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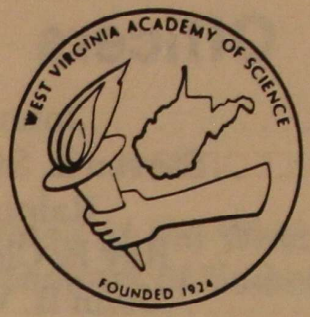

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Abstracts of Papers

for the 1988 Meeting

Biochemistry/Chemistry

JOHN M. CARL III and JOHN L. HUBBARD, Dept. of Chemistry, Marshall University, Huntington, WV 25701 and VONDA J. TEETS, DEREK W. NICOLL, PATRICK I. BROWN and GARY O. RANKIN, Dept. of Pharmacology, Marshall University School of Medicine, Huntington, WV 25704. Aromatic ring size in *N*-arylsuccinimide-induced nephrotoxicity.

Previous studies from our laboratory have demonstrated that *N*-(halophenyl)succinimides produce nephrotoxicity in rats. The parent compound *N*-phenylsuccinimide (NPS) has been shown to be non-nephrotoxic. The purpose of this study was to determine if increasing the size of the aromatic substituent relative to NPS would enhance nephrotoxic potential. Three compounds were synthesized: *N*-(1-naphthyl)succinimide (NNS), *N*-(1-anthracenyl)succinimide (1-NAS) and *N*-(9-anthracenyl)succinmide (9-NAS). Male Fischer 344 rats (200-275 gm) were administered a single intraperitoneal injection of an *N*-arylsuccinimide (0.4 or 1.0 mmol/kg) or vehicle (sesame oil, 2.5 ml/kg) and renal function monitored at 24 and 48 hr. All compounds decreased urine volume in the 1.0 mmol/kg groups, but this decrease was correlated with decreased food and water intake. The blood urea nitrogen (BUN) concentration was slightly elevated and organic ion uptake by renal cortical slices slightly decreased at 48 hr post 1-NAS (1.0 mmol/kg). Proteinuria (+2-+3) was observed following NNS or 9-NAS (1.0 mmol/kg) at 24 and 48 hr. Fatty livers were observed in the NNS (1.0 mmol/kg)-treatment group, while both liver and spleen exhibited cytotoxicity at 48 hr following 9-NAS (1.0 mmol./kg) administration. These results do not suggest that increasing the size of the aromatic substituent will enhance the nephrotoxic potential of *N*-arylsuccinimides. However, addition of naphthyl or anthracenyl groups to the nitrogen atom of the succinimide ring appears to alter the site of toxicity. (Supported by NIH grant DK 31210).

B. DASSARMA, Department of Chemistry, West Virginia State College, Institute, West Virginia 25112. Environmental Chemistry of Ambient Air.

An ambitious project on environmental chemistry of ambient air has been initiated with cooperative support of Environmental Protection Agency, National Institute for Chemical Studies and West Virginia State College.

The project is designed to address potential risk from low level routine volatile organic compounds (voc's) in outdoor ambient air in Kanawha Valley as a model for areas where chemical industry and urban population are in close proximity.

Three aspects of the project involve (a) selection of priority pollutants, development of (b) inexpensive, but reliable methods for collection, storage and analysis of priority voc's, and (c) course materials for basics of chemical toxicoloy and principles of risk assessment.

An outline of the progress made during 1986-1987 will be presented.

SAMPLES, BARBARA, SANJEEV SHARMA, H. WAYNE ELMORE and MARCIA HARRISON. Dept. of Biology, Marshall University, Huntington, West Virginia 25701.
Kinetics of ascorbic acid oxidation in plant tissue culture medium.

L-ascorbic acid is frequently included in medium to prevent browning of cultured plant cells, callus or organs even though evidence exists suggesting that it is degraded in aqueous environments. This investigation studied the stability of ascorbate within the milieu of plant tissue culture medium and the rate of destruction as affected by cultural and environmental parameters. Ascorbate was rapidly oxidzied in Knudson's, Brown's , and Murashige and Skoog's medium. Within 1-2 hrs after preparation of 100 nM/ml solutions ascorbate was destroyed. Autoclaving medium and shaking flasks accelerated decay. A pH range from 4.5 to 7.0 was tested with greater rates of destruction occuring at higher pH's. Sucrose, fructose and glucose known to slow oxidation at high concentrations had no significant affect when supplied at concentrations up to 6.0% often used in culture medium. Light intensity ranging from 0 to 1000 ft. c. did not accelerate destruction. Ascorbate was oxidized to dehydro-ascorbate which also underwent oxidation over 10-12 hrs. The rapid oxidation of ascorbate suggests that it may not exert it's effect directly as an intact molecule nor is it likely that dehydroascorbate remains in medium sufficiently long to allow its uptake by tissue and reduction to ascorbate. Alternatively the affects may be mediated by some product of further oxidation. These possibilities are being examined.

KATHRYN TAYLOR and VERNON REICHENBECHER, Department of Biochemistry. Marshall University School of Medicine. Huntington, WV. 25704
Lectin-resistant mutants of Chinese hamster cells.

The toxic lectins abrin and modeccin are each composed of two different polypeptide subunits. The B subunit binds to galactose residues on the cell surface. Following internalization, the A subunit enzymatically inactivates the 60S ribosomal subunits. In order to

study the mechanism of action of the toxins, lectin toxicity toward Chinese hamster lung (CHL) and Chinese hamster ovary (CHO) cells was examined and lectin-resistant mutants of the two cell lines were selected. Abrin reduced colony formation by CHL cells to 10% of the control at a concentration (D_{10}) of 2 ng/ml while the effective concentration for CHO cells was 20 ng/ml. The modeccin D_{10} value was 0.08 ng/ml for CHL cells and 0.8 ng/ml for CHO cells. Both cell lines were used for selection of lectin-resistant mutants following ethyl methanesulfonate mutagenesis. When abrin alone was used as the selective agent, abrin-resistant mutants were obtained in both cell lines. These mutants remained sensitive to modeccin. Similarly, modeccin resistant mutants selected using modeccin alone remained sensitive to abrin. However, when both abrin and modeccin were added concurrently to the selective medium, the resulting mutants were cross-resistant to both abrin and modeccin. The three classes of mutants obtained in this study suggest that abrin and modeccin share some, but not all steps in their mechanisms of action.

Biology/Microbiology

JAMEEL AL-DUJAILI and ROBERT ANDERSON. Division of Plant and Soil Sciences, Dept. of Agricultural Microbiology, West Virginia University, Morgantown, WV 26506-6057.
Coagulans Tomato Juice Agar as a Selective Medium for Bacillus coagulans.

Of four selective media, coagulans tomato juice agar was the best medium to detect and enumerate Bacillus coagulans strains that elevate the pH of acid food products. Thirty-three samples were collected randomly from natural sources. Samples were swabbed with sterilized cotton or mixed with peptone water and then inoculated into selective media. Coagulans tomato juice agar contains phyton, tomato juice, sodium chloride, and brom cresol purple. The medium was adjusted to pH 4.3 then sterilized at 240°F for ten minutes. Potassium sorbate 0.015% was used to inhibit growth of fungi. Comparative growth of B. coagulans studied in different selective media (CTJA, PBBA, PBBT) indicates that the most effective was CTJA. Therefore, CTJA was used to isolate, identify frequency in nature, and compare the strains of B. coagulans that elevate the pH of acid food products.

Another application of CTJA may be as a selective medium for isolation of other acid tolerant-acid duric microorganisms associated with foods.

JOSEPH P. CALABRESE and GARY K. BISSONNETTE, Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26505-6057.
Catalase as an amendment to recovery media for detection of chlorine-stressed coliforms.

Laboratory studies were performed to determine the effect of chlorination on cellular catalase activity. An environmental isolate of Escherichia coli was exposed to 0.84, 1.05, 1.58, and 1.89 mg/l Cl_2 as sodium hypochlorite for time periods of 7.5 or 8.0 minutes. A significant reduction ($P<0.05$) in activity was observed in chlorine-stressed cells ($\bar{x}$ = 17.21 Units/mg protein) as compared to the buffer-exposed controls ($\bar{x}$ = 31.66 Units/mg protein). Following these initial in vitro pure culture studies, resuscitation experiments were conducted on chlorinated sewage effluent utilizing the membrane filtration technique. Catalase concentrations of 1000-4000 Units/plate were added to Standard Methods agar (TGE) for total heterotrophic count, M-FC medium for fecal coliform detection, and M-Endo and mT7 media for total coliform and chlorine-injured coliform detection, respectively. In each case, media containing catalase provided better recovery of chlorine-stressed cells as compared to non-amended media (1.5- to 6.4-fold increase). These data suggest

that catalase addition to standard recovery media may improve detection of heterotrophic and coliform bacterial populations in chlorinated sewage effluent and provide a more accurate assessment of the sanitary quality of these waters.

CHRISTOPHER W. GREGORY, Dept. of Biology,
Concord College, Athens, West Virginia 24712.
Anatomy of a dicephalic calf.

A still-born, dicephalic calf was delivered on a farm near Athens, West Virginia. The specimen had two heads and two separate necks. In the posterior region of each skull was an anomalous foramen, exposing the brains. A severe case of spina bifida was present in the lumbar region. The tracheae from the two necks converged to form a single trachea. The circulatory system was very abnormal. The heart was much broader in the ventral to dorsal dimension than side to side. Both atria were small, with the right atrium on the right anterior portion of the heart and the left atrium on the left posterior portion. The vena cavae were attached to the right atrium. The aortic arch branched from the right ventricle and continued caudally on the right side of the body. The pulmonary trunk also branched from the right ventricle. Several vessels of intermediate size branched from the left ventricle, and were directed toward the left anterior region of the body. No vessels brought blood to the left atrium.

Association Among Coal Characteristics and Human Mortality in the Coal Producing Counties of West Virginia. ALLEN D. NICHOLSON and E.C. KELLER, JR., Department of Biology, West Virginia University.

Data obtained by the WV Geologic Survey on commercially important characteristics of the bituminous coals of West Virginia were examined for associations with human mortality. The average values of the coal seam variables were correlated to some 42 mortality parameters. Coal seam data were available from 34 of the 55 counties. The mortality data were obtained from the WV Department of Health for the years 1959 to 1982. Four variables were used that characterize the chemical nature of the coal ash (RIT, RST, RHT, and RFT). Eight other variables were used to characterize the coal: the % ash, BTU value, % sulfur, % moisture, % volatiles, % fixed carbon, grindability, and a coking index.
The grindability variable has a strong negative correlation with early death (under one month), infant mortality, premature birth,

avitaminosis, nephritis and nephrosis, intestinal obstruction and/or hernia. Grindability and Reducing Fluid Temperature (RFT) were strongly negatively correlated with (generalized) malignant neoplasms, neoplasms of the respiratory system, neoplasms of the urogenital system and diseases of the heart. Grindability, RFT, and Reducing Initial Temperature (RIT) all were negatively associated with neoplasms of the digestive organs and peritoneum. RFT and Reducing Hemosphirical Temperature (RHT) had a strong negative correlation with diabetes mellitus mortality. The Grindabilitiy Index was strongly negatively correlated with congenital abnormalities while FSI had a strong positive correlation with this variable. FSI also had a strong positive correlation with suicide mortality. Grindability is also negatively associated and volatility positively associated, with peptic ulcer mortality. Volatility is positively associated with mortality due to anemias. HGI and RFT were the most highly associated coal variables since several mortality variables were associated with each. Further, the mortality variables digestive/peritoneum cancer, respiratory neoplasm, general malignant neoplasms, heart disease, and urogenital cancer mortalities were strongly associated with both HGI and RFT.

WILLIAM ROBERT NYE, JR. and ROBERT E. ANDERSON, Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6057.
Extent, variation and effects of high temperature on refrigerated retail dairy products.

Bacteriological studies were conducted to determine differences attributable to code date and storage display case temperature on shelf life potential of fermented dairy products. A total of 48 samples of buttermilk, cottage cheese, sour cream and yogurt were purchased from six different retail markets in the Morgantown area. Microbial populations were enumerated from the fermented milk samples to detect total, psychrotrophic, coliform bacteria, and yeasts and molds.

Total, psychrotrophic, and yeast and molds were spread-plated onto Standard methods agar and Sabouraud dextrose agar, respectively. Assays for coliforms were pour-plated using Violet red bile agar. All samples were tested on the date of purchase, and on the respective pull date. Storage display case temperatures were recorded to determine the range from store to store within each case. There is evidence of high microbial counts corresponding to high storage temperatures. These high counts can be attributed to the length of code date, as well as abnormal storage display case temperatures. These data show that wide variation exist in cold storage temperatures and there is a need for supervision and training in retail food store workers with regard to safe handling and storage of dairy products.

CAROLINE E. O'NEILL and GARY K. BISSONNETTE, Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6057.
Effect of antecedent oxygen growth conditions on recovery of sublethally-injured Escherichia coli.

Bacteriological studies were conducted to determine the differences attributable to antecedent oxygen growth conditions on recovery of a 6-hr culture of Escherichia coli following thermal injury. After a 1 or 5 min exposure period (60°C), test strains (ATCC 25922, EPA 00244, and environmental isolates) were spread-plated onto Trypticase soy agar supplemented with glucose and yeast extract (TGY) and M-fecal coliform (M-FC) agar. Cells grown anaerobically prior to exposure to stress were more susceptible to heat, as evidenced by greater log reductions on both TGY and M-FC, than cells grown aerobically prior to exposure. There was a statistically significant ($P<.05$) difference in recovery on TGY which may be attributable to antecedent oxygen growth conditions. These data suggest that adequate consideration be given to culturing conditions when assessing bacterial susceptibility to heat stress.

JAMES J. SHIREY and GARY K. BISSONNETTE, Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6057.
Recovery of coliform bacteria incubated under reduced oxygen concentrations.

In vitro pure culture studies were conducted to assess recovery and colony diameter of coliform bacteria on M-Endo medium incubated under reduced oxygen concentrations. Bacteria were isolated from untreated, rural groundwater supplies on M-Endo medium and verified as coliforms or non-coliforms. Initial studies using two isolates of Escherichia coli which exhibited typical metallic sheen on M-Endo medium indicated no significant difference ($p<0.05$) in recovery when incubated at oxygen concentrations of 0%, 4%, 9%, 13%, 15%, and 21%. No significant difference ($p<0.05$) in recovery was observed between plates with colony densities ranging from 6 to 185 colonies per plate. Significant reduction ($p<0.05$) in colony diameter was observed at reduced oxygen concentrations (<4%) for both E. coli isolates, possibly permitting an increased counting range at lower oxygen concentrations. An unidentified coliform isolate which exhibits characteristic growth and metallic sheen under aerobic incubation was unable to grow and produce a metallic sheen when incubated under reduced oxygen concentrations (<13%). Cells originally incubated at oxygen concentrations less than 5% were unrecoverable after an additional 48 h incubation at 21% oxygen. This isolate would escape detection at reduced oxygen concentrations and lead to an underestimation of water quality. A nonsheen producing isolate was unable to grow at oxygen concentrations less than 5%, but all cells were recoverable when incubated an additional 48 h at 21% oxygen.

VALENTIN ULRICH, Div. Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6108 and SUSAN E. PALMER, Dept. of Pediatrics, School of Medicine, Iowa State University, Iowa City, Iowa 52240. A new preparation of maize seedling nuclei from small quantities of seedling tissue.

A new method for isolation of nuclei from small quantities of etiolated maize seedlings has been developed. A brief ether rinse weakens cell walls and removes cuticles. Vacuum infiltration of gum arabic-octanol solution preceding a shortened incubation period (from 14 to 3.0 h) facilitates turgor pressur equilibration, reduces nuclear fragmentation by homogenization, and prevents cellular autolysis and turnover of chromatin proteins. Smaller volumes of homogenate can be used, and centrifugation through reduced-volume gradients of gum arabic solutions provides a suitable fractionation procedure. Use of dark-grown tissue eliminates chloroplast contamination, prevents thickening of primary cell walls and reduces most starch deposition. Light and electron microscopy reveal that the nuclear fraction is relatively free of cytoplasmic contamination. Starch granules are removed during subsequent chromatic isolation. All steps are performed under conditions inhibiting nuclease and protease activity. The nuclei produced are suitable for chromatin isolation and analysis of nucleic acid and protein components. Removal of nuclear membranes is aided by use of Triton X-100, followed by ultracentrifugation of chromatin through sucrose gradients. The resulting chromatin is suitable for DNA, RNA and protein investigations. Furthermore, the chromatin was also fractionated by DNase II and the proteins of each fraction separated by electrophoresis. This method provides an improved nuclear fraction for the study of maize seedling chromatin.

Botany

William Homer Duppstadt, Department of Biology, West Virginia University, P.O. Box 6057, Morgantown, West Virginia 26506. Updates on the Vascular Flora of West Virginia. IV.

During the past year, eighteen species of vascular plants have been recorded at the West Virginia University Herbarium (WVA) as additions to the flora of West Virginia. The new species reported are: Juniperus communis L., Poa autumnalis Muhl. ex Ell., Leptochloa fascicularis (Lam.) Gray, Scirpus torreyi Olney, Carex woodii Dewey [C. tetanica Schkuhr var. woodii (Dewey) Wood], Carex oligosperma Michx., Juncus trifidus L. subsp. carolinianus Hamet-Ahti, Spiranthes ochroleuca (Rydb.) Rydb., Erysimum asperum (Nutt.) DC., Spiraea X vanhouttei (Broit) Zabel, Prunus pumila L., Lespedeza stuevei Nutt., Koelreuteria paniculata Laxm., Ammannia coccinea Rottb., Asclepias longifolia Michx., Borago officinalis L., Lycopus rubellus Moench, and Petasites japonicus (Sieb. & Zucc.) Maxim.

DALE F. HINDAL, JAMES W. AMRINE and TERRI A. STASNY, Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6057. Investigations on rose rosette on multiflora rose and its vector in southern Indiana.

Multiflora rose is a serious weed pest in West Virginia. Current cultural and chemical practices used to manage this plant often are costly and/or have serious environmental consequences. A disease of unknown etiology, rose rosette, that is vectored by an eriophyid mite (Phyllocoptes fructiphilus), is killing this plant in the midwestern U.S. and is spreading eastward. The disease is not yet present in West Virginia, but the mite is widespread. Because interest is developing in this disease for biocontrol of multiflora rose, studies on disease and mite development were initiated in May, 1987 in Clifty Falls State Park, near Madison, Indiana where large populations of multiflora rose (4075 plants/ha), the disease, and the mite are present. Disease development was recorded monthly in six transects (30 plants/transect) from May - October, 1987. The number of mites on 3 to 5 cm long stem tips collected from five symptomatic and five asynptomatic plants in each transect each month also was determined. The percentage of symptomatic plants in the transect increased from 30.9% to 52.8% and the total number of dead plants from 2 to 10 during this period. Mites were present on both symptomatic and asymptomatic plants, but symptomatic plants consistently had greater populations than asymptomatic ones. The increase in the number of symptomatic and dead plants suggest this

disease might function for biocontrol of multiflora rose in West Virginia. Before natural or artificial introduction, however, more information is needed on the nature of the causal agent, its vector(s), and their host ranges. The agent already is known to affect ornamental roses, so control measures must be developed to protect these plants before introduction.

JOHN C. LANDOLT, Div. of Science and Mathematics, Shepherd College, Shepherdstown, West Virginia 25443 and STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554. Cellular slime molds from West Virginia caves II. Comparison of the CSM microflora of cave soils with that of forest soils.

Previous studies of the occurrence and distribution of dictyostelid cellular slime molds (CSM) in two West Virginia caves (Whitings Neck Cave in Berkeley County and Bowden Cave in Randolph County) have indicated that these organisms exhibit surprisingly high levels of abundance and diversity in the cave microhabitat. The purpose of the present study was to compare the CSM microflora of cave soils with that of forest soils. At least five different species (Dictyostelium aureo-stipes, D. minutum, D. mucoroides, D. sphaerocephalum, and Polysphondylium violaceum) were isolated from cave soils. All of these were also recovered from samples of forest soil. Five other species (Dictyostelium discoideum, D. lacteum, D. giganteum, D. purpureum, and Polysphondylium pallidum) were isolated only from forest soils. In general, species richness, frequency of occurrence, and overall density of CSM were greater in forest soils than in cave soils. This might have been expected, since cellular slime molds depend upon a variety of aerobic bacteria for food. Organic material subject to bacterial decomposition is relatively sparse in the cave microhabitat but abundant in forest soils. Only a single species common to both cave soil and forest soil (Dictyostelium sphaerocephalum) was relatively more abundant in the cave microhabitat.

ADAM MICHNA and DALE HINDAL, Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6057. Comparison of vegetative compatibility of Endothia parasitica from selected sites in Michigan and West Virginia.

Hypovirulent isolates of Endothia parasitica, the chestnut blight fungus, containing dsRNA have been associated with the recovery of chestnut trees from the blight in Europe and Michigan. Recovery has not been observed in West Virginia. If dsRNA is responsible for hypovirulence, then its transfer between strains by hyphal anastomosis is critical to its establishment in a population.

If strains are vegetatively incompatible, anastomosis fails and the transfer of dsRNA may be restricted between isolates. This study was undertaken to determine the diversity of vegetative compatibility (v-c) group among isolates of E. parasitica collected from naturally occurring cankers in Michigan and West Virginia. Cankers were collected from three sites in both states. The Michigan sites included County Line and Frankfort, both recovering sites; and Kellogg, a nonrecovering site. The West Virginia sites, Boy Scout Camp, Brushy Mountain, and Judy Gap, were nonrecovering clear-cut areas. Single conidial isolates from 123 cankers were paired with 36 West Virginia test isolates of known compatibility. Three v-c groups were found in each of the County Line and Frankfort, Michigan sites. One v-c group from County Line was incompatible with the known West Virginia test isolates. Fourteen v-c groups were found at Kellogg, 10 of which were incompatible with the West Virginia isolates. Fifteen, 16, and 17 v-c groups were found at the Boy Scout Camp, Brushy Mountain, and Judy Gap, respectively. Judy Gap had 6 v-c groups which were incompatible with the West Virginia isolates whereas the Boy Scout Camp and Brushy Mountain had 8 and 12, respectively. The lower number of v-c groups in the two recovering Michigan sites may allow for more rapid transmission of dsRNA and could account for recovery of American chestnut from blight at those locations.

SUMAN SINGHA, BARTON S. BAKER and SATISH K. BHATIA. Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506-6108. In vitro Propagation of Running Buffalo Clover.

Trifolium stoloniferum Muhl. ex. A. Eaton (running buffalo clover) a species native to North America once ranged from West Virginia to Kansas. Only a few natural populations of this plant are now in existence and it is protected under the Endangered Species Act. The objective of this study was to employ tissue culture techniques for rapid propagation of running buffalo clover. Shoot tips cultured on Murashige and Skoog (MS) medium supplemented with 0.5 or 1 mg/l benzylamino purine (BA) showed excellent proliferation of new shoots. Medium containing 2 or 4 mg/l BA showed a reduction in shoot proliferation and culture growth. In vitro produced shoots were rooted on MS and half-strength MS medium containing 0 to 0.4 mg/l indoleacetic acid. Root growth was significantly higher on MS as compared to half-strength MS medium. Root plantlets were potted in a sand:peat:vermiculite mixture and acclimated to ambient conditions in containers covered with polyvinyl chloride film. No phenotypic variations have been observed in tissue culture regenerated plants being maintained in the greenhouse. The results show that micropropagation can be successfully employed to produce large numbers of plants and aid in the preservation of this endangered species.

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554 and HAROLD S. ADAMS, Dabney S. Lancaster Community College, Clifton Forge, Virginia 24422. An ecological study of the high-elevation red oak dominated communities of the mid-Appalachians.

Forest communities dominated by red oak (Quercus rubra L.) characteristically occur at higher elevations throughout the Appalachian oak forest region of eastern North America. In the present study, quantitative data on the structure and composition of the vegetation were obtained for red oak dominated stands at 14 different sites in the Ridge and Valley and Blue Ridge physiographic provinces of western Virginia. In the overstory (stems greater than 10 cm DBH) of these stands, red oak had an average importance value of 70.2. Despite the overwhelming dominance of red oak, the average number of other species present in the overstory was 4.9. The most important associates of red oak were red maple (average IV = 10.5), black birch (4.2), and white oak (3.8). The mean values recorded for basal area and density of the overstory were 26.1 m^2/ha and 589 stems/ha, respectively. Red oak was much less dominant (IV = 9.8) in the understory (stems greater than 2.5 cm DBH but less than 10 cm DBH), where witch hazel (19.6), red maple (16.2), mountain holly (9.9), and chestnut (8.3) were the other more important species present. Average species diversity (Shannon's formula) of the overstory was 1.36, whereas that of the understory was 2.00. All of the stands we sampled occurred at elevations greater than 1100 m (mean elevation = 1229 m) and the majority were situated on slopes with a northern exposure.

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554 and LAL SINGH CHAUHAN, Dept. of Biosciences, Himachal Pradesh University, Shimla (H.P.), India. Forest vegetation of the northwestern Himalayas.

The vegetation of the northwestern Himalayas ranges from subtropical forests in the foothills to alpine meadows above treeline. The climate of the region is montane temperate and is strongly influenced by the summer monsoon. The flora shows pronounced Euro-Mediterranean affinities, and many of the ecologically important genera (e.g., Pinus, Quercus, Rhododendron) are also important elements in the forests of eastern North America. In general, subtropical dry coniferous forests strongly dominated by Pinus roxburghii occur at lower elevations (1000 to 2000 m), whereas temperate moist forests consisting of various combinations of both coniferous and broadleaf trees are found at higher elevations (2000 to more than 3000 m). Among the more important subtypes of the latter are forests in which such species as Quercus incana, Cedrus deodara, Pinus wallichiana, Quercus semicarpifolia, Rhododendron arboreum, Picea smithiana, and Abies pindrow are dominants or codominants. (Supported by a grant from the National Geographic Society.)

STEVEN L. STEPHENSON and TAMMY K. KELLEY, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554. Notes on the distribution and ecology of Myxomycetes in the forests of West Virginia.

During the period of 1977-87, field collections of Myxomycetes (plasmodial slime molds) were made from a permanent study area (Mill Fall Run) in Marion County, West Virginia. In two of these years (1985 and 1987), collections were made at regular intervals during the entire field season (which extends from approximately mid-June until late October for Myxomycetes). Forty-nine species representing 18 different genera were identified from the 588 collections made during the entire study. Seven different genera (Arcyria, Comatricha, Cribraria, Hemitrichia, Physarum, Stemonitis, and Trichia) were represented by three or more species. Members of the Trichiales (41.8% of all collections) were the most commonly encountered Myxomycetes, with the Stemonitales (22.8%) and Liceales (21.1%) next in abundance. Based on the collections made during this study, the seasonal pattern for myxomycete community structure is for both species richness and species diversity to be relatively low in June, to increase to their highest levels in August and September and then to decline throughout the remainder of the season.

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554, T. N. LAKHANPAL, Dept. of Biosciences, Himachal Pradesh University, Shimla (H.P.), India, and P. K. MONGA, Deputy Commissioner, Kullu District, Kullu (H.P.), India. The forest crisis in northwestern India.

Like many developing countries, India faces a serious problem of diminishing forest resources. Most of the original forests in accessible areas have been exploited, both by destroying the trees to clear land for agriculture and by harvesting the trees for fuelwood, fodder, and building materials on a sustained and largely uncontrolled basis. For example, in Himachal Pradesh in northwestern India, forests cover 21,324 km^2, which represents about 38% of the geographical area of the state. However, over the past 20 years, the total forest cover has decreased about 11% and with increasing population, this trend is not likely to change. In rural areas, which is where 70% of the people in India reside, wood is the major source of cooking fuel. The majority of the fuelwood used in a given village is collected locally. This is usually done by women and children, who often carry it over long distances. A major consequence of an inadequate supply of fuelwood is the burning of agricultural residue and animal dung, which otherwise would be used for the restoration of soil fertility and increasing food production. Utilization of tree fodder for the feeding of livestock, a common practice throughout India, places additional stress on forests. (Supported by a grant from the National Geographic Society.)

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554 and CLARK T. ROGERSON, The New York Botanical Garden, Bronx, New York 10458. Notes on myxomyceticolous fungi.

The fruiting bodies of Myxomycetes (plasmodial slime molds) provide a substrate open to colonization by various species of fungi. The majority of these fungi also occur on other types of substrates, but a few species appear to be restricted to Myxomycetes and thus are obligately myxomyceticolous. Although commonly encountered in nature, the myxomyceticolous fungi have received relatively little attention. In the present study, 249 collections of myxomycete fruiting bodies colonized by fungi were examined and a total of 17 different taxa identified. The most commonly encountered taxa were Aphanocladium album, Blistum tomentosum, Gliocladium album, Nectria candicans, Tolypocladium microsporum, and Verticillium rexianum. As a general observation, myxomyceticolous fungi fall into two different ecological groups--those that seemingly cannot tolerate the calcium-rich chemical environment provided by members of the Physarales and those that are largely restricted to the fruiting bodies of this group of Myxomycetes.

Ecology

JO DAVISON, Lambda Group, Inc., 1445 Summit Street, Columbus, Ohio 43201 and STEVE MEADOR, Lambda Environmental Technologies, 119 Wright Street, Pt. Marion, Pennsylvania. Microbial Amelioration of Acid Mine Drainage.

Conventional acid mine drainage treatment systems are expensive and troublesome to operate and maintain. Artificially constructed wetlands are becoming a popular alternative to conventional treatment, but not all wetlands constructed work. Water and soil samples were taken from 560 wetland environments throughout the eastern United States and Canada and analyzed to characterize the wetlands' water quality and microbial populations. Examinations of the analyses coupled with field observations revealed that wetland ecosystems which contain certain combinations of microorganisms, in balance, were able to assimilate acid mine drainage without damage to macroflora and fauna. Technology was developed to use a manufactured matrix of sulfur and metal specific aerobic bacteria, Chlorophyta, Chrysophyta, Mastigophora, Ciliata, and bacterial-symbiotic fungal groups to establish self-supporting microecosystems which can be placed into constructed AMD treatment systems. Two field applications of the technology confirmed that AMD can be ameliorated by the microbial ecosystems, and that the matrix can be mass produced and placed over wide areas and varying terrain. Steps necessary to implement the technology are outlined.

DAGOBERTO IRIAS, BEN C. MOYER, BRIAN T. SIMPSON, ERIC S. SMITH and RAY R. HICKS, JR. Div. of Forestry, West Virginia University, Morgantown, West Virginia 26506. An ecological survey of emergent boulders in north-central West Virginia.

Vegetation and small mammals were surveyed on the surface of three large emergent boulders at the West Virginia University Forest. Compared to adjacent control sites, the vegetation on boulders was less diverse. Several species occurred on both sites but Rhododendron maximum, the predominant understory species of boulders, was absent from control sites. Three species of small mammals were trapped on control sites whereas only Peromiscus leucopus a species known for its climbing ability, was captured on boulders. Soils on boulders were shallow, highly acidic and high in organic matter, which probably limits the species that can cope with these sites. However, radial and height growth of the species that could tolerate the boulder environment compared favorably with those of similar species growing on control sites.

It was postulated that such emergent boulders may serve as refugia for certain species and provide protection from fire and deer browsing.

ALAN J. ISKRA and DONALD G. SOCTOMAH, USDA Forest Service, 180 Canfield Street, Morgantown, West Virginia 26505 and STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554. Red spruce forests and "spruce decline" in West Virginia.

Forest communities in which red spruce (Picea rubens Sarg.) is present as a canopy species cover an area of approximately 45,000 ha in the mountains of West Virginia. The red spruce community type is best developed at elevations above 1100 m, and nearly pure stands occur in some places. Quantitative data from a number of studies recently conducted in high-elevation spruce and spruce-fir forests at various localities throughout the eastern United States indicate that red spruce has shown a pattern of reduced growth and increased mortality since the 1960s. For example, in a survey of the red spruce forests of the Monongahela National Forest and adjoining state and private lands conducted during the summer of 1985, more than 30% of the red spruce trees were found to be either dead or declining. Based on these results, a comprehensive 5-year survey was initiated to quantify and characterize the extent and nature of spruce decline in West Virginia. Permanent study plots were established at 12 different localities in the state. During the 1986 and 1987 field seasons, an intensive ground survey was carried out on each of these plots. The vegetation of each plot was sampled and observations were made as to the extent of spruce regeneration and the symptoms and biotic agents associated with declining and recently dead spruce trees. Biotic agents isolated from suspect diseased tissue were identified and described as to percent occurrence. In addition, spruce trees were visually rated on 72 different symptomatology categories. Fine absorption roots occurring along spruce laterals were excavated and total numbers of fine roots on healthy and declining trees were compared. Fine roots also were checked for the presence of mycorrhizae.

MATTHEWS, KIMBERLY and DONALD TARTER, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701. Ecological life history, including laboratory respiratory studies, of Ameletus tarteri Burrows in Carpenter Run, North Fork of Cherry River, West Virginia (Ephemeroptera: Siphlonuridae).

The ecological life history of the mayfly Ameletus tarteri Burrows was studied in Carpenter Run, a tributary of the North Fork of the Cherry River, Greenbrier County, West Virginia from November 1986 to November 1987. Ameletus tarteri is known from West Virginia,

Virginia, and New York. Nymphs are usually found in rocky first and second order streams. These streams typically have low pH, low alkalinity and low specific conductivity. The following ecological and physiological components will be discussed and compared to other species of Ameletus: foregut analysis, growth, sex ratio, emergence period, fecundity, egg morphology, and oxygen consumption rates.

MCKAY, GREG and DONALD TARTER, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701. A preliminary study of the effects of artificial lake destratification on the gizzard shad (Dorosoma cepedianum) population in Beech Fork Lake, West Virginia.

Artificial destratification of Beech Fork Lake, West Virginia, was initiated in May 1987 when four artificial destratification fans were installed by personnel from the Huntington District of the U. S. Army Corps of Engineers. Improved water quality and productivity are desirable results of artificial lake destratification. Gizzard shad (Dorosoma cepedianum) were collected on a monthly basis through October. Stomach contents were analyzed and correlated with available food. Age and growth data were also established. Further research is expected to reveal an increased rate of growth of the fishes as lake productivity increases and modification of their diet as the community structure of organisms at lower trophic levels is altered in response to artificial lake destratification.

NORMAN, ROBERT and DONALD TARTER, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701. Effects of artificial destratification on the benthic populations in Beech Fork Lake, West Virginia.

In May 1987, personnel at the U. S. Army Corps of Engineers, Huntington District, began operating four artificial destratification fans in Beech Fork Lake, Wayne County, West Virginia. Artificial destratification is a major technique used as an in-lake method for improving water quality. In order to collect base-line data, pre-destratification benthic collections were made in summer and fall of 1986 using Hester Dendy multiplate samplers. Four stations were selected for the benthic sampling. At two stations, divers with scuba gear installed multiplate samplers. Four stations were selected for the benthic sampling. At two stations, divers with scuba gear installed multiplate samplers (triplicate) at depths of 5 and 15 feet for six weeks. At two additional stations, multiplate samplers were installed at 15 feet for six weeks. The same stations and procedures

were followed in summer and fall of 1987. The following comparisons of benthic populations will be discussed in relation to species diversity, equitability, number of taxa, number of specimens per square foot, and functional feeding groups (predators, shredders, collectors, grazers).

ALAN D. SMITH, DAVID SCHUBERT, Dept. of Quantitative and Natural Sciences, Robert Morris College, Pittsburgh, PA 15108. Discriminating degree of white-tailed deer travel route use.

Five environmental parameters were measured and recorded concerning white-tailed deer (Odocileus Virginianus) travel routes. Quantification of such travel use may be useful in wildlife management, such as timber harvesting operations. The parameters included number of browse, percent grass and forbs, average slope, percent overstory coverage, and distance of the travel route to the nearest road. Contracts were developed between 44 samples of known deer use and 44 samples on known nondeer use areas. These samples were randomly sampled along trails and transects. A total of 23 statistical hypotheses were tested using multiple linear regression techniques, corrected for multiple comparisons. Sixteen of these hypotheses were found to be significant. All 5 independent variables accounted for 29.2 percent of the explain variance in discriminating deer use. The model containing only browse and overstory coverage accounted for most (94.5 percent) of this total variance. Results from the Spearman and Kendall nonparametric correlations ranked browse and overstory coverage as adding most to explained variance. The best regression equation, according to Forward Stepwise procedures, yielded browse and overstory parameters as well. In addition, covariance procedures yielded negligible effects of multicolinearity on the hypotheses-testing results.

Spearman Correlation Coefficients of the Independent and Criterion Variables used in the Present Study.

Parameters	Browse	Grass	Slope	Overstory	Road	Deer Use
Browse	1.0000	0.2967	0.0392	0.2693*	-0.4630	0.3694**
Grass		1.0000	-0.0501	-0.1413	-0.2414	-0.0705
Slope			1.0000	0.1065	0.1978	0.1100
Overstory				1.0000	0.1015	0.5142**
Road					1.0000	0.0063
Deer Use						1.0000

Kendall Correlation Coefficients of the Independent and Criterion Variables used in the Present Study.

Parameters	Browse	Grass	Slope	Overstory	Road	Deer Use
Browse	1.0000	0.2239*	0.0155	0.1882*	-0.0297	0.3068**
Grass		1,0000	-0.0321	-0.1058	-0.1797*	0.0621
Slope			1.0000	0.0744	0.1328	0:0920
Overstory				1.0000	0.0734	0.4305**
Road					1.0000	0.0052
Deer Use						1.0000

*Denotes statistically significance at alpha level of 0.05 for a two-tailed, nondirectional test (corrected for multiple comparisons = 0.01).

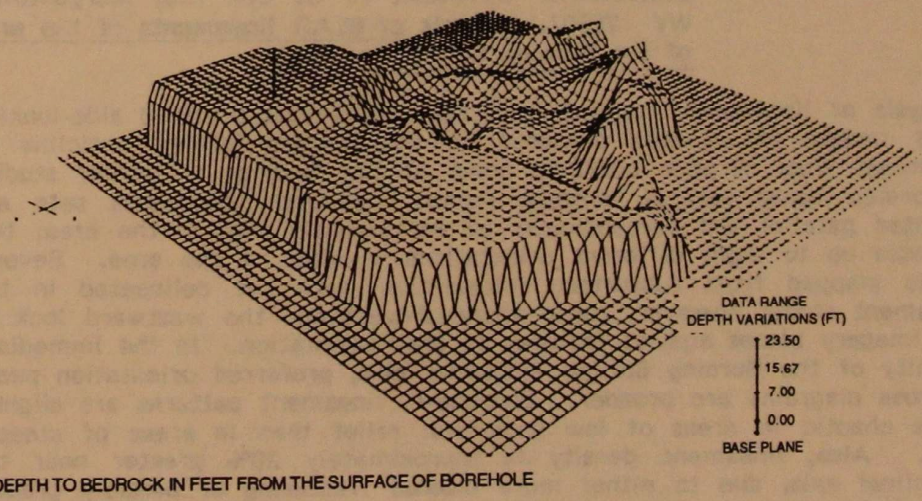
**Denotes highly significant at alpha level of 0.01 for a two-tailed, nondirectional test (corrected for multiple comparisons = 0.002).

Geology

ALAN D. SMITH, Dept. of Quantitative and Natural Sciences, Robert Morris College, Pittsburgh, PA 15108. Graphical, statistical, and visual aspects of response surfaces: A geotechnical case study.

The expanding uses of computer graphics and its application to engineering and geologic problems and data gathering are rapidly becoming an essential tool by investigators from a variety of disciplines. However, the usefulness of data collected and analyzed should also be based on its ability to communicate the results. The primary purpose of this paper is to present the use of selected computer graphical techniques in the trend surface analysis process, using the geotechnical parameter, depth to bedrock surface, as an example for illustrative purposes.

Computer generated three dimensional models of contour, first through sixth order trend surfaces, and their residuals of the geotechnical parameter depth to bedrock were completed by the use of several standard software packages. In addition, statistical models were generated to test the addition to explain variance by the employment of sequentially higher degree polynomial trend surfaces. The visual inspection of the ocmputer graphics illustrated that the second and third order distributions had lower values than the other residual of error surfaces. However, the sixth order trend surface was found to the best statistical fit, using the full and restricted model principle, but contained the largest magnitudes of residuals, especially along the periphery of the study area. The combined use of visual inspection of the computer generated models and common sense aid the investigators in selecting the second or third degree polynomials as the best fit.



Structure contour surface of depth to bedrock from surface to borehole.

STEWART TAYLOR, Dept. of Geology and Geography, West Virginia University, Morgantown, West Virginia 26506. Shallow seismic investigations: A source comparison in West Virginia.

A portable and economic seismic data acquisition system using an experimental weight drop source (Bison Instruments' Elastic Wave Generator (EWG)) has been tested recently. Most of the testing was undertaken at the Churchville, West Virginia locality (Lewis County) but additional tests were also made near Chestnut Ridge in Monongalia County, West Virginia.

Tests at the different areas were conducted to evaluate the EWG as a seismic source and show that technical problems such as source generated noise and the limited duration of reflected arrivals were not site specific. Analysis of the data acquired using the EWG was supplemented by comparison to 12 gauge shotgun source data which has been more rigorously researched in recent years.

The testing and subsequent analysis of source and reciever array patterns to discriminate against linear noise events became the primary work of this study after it was determined that the common offset method of seismic data acquisition did not produce interpretable data because of source generated noise and insufficient source energy input to allow recording at greater offsets. The results of this study show that when utilizing 10 Hertz low-cut geophones and a single source initiation, the EWG is limited to use with source-reciever offsets of less than 800 feet but inputs considerably more energy than a 12 gauge shotgun source which is limited to use with offsets of less than 300 feet.

EBERHARD WERNER, P. O. Box 795, Morgantown, WV 26507. **Analysis of SLAR lineaments of the area of the Burning Springs anticline.**

Analysis of lineaments mapped from recently available (1984) side-looking radar images in an area centered on the Burning Springs anticline of northwest West Virginia confirms some of the findings of earlier studies performed using various imagery forms. Several lineaments sets are oriented parallel and perpendicular to various fold axes in the area; this provides up to eight different orientations in most of the area. Several faults mapped from subsurface information were not delineated in the lineament study; however, these are east-west and the westward look of the imagery biases against features of that orientation. In the immediate vicinity of the Burning Springs anticlinal axis, preferred orientation peaks on rose diagrams are broader. Elsewhere, lineament patterns are slightly more chaotic in areas of low structural relief than in areas of steeper dips. Also, lineament density is approximately 20% greater near the anticlinal axis, due to either more intense fracturing or possibly greater topographic relief, although similar greater topographic relief near the Ohio River does not show a correspondingly higher lineament density. A

visual impression of slightly higher densities corresponding to steeper structural dips was noted. Rotational shifts of preferred orientation peaks, as reported in previous studies, were not particularly strong or consistent; and lineament density does not appear to differ between areas east or west of, and well away from, the axis of the Burning Springs anticline, as has been indicated in previous studies.

Psychology/Sociology/ Archeology

CHARLES W. HENNIG, Psychology Department, Salem College, Salem, West Virginia 26426.
Comparisons of tonic immobility across widely divergent species.

Tonic immobility (TI), also known as animal hypnosis and death feigning, is a profound state of motor inhibition that can be induced in many animals after a brief period of physical restraint. The duration of immobility episodes may last from a few seconds to several hours depending on the species and experimental manipulations that are involved. TI has even been proposed as an animal model for certain forms of behavioral inhibition in humans such as catalepsy, catatonic schizophrenia, and rape-induced paralysis. However, although TI has been induced and studied in many species ranging from invertebrates to primates, it has not usually been compared across several divergent species by a single researcher. The present study attempted to compare susceptibility to TI, duration of the immobility response, and other behavioral characteristics which accompany TI across a variety of species that are commonly used in laboratory research: anoles (Anolis carolinensis), geckos (Hemidactylus turcicus), chickens (Gallus gallus), rats (Rattus norvegicus), and squirrel monkeys (Saimiri sciureus).

Almost all the anoles, geckos, and chickens were susceptible to TI, whereas only about half the rats and squirrel monkeys went immobile. TI was easiest to induce in the chickens and geckos. The other species were somewhat harder to immobilize. Chickens and anoles showed the longest durations of TI, while rats and squirrel monkeys produced fairly brief immobility episodes. Some geckos showed long durations of TI, but the median response of this lizard was the shortest of all the species studied. Comparisons of TI across various strains of chickens, rats, and squirrel monkeys were also reviewed in order to present a more complete picture of genetic differences in TI. Finally, comparisons of some standard manipulations involving TI were made between anoles, chickens, and squirrel monkeys based on data from various sources.

JOHN E. HULL and WAYNE R. GILKEY, Dept. of Psychology, Bethany College, Bethany, West Virginia 26032 and DEBRA B. HULL, Dept. of Psychology, Wheeling Jesuit College, Wheeling, West Virginia 26003.
Students' perceptions regarding child care arrangements in dual-career families.

Female and male college students read a passage describing a dual-career couple which had to make child

care arrangements for a preschool child. Passages differed concerning the relative salaries of the couple, and the ease with which each could make child care arrangements. After reading a passage, each student rated the degree to which the male or female in the couple should: 1 -- make the child care arrangements; 2 -- stay at home to take care of the child; 3 -- stay home from work with a sick child. Statistically significant effects of relative salaries were found for items 2 and 3, while a significant effect of ease of making child care arrangements was found for item 1. These results will be related to the results of previously-conducted dual-career research.

KARL D. FEZER, Dept. of Biology, Concord College, Athens, West Virginia 24712. Suggestions for school board policies on conflicts between the scholarly consensus and the beliefs of parents and children.

School boards should be urged to adopt policies that forbid violation of First Amendment principles and that preempt superficially plausible arguments used by those who seek to promote religious viewpoints in public schools. Suggested principles, in abbreviated form, include: 1. In a democratic, pluralistic society committed to the principles of free speech and freedom of religion, it is proper for public schools to shape the beliefs and values of students only on matters about which there is a general consensus in the culture, not on matters peculiar to particular creeds or philosophies. 2. Understanding is not the same as belief. When teachers present concepts about which there is public controversy, teachers should make clear to students that they are not expected to accept the concepts, but they are expected to understand those concepts. 3. The chief source of information and concepts taught in public schools is the scholarly community. Students should be taught its nature and the source of its credibility and its limitations. 4. Public schools must transmit to students knowledge and understanding that represents the consensus of the most reputable sources of information. In presenting matters about which reputable scholars disagree, schools must convey a sense of the nature and extent of disagreement. 5. Teachers are professionals who are expected to be competent. Competence includes awareness of the reliability of sources of information. Professionals are expected to realistically assess the limits of their own expertise, and to know where to find greater expertise. 6. Free speech is a right of all citizens. Academic freedom is something quite different. One of its components, Lehrfreiheit, presupposes professional competence.

Ideas for Arab studies research: A Tunisian case study. JOSEPH T. MANZO, Dept. of Geography, Concord College, Athens, West Virginia 24712.

Currently, the literature in Geography on the Arab world is predominantly of a geo-political and political geographic nature. The purpose of this paper is to explore areas for study beyond the political realm. A Joseph J. Malone Fellowship, July 1987, provided a month of travel and contact with educators and government officials in Tunisia. By focusing on the north African country of Tunisia three areas of potential research become readily discernible. These three areas are: ethnicity, AIDS, and tourism. It is possible to generalize these topics to other Arab countries and, in some cases, to the third world in general.

W. HUNTER LESSER, USDA Forest Service, Monongahela National Forest, Elkins, West Virginia 26241. Preliminary Investigations at Files Run Quarry (46RD114): Lithic Procurement and Reduction in the Tygart Valley Uplands.

A prehistorically utilized source of Greenbrier chert was discovered on the western slope of Cheat Mountain, Randolph County, West Virginia in early 1987. The site is located on a 30% slope and consists of exposed Greenbrier chert nodules, fragments and various categories of reduced chert. A sample controlled surface collection has been conducted at the quarry. Site function is discussed and association with nearby Greenbrier chert reduction stations is explored as part of a local settlement/subsistence model.

Zoology

GLOVER, JAMES and DONALD TARTER, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701. Emergence patterns of leptocerid caddisflies from West Virginia (Trichoptera: Leptoceridae).

In West Virginia, the family Leptoceridae contains six genera (Ceraclea, Mystacides, Nectopsyche, Oecetis, Setodes, Triaenodes) and 19 species. Adults were collected with a black light trap from the seven major watersheds in the state. The emergence period extends from 14 May to 17 October. Linear regression analysis was used to determine the relationships between elevation and adult phenology of selected leptocerid species. These relationships will be discussed and compared to leptocerid species throughout the entire range.

MARY ETTA HIGHT and JANET FLETCHER, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. The Golden Mouse, *Ochrotomys nuttalli*, in West Virginia.

The Golden Mouse is a small, semi-arboreal mouse found in densely forested eastern deciduous woodlands. Distribution of the species is in the southeastern United States and its occurrence in West Virginia is peripheral. The first specimens collected in West Virginia were taken in Lincoln County in 1952. Specimens were taken from Cabell County in 1968 and 1970, and from Wayne County in 1975. The West Virginia Mammal Survey team captured a Golden Mouse in Mercer County in 1986, in habitat unlike that reported in the literature.
This paper is a preliminary report on our study undertaken to map the distribution of Ochrotomys nuttalli in West Virginia, assess the ecological requirements of the species, and study its biology. We searched for presumed suitable habitat in the southern counties and live-trapped three nights at each site. Complete ecological analyses were made at sites where O. nuttalli were caught. We observed captive mice in the laboratory and conducted simple food preference tests. New locality and habitat data presented extend the known distribution of the Golden Mouse in West Virginia.

LAURA TORRES MILLER, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701 and HARRY BRAILOVSKY, Depto. de Zoologia, Instituto de Biologia, UNAM, Apdo. Postal 70-153, Mexico D.F. 04510. A generic revision of the family Tingidae in Mexico (Hemiptera: Heteroptera).

The Mexican genera of the family Tingidae are revised. The genera Aepycysta Drake and Bondar, Dicysta Champion, Macrotingis Champion and Pliobyrsa Drake and Hambleton are reported for the first time in Mexico, resulting in a total of 24 genera and 79 species in Mexico. Each one is redescribed, illustrated and incorporated into a synoptic key. The morphology, history of the group and its economic importance are included.

DONALD C. TARTER and SANDRA R. DONAHOE, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701. State records of adult micro-caddisflies from West Virginia (Trichoptera: Hydroptilidae).

Based on an examination of adults and literature records, the first detailed investigation of the family Hydroptilidae, or micro-caddisflies, from West Virginia includes 13 species in five genera. Eleven species are state records. Included are important range extensions for Neotrichia vibrans Ross, Ochrotrichia dardeni Harris, O. graysoni Parker and Voshell, and Hydroptila perdita Morton. Based on adults from black light traps, the emergence period for micro-caddisflies from West Virginia extends from 29 June, Hydroptila grandiosa Ross, to 30 September, Stactobiella delira (Ross).

RALPH W. TAYLOR, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia. Some additional distribution records for land snails of WV.

G. K. MacMillan's 1949 work "The Land Snails of West Virginia" was the first extensive work to treat this group in the state. Very little work on the mollusks of the state has been published since then. The Field Museum of Natural History published Leslie Hubricht's The Distribution of the Native Land Mollusks of the Eastern United States in 1985. This work contains much new information about distribution patterns in West Virginia. I will, in this paper, compare and contrast the two works and give additional information on land snail distribution based upon the malacological collections housed at Marshall University. A hand-out with new county records will be distributed.

PROCEEDINGS OF THE WEST VIRGINIA ACADEMY OF SCIENCE

INSTRUCTIONS TO AUTHORS
Revised February 1982

1. *General Policy*

The publications policy of the Academy is intended to implement the goal of publication of the *Proceedings* by the Academy, namely, stimulation of research on the part of West Virginia scientists and Academy members by providing an outlet for publication of their research results. Within the limits of available resources, the Academy will attempt to maximize the number of articles it can publish, while maintaining standards by the peer review process. Where selection must be made, the sole criterion for judgment shall be the quality of the research involved. Articles of a local or regional nature, as well as those of broader scope, will be encouraged. Articles will not be discriminated against because of their subject matter, as long as they satisfy the requirement of the By-Laws that they be ". . . of a scientific nature" (Section VII, Article 1).

The Academy will consider papers that report the results of original research or observation. The Academy will not publish papers that have been published elsewhere. Each manuscript will be reviewed by the Publications Committee and by referees. Manuscripts longer than 15 pages* of double spaced typed copy normally will not be accepted. Membership in the Academy is a requirement for publishing in the Proceedings. In the case of joint authorship, at least one author must be a member of the Academy, and the author presenting the paper must be a member of the Academy. No author, or co-author, may submit more than two papers for any volume of the Proceedings. Ordinarily, papers offered for publication must have been presented at the annual meeting of the Academy. Publication is not automatic. The Proceedings editors also solicit outstanding expository papers.

2. *Preliminary Abstract*

A preliminary abstract, summarizing the results of the investigation must accompany the application for a place on the program of the annual meeting. The preliminary abstract must be typed on a special form, available from the Academy officers or editor, and will be published in the first number of the volume for that year. There is a $2 fee for each abstract submitted.

3. *Organization of Manuscripts*

Each manuscript shall start with an abstract (no more than 250 words) which should summarize the primary results. The following sequence is suggested for organizing a paper: Introduction, Materials

*The 15-page count refers to typewriter text and pages of figures, graphs, photos, and abstracts.

and Methods, Results, Discussion, Acknowledgments, and references cited. With the exception of the introduction, each division of the manuscript should be labelled. Sub-headings may be used. In general, the introductory abstract will replace a summary. This abstract should be suitable for sending to international abstracting services for immediate publication in the event that the paper is accepted for publication in the Proceedings.

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The author's name, department, institution, city, state, and zip code should follow the title.

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Line drawings should be carefully made on good rag paper for direct photo reproduction. Each figure should be numbered. While drawings may be of any convenient size, they will be reduced to 3 x 4 inches. Letters, symbols, and figures should be not less than 1 mm. high *after reduction* to printing size. In exceptional instances, a full page drawing (4½ x 6½ inches) may be used. Either original drawings or glossy photographs (mounted on illustration board with rubber cement) may be submitted. Photographic prints should be on glossy paper and have good contrast. Each drawing should be labelled on the back with the author's name and the appropriate legends. Camera copy will be used to reproduce mathematical formulas as far as practicable.

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Example of a journal citation at the end of paper:

5. Hall, J. L., and R. Campbell. 1957. Polarization of ethanol in benzene. Proc. W.Va. Acad. Sci. 29:53-57.

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6. Stacey, M., and S. A. Barker. 1960. Polysaccharides of microorganisms. Oxford Univ. Press. London. 228 pp.

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