). Genomic DNA was extracted using the QIAamp DNA Blood Mini Kit and quantified using the Turner TD-700 fluorometer and Pico-Green at Marshall University. Factor V gene regions were amplified by polymerase chain reaction (PCR) using specific oligonucleotide primers (synthesized at MU DNA Core Facility). PCR products were digested overnight at 37°C with 5 Units *MnlI* restriction enzyme. A normal genotype produced 3 restriction fragments at 37bp, 82bp and 104 bp while the mutant allele yields an additional 141 bp fragment due to loss of a *MnlI* cleavage site. Overall, the results suggest that we were able to develop RFLP techniques to analyze this FVL SNP and that the mutant allele frequencies fall within previously reported ranges. We also are currently analyzing this SNP on OCARD (Obesity-associated Cardiovascular Disease) study participants. In the future, we hope to assess whether these CRP and PON mutations are of importance to cardiovascular disease in West Virginians.

CHEMISTRY

TRAVIS LAWSON and **MATTHEW SCANLON**, Fairmont State College, Fairmont, WV 26554. **Preliminary work towards the determination of the binding constants of bithiophene and bithiophene derivatives via fluorescence spectroscopy.**

Our overall work focuses on preparing cyclodextrin encapsulated single strands of polythiophene via the Suzuki coupling in the presence of cylclodextrin. In order to accomplish this, we need to understand how the monomer units and the reactants bind with cyclodextrin. Thus our preliminary work is a study of how these reactants bind with cylodextrin. Our first attempt was to determine the binding constant of bithiophene with hydroxypropyl β-cyclodextrin in water since it has already published in the literature and will allow us to validate our method. The binding constant can be determined by measuring the fluorescence of a series of bithiophene solutions with varying concentrations of cyclodextrin. Data enables construction of Benesi-Hildebrand double reciprocal plots to determine the binding constants. The first part of this research focused on repairing the fluorescence instrumentation. We determined that the grating turret was out of alignment because in our first experiments an excitation wavelength of 385 nm produced fluorescence at 495 nm The concentration variation of the fluorescence intensity was also observed to be irregular. Bithiophene normally fluoresces at 356 nm with excitation at 318 nm. After realignment, our values for the fluorescence and excitation spectra matched the

literature. Unfortunately, our consequent measurements of binding constants resulted in an unexpected rise in the fluorescence intensity with concentration of cylcodextrin. It is known that the fluorescence of bithiophene decreases in the presence of cyclodextrin. This resulted in binding constants of -9.63×10^{14} at 25°C and 1.001×10^{16} at 40°C. The literature presents a binding constant of 3.67×10^{3}. When troubleshooting we discovered that the cyclodextrin was contaminated and the fluorescence signal from the cyclodextrin was in fact larger than that of the bithiophene and efforts are currently underway to purify the cyclodextrin.

MELINDA HUFF and **ANDREAS BAUR**, School of Science and Mathematics, Fairmont State College, Fairmont, WV 26554 mhuff@mail.fscwv.edu. **Synthesis and characterization of alkylisatins as precursors to novel tetrathiafulvalenes.**

Our research area is in the synthesis of tetrathiafulvalene derivatives, which are used in the preparation of electroactive and conductive materials. Our approach focuses on 2-alkoxy-4,5-benzo-1,3-dithiols (4) as key intermediates. We are currently investigating the preparation of (4) from commercially available alkyl substituted anilines (1). The anilines are converted to isatins (2), which function as precursors to anthranilic acid derivatives (3). Anthranilic acids (3) can be converted to 2-alkoxy-4,5-benzo-1,3-dithiols (4) using procedures obtained from the literature. We report on the synthesis, purification, and characterization of three isatins, 5-octylisatin (2a), 5,6-dimethylisatin (2b), and 5-butylisatin (2c). The substituted anilines, 4-octylaniline (1a), 3,4-dimethylaniline (1b), and 4-butylaniline (1c), were reacted with chloral hydrate and hydroxylamine hydrochloride in the presence of hydrochloric acid. Subsequent treatment with concentrated sulfuric acid yielded the substituted isatins (2). Melting point, IR, ^{1}H NMR, ^{13}C NMR spectroscopy and gas chromatography mass spectrometry (GCMS) were used to identify the alkylsubstituted isatins (2).

ECOLOGY

JOHN C. LANDOLT, Dept. of Biology, Shepherd College, Shepherdstown, WV 25443, **JAMES C. CAVENDER**, Dept. of Environmental and Plant Biology, Ohio University, Athens, OH 45701 and **STEVEN L. STEPHENSON**, Dept. of Biological Sciences, University of Arkansas, Fayetteville, AR 72701. **Dictyostelid cellular slime molds of Australia.**

The continent of Australia, with a total extent of approximately 7,682,300 km^2, covers about 5% of the earth's land area. Most of the continent is low, flat and dry; deserts and dry grasslands are the predominant vegetation types. During the past three field seasons, samples for isolation of dictyostelid cellular slime molds have been collected from a number of localities in Queensland, the Northern Territory, Western Australia, New South Wales, and Victoria. The majority of these samples were collected from the soil/litter layer on the ground, but some additional samples were obtained from the layer of organic matter ("canopy soil") associated with the bases of vascular epiphytes on the trunks and branches of trees in the tropical forests of northern Queensland. Some of these samples were collected at heights of more than 20 meters above the forest floor. Many of the forms that have been recovered from these samples could be assigned to described taxa, including such cosmopolitan species as *Dictyostelium mucoroides, Polysphondylium pallidum, P. violaceum,* and *D. giganteum* along with a few widespread tropical forms. However, a significant number of others (possibly as many as a dozen different examples) appear to represent species new to science. The number of apparently undescribed forms suggests that the dictyostelid biota of Australia is relatively distinct when compared to that of any other continent.

WILDLIFE

H. WAYNE WEAVER,[Evolven@aol.com], **JAMES T. ANDERSON**, [jander25@wvu.edu], **JOHN W. EDWARDS**, Division of Forestry ,West Virginia University, Division of Forestry, Morgantown, WV 26506 [jedwards@wvu.edu], and **THOMAS DOTSON**, West Virginia Division of Natural Resources, Point Pleasant, WV 25550. **Biological and behavioral analysis of nuisance and non-nuisance black bears in southern West Virginia.**

As interactions between black bears (*Ursus americanus*) and humans become more commonplace through habitat loss and forest fragmentation, reports of nuisance activity increase. Reports of nuisance bear activity generally involve scattering and consuming garbage, killing pets, and destroying agricultural crops. By understanding the ecological and behavioral characteristics of nuisance bears, we may better manage against this behavior in the future. We captured and analyzed data from 153 nuisance and 118 non-nuisance bears from 1996 to 2002. Age was greater for nuisance (N = 104, Mean = 4.04, SD = 2.64) than non-nuisance (N = 52, Mean = 3.29, SD = 2.75) bears ($p = 0.003$). Nuisance males translocated > 8 km (8-64 km) from point of capture were less likely to repeat nuisance behavior (N = 58, 27.6%) than bears moved < 5 km from their capture site (N = 11, 72.7%; $p = 0.005$). Nuisance males were 19% more likely to survive fall archery and rifle season (N = 106, 86.2%) compared to non-nuisance (N = 40, 67.0%, $p = 0.014$) males. Translocating bears from their capture site appears to be an effective tool to suppress repeat nuisance activity. Management goals aimed at increasing nuisance male harvest should be addressed in future studies.