

Volume 55, Number 1

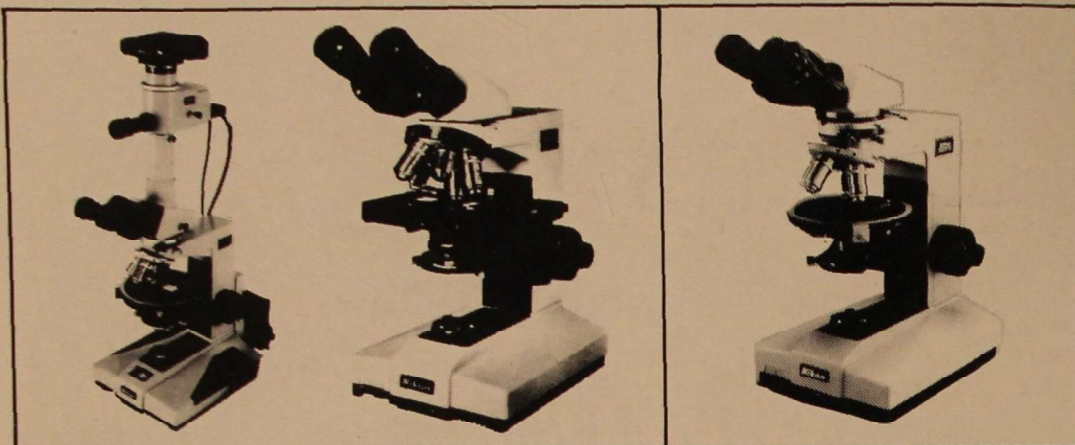
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**1983**



**Abstracts of papers for  
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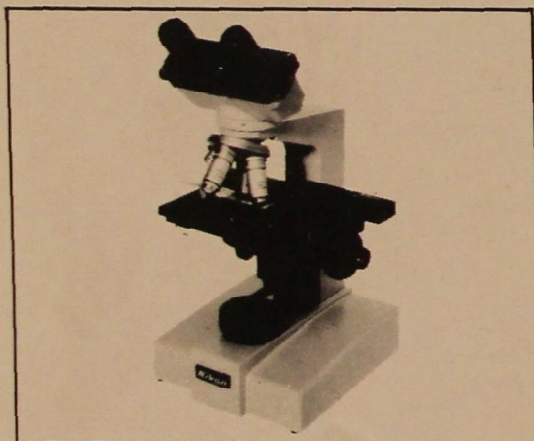
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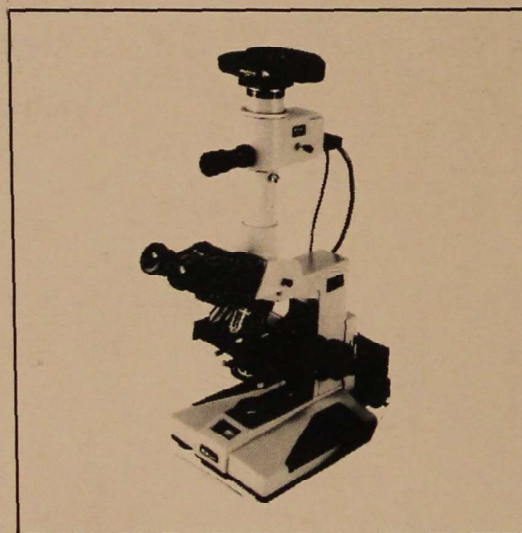
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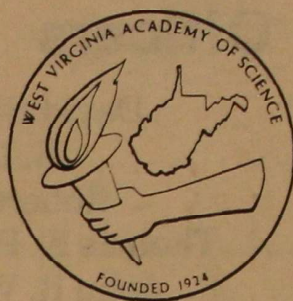
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# Abstracts of Papers

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# Biology

MARY E. ECKEL and KARL D. FEZER, Dept. of Biology,  
Concord College, Athens, West Virginia 24712.

## A human pedigree showing declining penetrance of cutaneous syndactyly?

Cutaneous syndactyly is thought to be caused by an autosomal dominant gene. Three generations of descendants of a man conspicuously exhibiting this trait, in his feet only, were studied. Of the 88 diagnoses, 37 were based on direct examination of feet (when hand- and footprints were taken for later dermatoglyphic analysis), 24 were based on interviews with the individual or with his/her parents or grandparents, and 27 on interviews with other relatives. In the first generation, 7 out of 14 persons conspicuously exhibited the trait, in the second generation, 6 out of 33, and in the third, none out of 41. The 7 first-generation persons with the trait had 24 children, of whom 5 had the trait. Also, one first-generation man without the trait had a daughter with it. Three of the 6 second-generation persons with the trait had 6 children, none of whom had the trait. Second-generation persons without the trait had no syndactylous children. Six of the 37 persons whose feet were examined directly were conspicuously syndactylous. All had the second and third toes fused on both feet. However, the degree of fusion varied from 25 to 100 percent of the length of the toes, and was not always the same on the two feet of one person. The apparently declining penetrance of the trait in this pedigree could be due to presence of other genes in the original couple that promoted expression of a syndactyly gene, and that were diluted in subsequent generations. If so, the percent penetrance of the syndactyly gene may not be a meaningful concept.

RALPH TAYLOR, Dept. of Biological Sciences, Marshall University,  
Huntington, West Virginia 25701. The current distribution of  
the Jumping Mice *Zapus hudsonius* and *Napaeozapus insignis* in  
West Virginia.

Materials from the West Virginia Mammal Survey, Marshall University Mammal Collection and published scientific literature are brought together to produce a concise picture of known records of occurrence for these two species in the state.

This report mentions specimens of *Zapus hudsonius* from ten counties including previously unreported records from Putnam County. The Putnam County record represents a significant extension of the known range of distribution for this species within the state. All previous reports were from the northern and eastern panhandles.

The records for *Napaeozapus insignis* cover fourteen counties and include previously unreported records from Wayne, Putnam and Kanawha counties. These records are important in that they not only extend the known distribution into southwestern West Virginia, but they also are at low elevations (Ca. 500' to 700'). All previous records were from elevations ranging between 1,700' and 4,700'.



JAMES D. TUCKER, Microbiology Section, LIB,  
DRDS, National Institute for Occupational Safety  
and Health, Morgantown, West Virginia 26505.  
Cytogenetic Activity of Nitrosated Coal Dust  
Extract on Human Lymphocytes.

The induction of chromosome aberrations and sister chromatid exchanges (SCE) on human lymphocytes by coal dust extract nitrosated with  $\text{NaNO}_2$  was investigated because coal miners have an elevated frequency<sup>2</sup> of gastric cancer. Heparinized peripheral blood from two unrelated male donors was used in each experiment. The induction of chromosome aberrations was investigated during two different phases of the cell cycle: 1) resting ( $G_0$ ) phase, and 2) DNA synthesis and pre-mitotic gap (S and  $G_2$ ) phases together. The results indicate that 10.0  $\mu\text{l/ml}$  of nitrosated coal dust extract (NCDE) causes an increase in chromosome aberrations in each cell phase tested. In the SCE system, 25 cells were counted per dose per person. The SCE frequency increased from 9.2 per cell in untreated cultures to 31.6 per cell in cultures treated with 10.0  $\mu\text{l}$  of NCDE per ml. The results are statistically significant (t-test,  $p < .0001$ ).  $\text{NaNO}_2$  alone, and non-nitrosated coal dust extract did not induce chromosome aberrations or sister chromatid exchanges. These results indicate that nitrosated coal dust extract is cytogenetically active in human peripheral lymphocytes.

JAMES D. TUCKER and E.C. KELLER, JR., Department of Biology,  
West Virginia University, Morgantown, WV. Environmental  
Associations with Mental Retardation in West Virginia.

The frequencies of Down Syndrome and three general categories of mental retardation were found to be strongly and significantly associated with a variety of environmental parameters on a county-by-county basis in West Virginia. The strongest association involves Down Syndrome and specific geological and mining variables. Significant associations with other, similar, environmental variables were found for the percentage of people that are classified as educable, trainable, or profoundly retarded. These results suggest that certain components of the environment are associated with both specific and general types of mental retardation, but that further work needs to be done in order to elucidate the precise nature of these relationships.

A. LAFFERTY, E.C. KELLER, JR., and J.D. TUCKER. Department of  
Biology, West Virginia University, Morgantown, WV. Relationships  
Among West Virginia County Mortality Rate and Natural Water  
Characteristics.

Correlation analyses were completed on West Virginia county mortality rates, obtained from the West Virginia Public Health Depart-



ment, with natural water characteristics of the counties of West Virginia, obtained from the EPA STORET system. Alkalinity, acidity, and pH were the most dominant water variables associated with the mortality attributes. Death under 1 year of age was the mortality attribute most associated with the county water characteristics. Death due to Benign neoplasms, homocides, nutritional differences, cirrhosis of the liver, and malignancy of the respiratory system were those mortality attributes most associated at a secondary (lower) level with county water characteristics.

E.C. KELLER, JR., and J.D. TUCKER. Biology Department, West Virginia University, Morgantown, WV. Impact of County Environmental Characteristics on the Age-Death Profiles in West Virginia.

County-by-county data from West Virginia indicates that the profile of various air quality, geologic, and water quality characteristics significantly associate with the human age-death profile of West Virginia. Numbers of air pollution emitters, particulate emission levels, hydrocarbon emission levels, and NO<sub>x</sub> emission levels appear to be those air quality variables most associated with the age-death profile. Low pH levels of natural waters appears to be the water quality variable most associated with the age-death profile. Various characteristics of the underlying bituminous coal beds, amount of coal produced, and aspects of the underlying limestones of each county are those geologic variables most associated with the age-death profile of West Virginia populations.

P. BACIU, E.C. KELLER, JR., and J.D. TUCKER. Department of Biology, West Virginia University, Morgantown, WV. Relationships Among Cancer Rates and Environmental Factors in West Virginia.

Correlation analyses were completed on West Virginia cancer rate data from a county-by-county federal cancer study in the 1960's with county geologic, water, air, and coal production environmental county statistics. Virtually all of the significant associations were obtained in the male sub-set of the West Virginia population. The types of cancer-most frequently observed to be in association with environmental factors were stomach, intestinal, and rectal cancers. Those environmental factors most frequently associated with cancers were: the iron and acidity content of natural waters; the emission levels of CO<sub>x</sub> NO<sub>x</sub>, Hydrocarbons, and total particulates; the amount of sulfur and ash in underlying coal beds; and the amount of coal produced in the respective counties.



DANIEL PETTRY and DONALD TARTER, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. The relationship between body size and body coloration of *Baetisca carolina* Traver nymphs in Panther Creek, Nicholas County, West Virginia (Ephemeroptera: Baetiscidae).

Considerable inconsistency was noted in the regularity of the coloration exhibited by *Baetisca carolina* nymphs during monthly collections from October 1981 to September 1982. During fall and winter months, the majority of the nymphs exhibited a dark body coloration, with dark pigmentation on the legs and on the ventral surface of the thorax and abdomen. In spring and summer, as the nymphs grew and approached the emergence period, the dark pigmentation diminished among most of the nymphs. A total of 775 nymphs were placed into 0.1 mm size classes based on head width, and the percent of individuals with light coloration in each size class was determined. The correlation coefficient between the midpoint of each size class and the percent frequency of light colored individuals in that size class was determined to be 0.87.

The nymphs were closely examined for the presence or absence of a dark basal band on the caudal filaments. A total of 146 immature nymphs (< 1.0 mm head width) were examined and 100 percent of these nymphs exhibited the basal band. A total of 196 mature nymphs with developed wing pads were examined and only 11.2 percent of these nymphs exhibited the basal band. A total of 740 shed nymphal exuviae were examined and only 20.8 percent of these exuviae exhibited the basal band.

D. WERNER and A. BENSON. Department of Biology, West Virginia University, Morgantown, WV. Leaf pack processing in acid and non-acid tributaries of a northern West Virginia cold water stream.

Sugar maple (*Acer saccharum*) leaf packs were placed in two tributaries of a northern West Virginia stream to determine the effects of lowered pH on leaf pack processing rates. pH in the acid tributary, Lick Run, ranged from 4.0 to 4.5, while the pH in the non-acid tributary, Roaring Creek, ranged from 5.9 to 6.8. Leaf pack processing rates were shown to be significantly higher in Upper Roaring Creek than in Lick Run. Four processes contributed to the break down of leaves within a stream. Leaching, physical abrasion, shredding by invertebrates and microbial decomposition. It was concluded that the differences in the leaf pack processing rates of the two streams were due to reduced shredder and microbial activity at the lower pH.



# Botany

RODNEY BARTGIS, Dept. of Biology, West Virginia University,  
Morgantown, West Virginia 26506. Aquatic vegetation of a  
natural karst lake in West Virginia.

Lake Louise is a 14.5 m deep natural karst lake in Jefferson County, West Virginia. In the summer of 1982, 1 m wide transects were arranged radially from the center of the lake to the edge of the surrounding marl wetland. Percent cover of each vascular and bryophytic species was recorded in each community. Discrete community boundaries were evident and corresponded to shifts in species composition. Communities were arranged in concentric zones and were related to water depth. Emergents including Sparganium eurycarpum and Veronica anagallis-aquatica dominated shallow areas. The submergent Elodea canadensis dominated the steep sides of the Lake bottom from a depth of 1.5 to over 4 m. Between the two extremes floating species, including Potamogeton amplifolius and P. crispus, were dominant. Floating thalloids, including species of Lemna, Spirodela and Riccia, were abundant throughout the floating and emergent zones. Although the overall community structure was different from that of a northern Michigan karst lake, the flora of Lake Louise was similar, sharing fifty out of seventy-seven vascular species.

DAVID M. LAW and ROBERT H. HAMILTON, Dept. of  
Biology, The Pennsylvania State University,  
University Park, PA 16802. Effects of exogenous  
application of phytohormones on in vivo levels of  
auxins.

It is well known that specific growth processes in plants are often regulated by an interaction of two or more phytohormones. After reporting a rapid isotope-dilution method for analysis of the in vivo levels of the auxin IAA and its inactive conjugate, indole-acetyl aspartic acid (IAAsp), in dwarf peas (Proc. W.V.A.S. 54: 6 (1982)), we applied this procedure to a study of the effect of exogenous application of other phytohormones on endogenous IAA and IAAsp levels. Two-week-old light-growth Little Marvel pea seedlings were sprayed with either  $5 \times 10^{-4}$  gibberellic acid, benzyladenine, or abscisic acid, and plants were harvested three days later for comparative analyses of IAA and IAAsp levels in treated and control plants. Results of these experiments will be presented and discussed in terms of possible mechanisms for observed changes in auxin levels (e.g., promotion or inhibition of IAA or IAAsp synthesis).



STEVE BECKELHIMER, Dept. of Biological Science,  
Marshall University, Huntington, West Virginia  
25701. Influence of periodic inundation on the  
vertical distribution of corticolous lichens.

The vertical distribution of corticolous lichens was studied along Big Seven Mile Creek, a tributary of the Ohio River using step-wise discriminant analysis. The populations appear to respond to a gradient of inundation up the tree bole as well as upstream to less frequently inundated areas. Macroepiphytic coverage and species richness increased with height on the tree bole and distance from the mouth of the stream. Periodic inundation was shown to inhibit lichen growth at all heights at the most downstream site while inhibiting only the lower heights on the tree bole at the more upstream sites. Of all species observed, Arthonia caesia (Flot.) Korb and Physcia lacinulata Mul. Arg. possessed highest tolerance to periodic inundation. Candelaria concolor (Dicks.) B. Stein, Parmelia hypotropa Nyl. and Physcia tribacoides Nyl. were least tolerant to inundation.

Three state records were established : A. caesia, Catillaria nigroclavata (Nyl) Schul. and Lecidea erythrophaea Floke were previously unreported from West Virginia.

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont  
State College, Fairmont, West Virginia 26554.  
A half century of succession in a former chestnut-  
dominated forest community in southwestern  
Virginia.

In 1932, as reported in her classic work Deciduous Forests of Eastern North America, E. Lucy Braum surveyed a chestnut-dominated forest community on Salt Pond Mountain in southwestern Virginia. At that time, the full effect of chestnut blight was not yet evident. During the summer of 1982, the vegetation of this same site was intensively resampled in order to determine the extent and nature of the compositional changes which had occurred after a half century of succession.

The compositional changes which have taken place in the tree stratum over the 50 year interval are striking. Quercus rubra, which formed only 11% of the canopy in 1932, is now the predominant species present, and Castanea dentata, which once made up 85% of the canopy, has disappeared completely. Acer rubrum has increased in importance, and Quercus alba has declined. Several other species (e.g., Betula lenta, Acer saccharum, Amelanchier arborea, Prunus serotina, and Robinia pseudoacacia) not recorded as canopy trees in the original study are now represented in the tree stratum. Compositional differences between the pre- and post-blight communities are less apparent for subordinate strata of vegetation, although available data suggest an increase in mesic species for the herb stratum.



DAVID F. BLAYDES, DENNIS HEINTZMAN, ROGER SEEGER  
AND G. MICHAEL MARESCA, Department of Biology,  
West Virginia University, Morgantown, WV 26506.  
Cytokinin Nucleoside Inhibition of *Nicotiana*  
*glauca* Tissue Growth.

Exogenous cytokinins inhibit the growth of *Nicotiana glauca* callus cultures at a wide range of concentrations. Our strain of *N. glauca* can be cultured on Miller's medium. This medium contains (mg/l):  $\text{KH}_2\text{PO}_4$ , 300;  $\text{KNO}_3$ , 1000;  $\text{NH}_4\text{NO}_3$ , 1000;  $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ , 500;  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 71.5;  $\text{KCl}$ , 65;  $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$ , 14.0;  $\text{H}_3\text{BO}_3$ , 1.6;  $\text{Cu}(\text{NO}_3)_2 \cdot 8\text{H}_2\text{O}$ , 0.35;  $(\text{NH}_4)_6\text{Mo}_2\text{O}_{24} \cdot 4\text{H}_2\text{O}$ , 0.10; meso-inositol, 100; nicotinic acid, 0.5; pyridoxine . HCL, 0.1; thiamine . HCL, 0.1; a-naphthaleneacetic acid, 2.0; sucrose, 30,000; Bacto-agar, 10,000. An auxin is required with this medium. The possibility exists that the tissue produces cytokinin (Law and Blaydes, these Proceedings, Hagen and Marcus Plant Physiology, Vol. 55, p. 90). C.E. Gasque (Plant Physiology, Vol. 69, 1982) presents evidence that two of the cytokinins are the nucleoside forms of zeatin and dimethylallylamino purine. We find that kinetin nucleoside is nearly as inhibitory as kinetin with our strain of tissue. Kinetin reduced growth to 19.5 percent of their control and kinetin nucleoside reduced growth to 28.7 percent of the control at 30 days after planting ( $2 \times 10^{-5}$  MK, KR).

JIM MICHNOWICA and TOM WEAKS, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. The influence of deleterious concentrations of heavy metals on the growth of *Selenastrum capricornutum* Printz.

Acute toxicity tests were conducted to observe the response of *Selenastrum capricornutum* Printz. to the heavy metals As, Cr, Cu, Ni, and Zn added singly to artificial media. Cultures were incubated for a period of seven days at pH 4 in standard algal assay media containing sublethal concentrations of the metals. The adjustment of pH to higher levels resulted in increase growth when cultures were treated with As, Cu, or Ni and incubated for an additional 7 days. Toxicity was least at the optimum pH range for growth of the alga. The toxicity of Cr or Zn was not found to be significantly altered at higher pH levels.

It was suggested that increasing the pH modifies the toxicity of As, Cu, and Ni by changing an internal factor that affects the transport system. *Selenastrum capricornutum* did not counteract the toxicity of any of the metals after 14 days incubation time. This indicates that complexation of ions by excretion products or absorption of ions or their complexes by the cell walls did not occur.



MICHAEL A. POLECHKO, Dept. of Biology, St.  
Vincent College, Latrobe, Pennsylvania 15650  
and Roy B. Clarkson, Dept. of Biology, West  
Virginia University, Morgantown, West Virginia  
26506. A serological study of the systematics  
of the Walnut Family, Juglandaceae.

The purpose of this systematic investigation was to obtain data applicable to determining the serological correspondence between the Juglandaceae, members of the Fagales, and the Anacardiaceae. Antisera were produced for seed proteins from Juglans nigra, Carya illinoensis, and C. ovata, and tested against various taxa of the Fagales and the Anacardiaceae using the Ouchterlony double diffusion technique. Serological correspondence was observed to be (1) very strong between members of the Juglandaceae, (2) moderate with members of the Fagales, and (3) weak with members of the Anacardiaceae. These results support Cronquist (1981) and Takhtajan (1969) who place the Juglandaceae close to the Fagales. Potential errors in analysis of these relationships were clarified upon the discovery of a non-specific precipitin reaction between seed proteins from the Anacardiaceae and normal immunoglobulin. These reactions were probably due to the presence of polyphenolic tannins in both Rhus typhina and Mangifera indica seed extracts.



# Zoology

John C. DELFINO, 356 Roxalana Hills Drive  
Dunbar, West Virginia 25064. Winter bat survey  
in the caves of Monroe County, West Virginia.

Nineteen caves in Monroe County, West Virginia were surveyed between 15 January and 14 March, 1982 to ascertain species diversity and abundance of bats and to measure temperature and relative humidity of sites containing hibernation bats. A total of four species was observed. No cave was observed to house all species, and five caves were observed to contain no bats. The following percentages of occurrence were determined: Pipistrellus subflavus (94.29), Eptesicus fuscus (4.65), Myotis lucifugus (0.85), and Myotis leibii (0.21). The relative abundances of these species varied from cave to cave. The species were hibernating at localities characterized at about the following average temperature and relative humidity: P. subflavus (9°C.; 97%), E. fuscus (4°C.; 98%), M. lucifugus (11°C.; 98%), and M. leibii (8°C.; 100%). Calculation of the coefficient of skewness and kurtosis was made for only the distribution of the dry and wet-bulb temperatures and relative humidity values for the sites housing P. subflavus and E. fuscus. Temperature and relative humidity are given for those caves observed to contain no bats.

JAMES E. JOY and STEPHEN MCBRIDE, Dept. of Biological Sciences, Marshall University, Huntington, W. Va. 25701. Chaetogaster limnaei (Annelida: Naididae) in aquatic snails, Oxytrema canaliculata, from Mud River, Cabell Co., W. Va.

Chaetogaster limnaei von Baer was recovered from 130 of 235 (55.3%) Mud River snails, Oxytrema canaliculata (Say), collected from April thru November 1981. Prevalence was highest (at 100%) in July, August, and September, and lowest (0%) in April. Monthly mean numbers of C. limnaei per infected snail were low, peaking at 5.5 in September. Prevalence and intensity of infection paralleled mean water temperatures.

ROGER R. SHEPPARD, Biology Dept., Concord College, Athens, West Virginia 24712 and DEBRA A. BRICKEY, Biology Dept., Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061. Sexual dimorphism in the labial palps of the greater wax moth, *Galleria mellonella* L.

A difference was found in the structure of the labial palps of male and female greater wax moths. Results of observations with a scanning electron microscope indicate that both sexes have a pair of three



segmented labial palps. However, the labial palps in the female are much larger and contain more chemical sensilla than the corresponding mouthparts in the male. The labial palps in the male contain a pair of hook-like structures at the distal end which the female lacks. Observations of mating behavior reveal that the male uses the labial palps to grasp the female just before copulation. Preliminary experiments suggest that the labial palps in the female are involved in reception of sex pheromone produced by the male.

JOHN E. SCHMIDT and MICHAEL A. ZETO, Division of Water Resources, West Virginia Department of Natural Resources, Charleston, WV 25311.

A survey of the freshwater mussel fauna of the Kanawha River, September 1981-September 1982.

Fresh water mussels (naiads) were collected from the Kanawha River at several locations between Winfield and Falls View as part of a statewide survey to identify naiad populations. Sampling took place during the Fall of 1981 and the Fall of 1982 when the river was low and clear. Naiads were sampled with a 10-foot dovetail mussel brail and sight/hand collecting.

Nineteen species of naiads and the asiatic clam Corbicula sp. were collected. The majority (18 species) were collected in the 7-mile stretch of the Kanawha River downstream of Kanawha Falls. Two species - Cyprogenia stegaria and Obliquaria reflexa are very rare in West Virginia. Only Corbicula sp. and one naiad species, Anodonata g. grandis, were collected downstream of Charleston. No endangered species were collected, although a population of Lampsilis abrupta (=orbiculata) is known to occur downstream of Kanawha Falls near Deepwater.

Janice E. Fisher and L. E. McCoy, West Virginia Department of Natural Resources, Division of Water Resources, 1201 Greenbriar Street, Charleston, West Virginia 25311. The results of Ohio River macroinvertebrate sampling for 1975-1981.

The results of macroinvertebrate sampling (Hester-Dendy multi-plates) from nine stations along the Ohio River (at U.S. Army Corps of Engineers lock and dam facilities where possible) are presented.

Comparisons of Brillouin diversity, numbers of individuals and taxa present for each site indicate significant (one-way anova, 0.05 level of confidence) improvement for two sites (Weirton and Hannibal). Only one site was significantly (0.05 level, one-way anova) poorer (Keyger Creek). Most other stations appear to have made some improvement or remained the same with the notable exception of Willow Island and Belleville. These stations appear to have been adversely impacted



by some factor or combination of factors. The Belleville site had shown continued improvement from 1975 through 1980, however, the 1981 sample revealed a significant (0.05 level) drop in diversity.

JAMES E. JOY, ANITA J. PRITCHARD, and DONALD DANFORD,  
Biological Sciences, Marshall University, Huntington, W. Va.  
25701. Corbicula fluminea (Mollusca: Pelecypoda) as a  
biological indicator of heavy metals in the Kanawha River, W. Va.

A total of 200 large (16 to 24 mm) Corbicula fluminea individuals were monitored for 10 heavy metals at four different sites (50 clams at each site) on the Kanawha River over a nine week period. Analysis of the viscera revealed silver in the smallest concentrations (between 0.1 and 0.2  $\mu\text{g/g}$ ) of the metals at all four sites. Cadmium was also found in low concentrations (between 0.2 and 0.4  $\mu\text{g/g}$ ). Iron was found in the highest concentrations, in some cases surpassing 500  $\mu\text{g/g}$ . Magnesium levels were also high, generally ranging between 100 and 200  $\mu\text{g/g}$  at all sites. Concentrations of zinc were interesting because of their virtually unchanging levels ( $\approx 30$   $\mu\text{g/g}$ ) at all four sites over the nine weeks. Copper concentrations were also very constant (between 7.0 and 9.0  $\mu\text{g/g}$ ) at all sites with the exception of weeks 7 and 9 at Marmet when copper levels reached 17.0 and 12.0  $\mu\text{g/g}$ , respectively. Chromium levels while generally low were quite variable, ranging from 0.5  $\mu\text{g/g}$  at London, to a high of 12.0  $\mu\text{g/g}$  at Glen Ferris. Manganese levels were also quite variable, ranging from a low of 9.2  $\mu\text{g/g}$  at Winfield to a high of 100  $\mu\text{g/g}$  at London.

ROBERT W. GATEWOOD, WV Dept. of Natural Resources,  
1201 Greenbrier St., Charleston, WV 25311 and  
Donald C. Tarter, Dept. of Biological Sciences,  
Marshall University, Huntington, WV 25703. The  
life history and ecology of the alderfly *Sialis  
aequalis* Banks from Flatfoot Creek, Mason County,  
West Virginia.

The alderfly *Sialis aequalis* Banks from Flatfoot Creek, Mason County, West Virginia, was studied relative to its life history and ecology during the period April 1978-May 1979, and its low pH tolerance experimentally estimated in the laboratory. Larvae were collected along the margins of the stream from a substrate of leaf and vegetative debris, mud, and silt. Larvae were detritivorous in their feeding habits, despite the high food potential of their habitat. Their diet was infrequently supplemented with chironomid midges and other dipterans. Length-frequency distributions for larvae indicated one size class for the population, and thus a one-year (univoltine) life cycle. Growth rate, based upon mean head capsule width, was greatest (534%) from larval hatching through summer. The greatest monthly growth rate (344%) occurred from May to June. No increase in head capsule width was observed in February and March, the final months of the larval stage. The 96-hour median tolerance limit for low pH for S.



aequalis was 2.3. Pupation in the laboratory was variable in duration, ranging from 10-22 days. In the field, pupation began in late March, and concluded 4-5 weeks later. Adults were first observed in late April, and none were observed after May 10. Sexual dimorphism relative to body length was observed in a limited sample of adults. Mean body length was 14.1 and 11.6 mm for males and females, respectively. Ovarian eggs of adult females ranged in number from 402-818,  $\bar{x}$ =657. Mean egg length and width were 0.23 and 0.61 mm, respectively.

DONALD TARTER, LEE HARTSOCK, STEVE MCBRIDE and MARK SHERIDAN, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. Low pH tolerance, under continuous-flow bioassay conditions, of hellgrammite larvae, *Corydaulus cornutus* L. (Megaloptera: Corydalidae).

Hellgrammite larvae, *Corydaulus cornutus* L., were experimentally tested under continuous-flow bioassay conditions to determine their tolerance to low pH. The straight-line graphical interpolation method was employed to determine the pH value at which 50 percent of the hellgrammites survived after 96 hours. The  $TL_{m}^{96}$  pH value was 1.76. This investigation was compared with other low pH tolerance studies of larval megalopterans.

DONALD TARTER and MARK SHERIDAN, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. The taxonomic status and distribution of the stoneflies *Malirekus hastatus* (Banks), *Yugus arinus* (Frison), and *Y. bulbosus* (Frison) in West Virginia (Plecoptera: Perlodidae).

*Malirekus hastatus* (Banks) and *Yugus bulbosus* (Frison) are distributed throughout 12 and 11 counties, respectively, in all drainage basins of West Virginia except the Little Kanawha River and slow, low gradient streams along the Ohio River. Based on more definitive characteristics, *Y. arinus* (Frison) is not found in West Virginia as previously reported in the literature. Naiads of both species are found from first order streams to fifth order rivers. Fifteen watersheds, including two rivers, contain naiads of both species.

CHARLENE NUGEN and DONALD TARTER, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. Larval key to *Hydropsyche* and *Symphitopsyche* species from West Virginia (Trichoptera: Hydropsychidae).

A larval key is presented for 15 species and two species groups of the genera *Hydropsyche* and *Symphitopsyche* from West Virginia. The following species and species groups are included in the key: H.



depravata group, H. dicantha Ross, H. hageni Banks, H. hoffmani Ross, H. leonardi Ross, H. orris Ross, H. phalerata Hagen, H. scalaris Hagen, H. simulans Ross, S. bifida group, S. bronta (Ross), S. macleodi (Flint), S. morosa (Hagen), S. Slossonae (Banks), S. sparna (Ross), S. ventura (Ross) and S. walkeri (Betten and Mosely). Important taxonomic characters include: (1) color patterns, setation and number of branches on pleural gills, (3) setation on genae and anal legs, and (4) tubercles on apotome. Additional comments are made regarding the environmental influence on head patterns.

N.S. STROUSE, E.C. KELLER, JR., and J.D. TUCKER. Department of Biology, West Virginia University, Morgantown, WV. Relationships Among County Deer and Turkey Kills and Selected Environmental Factors in West Virginia.

Deer and turkey kill records for 5 years (1975-1980) were correlated with Geologic, air quality, and water quality factors on county-by-county data from West Virginia. Strong correlations were obtained among certain of the geologic factors and the numbers of deer killed. The major geologic factors in these deer-kill relationships were: the amount of the county underlain by natural brine, the percentage of the county underlain by devonian and silurian, and mississippian age limestone, the percentage of the county underlain by bituminous coal with less than 1.5% sulfur, and the amount of the county underlain by bituminous coals with an ash content of less than 6%.



# Microbiology

S. CRAIG STAMM and E.C. KELLER, JR. Department of Biology, West Virginia University, Morgantown, WV. Pre-incubation Ames Testing and Cytotoxicity of the SRC-II Heavy Distillate and its Mutagenic Subfractions.

The heavy distillate of the Sovent Refined Coal-II (SRC-II) synthetic fuel process is a product that has been shown to be mutagenic in previous Ames testing. However, more of the previous testing utilized the pre-incubation form of the Ames test (pre-incubation of the presumptive mutagen, mixing of the cells and metabolic activator (S-9), at 37°C for 20 minutes prior to plating). This pre-incubation Ames test is, in many cases, able to show mutagenic activity of chemicals that go undetected in the standard Ames plate assay, such as dimethylnitrosamine (DMN). Preliminary testing with this assay system showed linear dose responses of the amount of mutagen plated vs. histidine revertants (reverse mutation). Also, the cytotoxicity of these SRC-II derived compounds were assayed by plating the cells and the mutagen in nutrient agar overlays on nutrient agar plates. These results showed that metabolic activation via S-9 was necessary for mutagenic activation of these compounds. Further, these assays showed less mutagenic activity than that previously recorded for the heavy distillate using the standard Ames test. Hence, the pre-incubation test might be less sensitive at detecting the type of mutagens in the SRC-II heavy distillate as compare with the standard Ames plate assay, but may show mutagenic activity in sub-fractions not previously shown to be mutagenic.

E.C. KELLER, JR., R. GERBER, and D. WERNER. Department of Biology, West Virginia University, Morgantown, WV. The importance of In-Stream Flow in the Determination of Total Algal Biomass.

Stepwise regression analyses of in-stream flow were done on data within a series of 8 homogenous segments of the Upper Monongehela River Basin. In-stream flow was an important attribute in regard to the levels of total algal biomass observed, however, the combinations of other physical/chemical variables "determining" total algal biomass were quite different among the eight segments. Those combinations of variables and the relative effectiveness of in-stream flow was a direct function of the nature of the homogenous segment (viz., acid drainage dominated, sewage/industrial waste dominated, non-polluted, etc).



REUBEN A. COHEN AND DAVID B. YELTON. Dept. of Microbiology, West Virginia University Medical Center, Morgantown, West Virginia 26506. Cloning of the Polyoma Virus Gene for Capsid Protein VP2 in Escherichia coli.

The polyoma virus gene for capsid protein VP2 is being cloned into E. coli in such a manner as to optimize its expression. Cloning is done by a transformation procedure utilizing a derivative of the plasmid pBR322 as the vector. This plasmid incorporates a DNA sequence which, when transcribed, ensures the presence of a ribosome binding site at the 5' end of an adjoining mRNA.

Circular polyoma virus DNA is extracted from infected mouse cells using the Hirt procedure and is purified by centrifugation in restricted with Bcl I, which cleaves the DNA at a single site located 23 bases before the start of the VP2 gene, creating a linear molecule. The ends of this molecule are randomized by treatment with exonuclease III and nuclease S1. This increases the probability of obtaining a plasmid with the viral DNA inserted such that, following transcription, the viral mRNA will be translated in the correct reading frame. The exonuclease III/S1 treatment converts the staggered ends of the DNA molecule to blunt ends. Hind III linkers are then ligated to the blunt ends and the molecule is digested with Hind III endonuclease creating three fragments. One of the Hind III fragments will contain the entire VP2 gene. Due to a difference in size this fragment can be separated from the other fragments by agarose gel electrophoresis.

This purified Hind III fragment is then ligated into the plasmid which has also been restricted with Hind III. The ligated DNA is then transformed into E. coli. Transformed clones can be selected by virtue of their resistance to tetracycline. These clones can then be screened by immunological techniques to identify those producing VP2.

J. BONILLA, D. BUTLER, L. HASTON, H. MANGUS, C. OGLE, E. PAULEY, J. PAULEY, F. RANA, C. SOOY AND B. DAS SARMA, Department of Chemistry, West Virginia State College, Institute, West Virginia, 25112. Biological Activity of Transition Metal Complexes.

A biochemical lambda prophage induction assay (R. K. Elespuru, in Short-Term Tests for Chemical Carcinogens, ed. H. F. Stich and R. H. C. San, Springer-Verlag, New York, 1981, 1-11) has been found to be a rapid quantitative, inexpensive, and reproducible method for correlation of structures with potential anticancer activity of platinum complexes (B. Das Sarma, S. K. Daley and R. K. Elespuru, Chem. Biol. Interact., in press). It is now known that filamentation of E. coli that led to the accidental discovery of the wonder drug cisdiammine dichloro-platinum (II) (cisplatin) and prophage induction are part of the coordinate "SOS response" occurring in E. coli following damage to DNA. Cisplatin is assumed to be activated by hydrolysis of chloride in chloride depleted cellular fluid. Cisplatin and its analogs have been found to



be ineffective in colorectal carcinoma where the cellular chloride concentration is high. The effect of cisplatin and its palladium analog on halobacterium that thrives in high chloride concentration, is considered to throw additional light on the chloride-hydrolysis activation theory.

A systematic study on the biological activity of transition metal complexes has been initiated in our laboratory in terms of killing and filamentation of E. coli K-12, DB 5444, and halobacterium halobium in addition to prophage induction in BR 469 and BR 513. Results of known complexes of platinum, palladium, Nickel, Copper, Cobalt and Iron prepared and characterized in our laboratory on these bacterial systems will be presented.

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont  
State College, Fairmont, West Virginia 26554.  
Myxomycetes associated with southern Appalachian  
spruce-fir forests.

A preliminary study of the Myxomycetes (plasmodial slime molds) associated with southern Appalachian spruce-fir forests was carried out during the 1982 field season. Field and moist chamber collections were made from three different study areas: (1) Blister Run in Randolph County, West Virginia; (2) Mount Rogers in Grayson County, Virginia; and (3) the Great Smoky Mountains National Park in North Carolina. Thirty-four species representing 20 genera have been identified to date. This total includes a significant number of species that are either characteristically associated with the decaying wood of conifers or appear to have distributions centered in montane regions. Prominent examples include Licea minima, Barbeyella minutissima, Cribraria rufa, Lepidoderma tigrinum, and Trichia erecta. The collection of Barbeyella minutissima is particularly noteworthy, since it apparently represents the first record of this species from eastern North America.



# Chemistry, Engineering Sciences, Geology, and Mining

B. DAS SARMA AND BERNARD KRABACHER, Department of Chemistry, West Virginia State College, Institute, West Virginia 25112. Special projects and research to stimulate student interest in undergraduate colleges.

It is generally agreed that research is not only an essential, but also a vital part of undergraduate education in Chemistry. A survey of undergraduate research (J. N. Spencer and C. H. Yoder, J. Chem. Ed., 58, 1981, 781) indicated that competitive research is not only feasible but also very much cost effective in many selective private institutions. Meaningful research, however, is very difficult to carry out in an undergraduate state college.

It has been found that motivated students are easily attracted to special projects that offer access to any interesting ongoing faculty research program. Many of these youths will gladly work far beyond academic credit earned. Some students are eager to work during summer even without financial or credit hour incentives. The double bonus of undergraduate research to the faculty as well as to the students will be discussed with special reference to the Chemistry Department at the West Virginia State College.

JAMES SCOTT LEWIS, Dept. of Geology, West Virginia University, Morgantown, West Virginia 26506.  
Reservoir Rocks of the "Catskill Delta" of Northern West Virginia: Stratigraphic Basin Analysis Emphasizing Deposystems.

The stratigraphy and genesis of gas-producing sandstones of the "Catskill Delta" (Upper Devonian) are poorly understood. These sandstones were studied to determine their position, geometry, trend, and distribution using subsurface data. A deposystem analysis of this sequence also included a detailed evaluation of sedimentary characteristics from an outcrop near Elkins, West Virginia, which is located at the eastern margin of an eight-county study area (3360 sq. km.) of northern West Virginia.

The stratigraphic interval ranges from 762 to 1219 m in thickness within the study area, and includes the Devonian Greenland Gap Group (Chemung), and Hampshire Formation (Catskill), and the Mississippian Pocono Formation. Subsurface data consists of gamma-ray logs, bulk-density logs and lithologic logs, with well well spacing averaging one per 13 sq. km. Using these data, six regionally mappable lithologic intervals are recognized and mapped.

The Elkins outcrop provided sedimentologic, petrographic, and paleontologic evidence used to suggest environments of deposition. The



vertical succession of facies and their respective depositional environments for the Upper Devonian are: 1) shales with thin interbedded siltstones (distal storm deposits); 2) thick sandstones and siltstones with "hummocky cross-stratification" and thin interbedded shales (amalgamated proximal storm deposits); 3) very thick bedded, well sorted sandstones (high energy beach-bar complex); 4) interbedded lenticular sandstones and redbeds (fluvial channels and floodplain deposits, some exhibiting paleosoil characteristics). A wave dominant delta with frequent storm reworking is postulated, and this interpretation is a modification of models suggested by Allen and Friend (1968) and Walker (1971). The deposystem analysis of the gas-sandstones of the "Catskill Delta" provides criteria for enhanced predictability of these subsurface reservoir rocks.

C.F. EBLE, Dept. of Geology, West Virginia Univ., Morgantown, W.V. 26506, W.C. GRADY, Dept. of Geology, West Virginia Univ., J.J. RENTON, Dept. of Geology, West Virginia Univ., and W.H. GILLESPIE, West Virginia Dept. of Agriculture, Charleston, W.V., 25305. Paleoecology of the Redstone Coal Bed in West Virginia.

A detailed petrographic and palynologic analysis has been conducted on several increment channel samples of the Redstone coal bed collected in northern West Virginia. An interpretation of the paleoecological conditions that existed during the deposition of vegetable material are based upon the results of this study. Spores and pollen recovered from oxidative maceration of the coal have been identified and suggest a flora dominated by pteridophytes with comparatively minor contributions from sphenopsids, pteridosperms and other plant groups. Identification of macerals has been accomplished utilizing incident light microscopy. The correlation between palynomorphs and macerals has documented both the biological and geochemical history of the ancient swamp in which the Redstone coal bed accumulated.

SCOTT W. IMBUS, and FRANCIS T. C. TING, Dept. of Geology and Geography, West Virginia University, Morgantown, West Virginia 26506. Petrographic characterization and classification of oil shales.

Oil shale samples from the Green River Formation of the Piceance Creek Basin, Colorado, were examined to detect changes in the organic matter with Fischer assay yield. Petrographic parameters suspected of influencing the Fischer assay yield were established and quantified. Additional observations on gross petrography were made to supplement the quantitative data. Fifty vitrinite reflectance readings were taken on each sample and were averaged to determine mean maximum reflectance. Because of the small differences in depth of burial of these rocks, little increase in reflectance with depth was expected or obtained. However, a moderate to good correlation was found between reflectance and depth for the rich samples. In addition, reflectance was found to vary inversely with Fischer assay yield.



Categories of organic matter based on appearance in bright field illumination and blue light fluorescence were delineated and quantified with a point count. With few exceptions, organic and inorganic volume percentages correlated well with Fischer assay yield and weight percent spent shale data, respectively. Explanations were sought to aid in understanding why some samples had anomalous yield-volume percent inorganic relations. Although it is difficult to explain this phenomenon using the quantitative data, inferences can be made using qualitative observations. High yield-low organic content samples appear to possess organic material of unusual character or distribution. The organic matter may fluoresce brilliantly or be concentrated in thick bands. Low yield-high organic content samples may be indicative of an unfavorable type or distribution of organic matter. Samples in this category appear to have moderately bright fluorescing matter that is uniformly distributed. Despite irregularities, point counts provide consistent estimates of Fischer assay yield.

LOUIS L. TSAI, and FRANCIS T. C. TING, Dept. of  
Geology and Geography, West Virginia University,  
Morgantown, West Virginia 26506. Coal  
reflectance and its application.

Coal is usually modeled as a uniaxial negative material. The difference between maximum and minimum reflectance is called bireflectance,  $R_{bi}$ , and its value usually increases with the increase of coal rank. This phenomenon reflects the increasingly orderly arrangement of the stacked aromatic micelles in a plane parallel to bedding. It was observed by the authors that coals that had been subjected to greater stresses usually have higher bireflectances. The orientation of the reflectance indicatrix is influenced by the combined effect of vertical compaction and horizontal stress during coalification. Therefore, the reflectance indicatrix can reflect the tectonic and coalification history of coal. A new technique was developed at West Virginia University to measure and calculate the orientation of the vitrinite reflectance indicatrix of coal. Because many high rank coals also exhibit biaxial phenomena, both uniaxial and biaxial indicatrix models were applied. A series of coal samples of different rank and from different geographic locations (Allegheny plateau, Appalachian valley and ridge province, and southwestern Canada) was collected for examination. Oriented coal blocks were polished and a series of prescribed measurements and calculations were performed in order to obtain the maximum and minimum reflectance and their orientation in space. The results indicate a good correlation between measured data and paleostress conditions.



S. B. HANNAH and M. T. HEALD, Dept. of Geology and  
Geography, West Virginia University, Morgantown,  
West Virginia 26506. Petrology of the Big Injun  
Sandstone in Clay County, West Virginia.

A core of the Big Injun Sandstone (Mississippian from the James Phillips #10 well (Clay 1126) in Clay County, West Virginia was studied using thin sections, X-ray diffraction and chemical analyses. The sandstone is 54 feet thick and exhibits inclined bedding and coarse zones in the upper half of the interval. The lower half is massive with some sections of parallel laminations most of which are only slightly inclined. The lithologic type is chiefly sublitharenite with subrounded, fine-to-medium-sized grains. The lithic grains are quartzite, quartzose schist, shale and illite aggregates which may represent clay galls. Before leaching some of the sand contained as much as 15% feldspar mainly in the form of sodic plagioclase. Secondary feldspar overgrowths are altered to very low birefringent material which may be chlorite. Calcite cement is common in the upper part of the sand near the contact with the Greenbrier Limestone. Calcite is irregularly distributed in other parts of the sand occurring as grain replacements particularly of feldspar and as pore filling especially in the coarser sand. Grains near the top of the section are coated with infiltration illite. Most of the grains in the remainder of the sand have chlorite rims.

The original porosity of the sand was high but has been reduced by a number of processes. Some pores were partially closed by the compaction of weak ductile grains. Locally pores were reduced by secondary quartz and calcite. Where chlorite rims were well formed, growth of secondary quartz was inhibited and good porosity was preserved. Appreciable secondary porosity developed in some intervals where partial leaching of feldspar occurred. The sequence of diagenetic events was: infiltration of illite in upper section, compaction with deformation and fracturing of weak argillaceous grains, feldspar overgrowths, chlorite coatings, fracturing of grains, attending additional compaction, partial leaching of feldspar, secondary quartz, calcite and then additional secondary quartz.

KATHERINE R. BRUNER and MILTON T. HEALD, Department of Geology and Geography, West Virginia University, Morgantown, West Virginia 26506.  
Petrology and Diagenesis of the Tuscarora Sandstone  
in Kanawha County, West Virginia.

The Silurian Tuscarora Sandstone is a fine-grained to conglomeratic orthoquartzite that apparently formed in a transitional marine environment. It is of particular interest because of its production of gas which is commonly rich in CO<sub>2</sub>.

The chief cement in the Tuscarora is secondary quartz overgrowths, and this is the main cause of porosity reduction. Where pore-



filling is incomplete the secondary quartz usually occurs as euhedral overgrowths. Pressure solution is also an important factor in reducing porosity and commonly occurs throughout the interval studied. However, pressure solution is more pronounced in the fine-grained areas, and is particularly enhanced by the presence of clays (usually illite) as grain coatings and along laminae.

Differential cementation of the Tuscarora is widespread. This type of cementation is associated with the presence of clay, and clay distribution may be related to gas lenses, dewatering, and biological activity. Various forms of this type of cementation include tightly cemented layers alternating with poorly cemented layers (bands), thin tightly cemented bands parallel and perpendicular to bedding (lattice network), lenses, and porous cones above pebbles and clay clasts.

Clay coatings are favorable in preserving primary porosity as they have an adverse effect on secondary quartz overgrowth. In the presence of clays, the overgrowths are irregular, indicating difficulty in nucleation.

Dissolution of soluble minerals, such as feldspar, is responsible for the secondary porosity. Also there is a minor amount of intragranular secondary porosity from leaching of inclusions within detrital quartz.

JAY W. HAWKINS, Dept. of Geology and Geography,  
West Virginia University, Morgantown, West Virginia  
26506. Distribution of Iron Disulfides in the  
Waynesburg and Redstone Coals of Northern West  
Virginia and Southwestern Pennsylvania.

Petrographic analyses of the Waynesburg and Redstone Coals in West Virginia and Pennsylvania have lead to a better understanding of the mechanisms and time of emplacement of iron disulfides in these coals. Determination of the distributions of the iron disulfide (pyrite and marcasite) morphologies along with similar analyses of the maceral components, aided in the determination of emplacement factors.

The nine major iron disulfide morphologies used in this study include: framboidal, cell filling, fracture filling, dendritic, bedding plane type, marcasite, patches (euhedral aggregates of crystals), isolated euhedral crystals, and massive anhedral. These morphologies were categorized into two groups, massive and euhedral. Relative abundances of each morphologic type was determined by a point count technique on polished coal pellets. Maceral-mineral affinity of each morphology was also recorded. A separate examination of the maceral components allowed a relative determination of the paleopeat forming swamp chemistry.

By using visual examination of the data, some general conclusions concerning iron disulfide emplacement can be expressed. When comparing a high versus low pyritic sulfur column of the same coal, the massive types of iron disulfides tend to be the dominant morphology in the high sulfur column. In the Waynesburg Coal, the emplacement of iron disulfides above and below the main parting occurred under different chemical conditions and/or at different times, and resulted in greatly differing iron disulfide occurrences in the two benches.



This is contrary to previous investigations. The major difference in morphologies in each bench suggest a difference in paleopeat forming swamp chemistry.

HESSE, MICHAEL A.

West Virginia University, Dept. of Geology and  
Geography, Morgantown, West Virginia 26506

A geostatistical analysis of the Pittsburgh coal  
bed in north-central West Virginia

Geostatistical estimation techniques are used to analyse the raw sulfur content and the thickness of the Pittsburgh coal bed in north central West Virginia. These techniques are compared to conventional mapping techniques to assess the usefulness of Matheronian Geostatistics as a tool in coal reserve estimation. Semivariograms of the bed thickness and the raw sulfur content are used to analyse the deposit in question before mapping it. Preliminary results show that anisotropies, trends and random distributions in the deposit can be detected at an early stage through the analysis of semivariograms. In addition, semivariograms are also used to develop a more sophisticated sampling pattern. An evaluation of the overall practicality of geostatistics for the exploration geologist concludes this paper.

STEVEN McCLELLAND, West Virginia Geological and  
Economic Survey, Box 879, Morgantown, WV 26505 and  
WARREN NORTON, Dept. of Geology, Kent State Univer-  
sity, Stark Campus, 6000 Frank NW, North Canton,  
Ohio 44720. Roof Shale Flora of the Thomas, WV  
Amphibian Footprint Site, Bakerstown Coal,  
Conemaugh, Upper Pennsylvanian.

A strip mine just south of Thomas, Tucker County, West Virginia in the Bakerstown coal of Late Pennsylvanian Age yielded abundant amphibian footprints, freshwater mollusks, and a sparse compression flora. This paper reports on the compression flora. The flora is dominated by Neuropteris ovata. Other taxa present include cordaites, calamites, other Neuropteris, Annularia, and Pecopteris.



HAROLD V. FAIRBANKS, Department of Chemical Engineering, West Virginia University, Morgantown, WV 26506. Studying the Effects of Ultrasonic Processing of Materials with a Kinetic Model.

In general, the effect of adding ultrasonic radiation during the processing of materials appears to be catalytic. This effect is quite significant when the normal rate toward equilibrium for the process is very slow. To aid in the understanding of this effect, a kinetic model was built to simulate the motion of the unit masses within a materials system when irradiated with ultrasonic energy. The effect of ultrasonic frequency and ultrasonic intensity was investigated. The results were recorded by use of motion picture.

The use of the kinetic model helped in the understanding of the following effects: (1) Why there is a minimum ultrasonic intensity required, (2) Why ultrasonic frequency is not very important, and (3) Why there appears to be more than one set of optimum conditions for a system. These effects had been observed in our ultrasonic studies with the following processes: heat treatment of metals, drying of powdered materials, oil flow through porous sandstone, and molding of polymer powders.



# Psychology and Education

KRISTEN SJOSTROM, Department of Psychology,  
Glenville State College, Glenville, WV 26351.  
Distortion in the retrospective rating of confidence for prior predictions.

The purpose of this pilot study was to determine if a systematic distortion occurs in the retrospective ratings of confidence for predictions that are known to be either correct or incorrect. Previous research suggests that subjects (Ss) informed of the outcome of their predictions will overestimate their prior confidence for correct predictions while underestimating it for those that are incorrect. Thirty Ss each made 10 football team selections based on predictions about the final scores of upcoming games. In addition, Ss answered several questions designed to give a measure of their ego involvement regarding knowledge and interest in football games. Half of the Ss (control group) gave pregame ratings of their confidence in being correct in each of their selections. The other half of the Ss (experimental group) gave postgame ratings of their prior confidence for each of their selections after being informed of the accuracy of their predictions. An analysis of the results indicated that for the experimental group only, the Ss' reported confidence in their incorrect selections (losses) was significantly ( $p < .01$ ) lower than their reported confidence in their correct selections (wins) or their selections that ended in a tie (ties). Furthermore, Ss' reported confidence for their losses was significantly ( $p < .01$ ) lower for the experimental group than the control group. It was concluded that the experimental group underestimated their prior confidence in their losses. Significant ( $p < .05$ ) positive correlations between the measures of ego involvement and Ss' confidence ratings for wins, losses, and ties were found for the experimental group, but not the control group. The results were discussed in terms of supporting a motivational or information-processing explanation of distorted hindsight. Based on the results of this experiment a proposal for additional research was indicated.

IRUAKU BRODIE-MENDS and JOHN H. HULL, Dept. of Psychology, Bethany College, Bethany, West Virginia 26032. An interim report on an alcohol awareness program.

Dealing with alcohol use and abuse is of concern to most college student life personnel. This paper is an interim evaluation of a college-based alcohol awareness program which is designed, in part, to: 1--provide students with basic facts regarding alcohol and its effects; 2--measure alcohol knowledge, attitude, and behavior changes resulting from this program; 3--provide baseline data regarding



campus alcohol use; 4--initiate a college course on alcohol and alcoholism; 5--provide basic alcohol and alcoholism information to local high school students.

JOHN H. HULL, H. LYNN CLINE, FRANCESCA ELSTON,  
Dept. of Psychology, Bethany College, Bethany,  
West Virginia 26032 and DEBRA B. HULL, Dept. of  
Psychology, Wheeling College, Wheeling, West  
Virginia 26003. Interpersonal responses in  
situations involving alcohol abuse.

Twenty females and 20 males read a series of seven stories describing others' alcohol use. Half of the subjects first indicated how they "probably" would respond in the situations, then what they thought the "best" responses would be in the situations. The other subjects indicated "best" responses first, then "probable" responses. All responses subsequently were rated for assertiveness.

Analysis of variance on assertiveness ratings indicated: 1--overall, "best" responses were significantly more assertive than "probable" responses; 2--females' responses were significantly more assertive than males'; 3--situations involving dealing with a drunken father, encountering underage children drinking, and being asked by a roommate to go to a bar showed significant increases in assertiveness ratings between "probable and "best" responses, while the other four situations did not show significant increases.

LINDA J. PARROTT, Dept. of Psychology,  
West Virginia University, Morgantown,  
West Virginia, 26506. Philosophical  
foundations of natural science.

Philosophy is defined as the critical study of fundamental assumptions and the grounds for them. As such, philosophy is regarded as an inevitable foundation for all intellectual enterprises, among them the sciences. In science, assumptions initiate and alter hypotheses, and make possible the systematic organization of investigative practices and their products. When assumptions are not known or are not formalized as postulates, sciences lack internal consistency and rigor. Further, the failure of one science to articulate its underlying system of postulates hinders the interdisciplinary association of that science with others. There is no single philosophy, however, only particular kinds, and it is argued that some kinds are more useful to the sciences than others. Guidelines are suggested by which suitable postulates for scientific enterprises may be selected.



ALAN R. SACK and MARIAN B. LIDDELL, Division of Family Resources, College of Human Resources and Education, West Virginia University, Morgantown, WV 26506. Marital adjustment, division of labor and professional women.

The study investigated the relationship between marital adjustment of professional women and the extent which husbands contribute to housework and child care. The study concentrated on the dual-career marriage where women are typically well educated, work many hours and are committed to their jobs.

Using a 71 item questionnaire the survey was mailed to 359 female faculty at a land-grant university. The questionnaire included Spanier's Dyadic Adjustment Scale and items related to number of hours devoted to housework, career, and child care. A twenty-item scale determining spouses' involvement in household tasks was also included. Two hundred and ten women returned the questionnaire of which 113 were currently married. The Dyadic Adjustment Scale included four sub-scales: dyadic consensus: dyadic cohesion: affectual expression: and, dyadic satisfaction. Analysis of the data revealed dyadic satisfaction to be unrelated to age, number of children or number of years married. Multiple regression was used to determine significant predictors. Only the wife's satisfaction with the husband's house-keeping was found to be significant. The findings showed husband's not contributing equally to housework and child care as the wives. Household chores selected by mates are still primarily along traditional male and female roles. Professional husbands and wives devote almost an equal number of hours a week to their careers. However the number of hours a wife devoted to her career was a statistically significant predictor of dyadic adjustment. Women devoting greater hours toward the career tended to score lower on the affectual scale. While today's professional women may believe there is a move toward egalitarianism in the home, the research is not consistent with that belief. Professional women, while educated and as involved in their careers, tend to follow "traditional patterns" of work in the home.

PHILIP N. CHASE, THOMAS DONALDSON, DANIEL SILBERMAN, JULIE SMITH and JEFFREY ARBUCKLE, Dept. of Psychology, West Virginia University, Morgantown, WV 26506. Authoring Computer Assisted Training Packages.

As microcomputers have become more assessible, many trainers in industry have turned to computer assisted instruction (CAI) for assistance. Unfortunately, much of the commercially available instructional software does not train what it purports to train. Thus, trainers are developing their own materials. However, this requires a rare blend of content, computer and instructional design skills. Since many trainers do not have all of these skills, they need guidelines to develop their materials. This paper describes a method for assisting the trainers. An authoring aid is described that



integrates principles of instructional design with the current capabilities of computer materials. Few computer or instructional design skills are required by the trainer in order to use the aid. The trainer provides the content expertise and the authoring aid provides the computer and instructional design expertise. In order to provide the computer and instructional design components, the authoring aid is composed of software modules. One module prompts the trainer for content material that is coded as data. Then, the other modules manage the data, edit the data and present the data as content in the form of training packages. The presentation format depends on the learning outcome the trainer wishes to obtain. However, all presentation formats are based on principles of instructional design (Gagne, 1970; Merrill and Tennyson, 1977; Gagne, Wager and Rojas, 1981).

JOSEPH T. MANZO, Dept. of Geography and MICHAEL  
P. NAGY, Dept. of Sociology, Concord College,  
Athens, West Virginia 24712

Arizona Hillbillies: West Virginia Settlement in  
the Far West

It has been noted that Appalachians are moving greater distances in each successive wave of migration. The purpose of this paper is to examine a small group of West Virginians who moved to Arizona in 1979. A survey instrument consisting of open-ended questions was used to elicit responses concerning the general contentment, clustering propensities, movements in the area and potential back migration of this group. Preliminary results indicate that West Virginians in Arizona are potential back migrants but, due to the lack of employment opportunities in West Virginia, the surrounding states are more attractive.

SALLIE MAHOOD, Student, Concord College, Athens,  
West Virginia 24712. Social Science Images.

Given the unemployment trends of late, knowledge of career forecasts ought to be of importance to college students. A pre-test survey was completed by approximately three hundred students in a variety of general studies courses at Concord College. This test surveyed their attitudes toward career opportunities in traditional social science areas such as psychology, sociology, geography and philosophy. The test results were then compared to occupational forecasts in the standard publications. A majority of those sampled underrated career opportunities in social science fields. Those fields particularly underrated were geography and philosophy.



JOHN R. WARNER, JR., Department of Sociology and Anthropology, West Virginia Wesleyan College, Buckhannon, WV 26201. The Revolution in Juvenile Justice in West Virginia: 1977-1982

An analysis and critique of the response made by the juvenile justice system of a small rural state to the initiatives of the federal Juvenile Justice and Delinquency Prevention Act of 1974, the paper traces the response of the judiciary, legislative and executive branches of government.

The response begins in the West Virginia Supreme Court of Appeals when, on March 22, 1977, Justice Richard Neely ruled in Harris v. Calendine that status offenders may not be housed in the state reform schools or other facilities operated by the Department of Corrections. Many status offenders were released from custody at that time, including 61 of the 70 girls being held at the Industrial Home for Girls at Salem. In all, twelve court rulings are discussed.

The paper traces the growth of juvenile justice law between 1972 and 1982, following four acts of the state legislature: SB 200, 1977, SB 364, 1978, HB 1484, 1979, and HB 1010, 1982, and the work of the State Advisory Group which was mandated by Governor Rockefeller to administer Juvenile Justice federal funds in 1978.

The paper discusses the condition of the juvenile justice system today, and suggests problem areas and guidelines for the future.

CHARLES W. HENNIG and BRIAN D. SPENCER, Psychology Department, Salem College, Salem, West Virginia 26426. Dose-response effects of spiroperidol on tonic immobility in chickens.

Tonic immobility is a catatonic-like state that can be produced in many animals by a brief period of physical restraint. Under natural conditions this behavior seems to serve as an antipredator response. A number of studies have implicated the serotonergic neurochemical system with this immobility reflex. Recently, it has been suggested that there are two types of serotonin receptors in the body. One kind seems most sensitive to serotonin, which is known to affect immobility duration, while the other type of receptor is most sensitive to spiroperidol, whose effect on immobility is unknown. The present study examined the effects of various dosages of spiroperidol on the behavior known as tonic immobility. The subjects were 54 Production Red chickens. At 15 days of age, these animals were divided into six equal groups. Subjects in these groups received IP injections of either distilled water, 1% lactic acid solution, or .02, .2, 2.0, and 20 mg/kg dosages of spiroperidol dissolved in 1% lactic acid. After injections, each animal was restrained and the duration of their immobility episode was recorded. The means of the two control groups did not differ much from each other and their pooled mean duration was 228 sec, while the mean durations of immobility for the four spir-



operidol groups (755, 1122, 1853 and 2669 sec, respectively) differed significantly from that of the control groups. These findings support the hypothesis that the serotonergic system is involved with tonic immobility and give the dose-response characteristics of spiroperidol's effect on this behavior.



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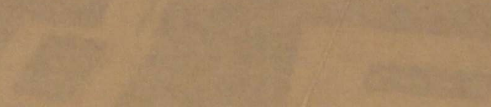


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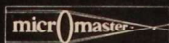


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