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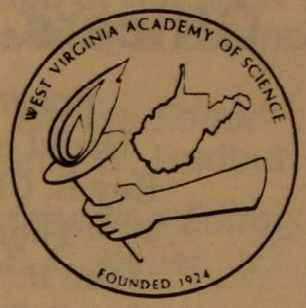

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ABSTRACTS OF PAPERS FOR THE FIFTY-SEVENTH ANNUAL SESSION

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Ecology

ROBERT K. RILEY, Biology Department, Frostburg State College, Frostburg, Maryland 21532
P. DOUGLAS CURTIS, Maryland Bureau Of Mines, 69 Hill Street, Frostburg, Maryland 21532
Preliminary results of the occurrence of endomycorrhizae on surface mine top soil piles.

The roots of grasses from ten different surface mine top soil piles were studied for the presence of endomycorrhizae. The top soil piles ranged in age from one to three and one half years and had been revegetated within six months after stockpiling to prevent erosion. Root samples were fixed in FAA, stained with acid fuchsin-lactic acid, and observed by light microscopy for presence of endomycorrhizae. Eight of the study sites showed less than 5% endomycorrhizae infection and two of the sites showed between 5% and 10% infection. These results show that the current top soil storage practices do not encourage an increase in the number of endomycorrhizal roots of the vegetation species used in erosion control. These results also suggest that stored top soil is a poor source of endomycorrhizal inoculum for revegetation species on reclaimed surface mined soils.

DAVID W. BUCKALEW, ROBERT K. RILEY, WAYNE A. YODER AND WILLIAM J. VAIL, Biology Department, Frostburg State College, Frostburg, Maryland 21532. Invertebrates as vectors of endomycorrhizal fungi and Rhizobium upon surface mine soils.

This study showed that invertebrates are vectors of both endomycorrhizal fungi and Rhizobium on grasses and a legume used as revegetation species on surface mine soils. Fumigated soil samples from disturbed and undisturbed sites were aseptically placed into sterile one-gallon glass containers, seeded with 100 surface-sterilized seeds each of rye grass, fescue, and clover. To these vessels were added grasshoppers and earthworms collected from the soil sample areas. The controls lacked the invertebrate inoculum. The experimental and control vessels were incubated at 23°C $\pm$ 1°C with a 12 hour photoperiod. After eight weeks, the roots were stained and cleared with acid fuchsin - lactic acid to determine endomycorrhizal infection. The presence of root nodules on clover indicated Rhizobium infection. Grasshoppers and earthworms were shown to be vectors of both endomycorrhizal fungi and Rhizobium on all soil samples tested. The grasshoppers provided up to 33 percent infection of endomycorrhizae in all species tested; earthworms to 52 percent. Root nodules on clover were present in up to 93 percent of the root samples inoculated with grasshoppers; the earthworms produced up to 95 percent infection.

STEVEN L. STEPHENSON, Dept. of Biology, Fairmont State College, Fairmont, West Virginia 26554. A preliminary report on the distribution and ecology of Myxomycetes in the forests of West Virginia.

Field collections of Myxomycetes were made from four different study areas in northern and central West Virginia during the period of 1977-1981 to obtain data on the distribution and ecology of these organisms in the forests of the state. Forty-two taxa representing 16 genera have been identified to date. This total includes several species which have not previously been reported from the state. Prominent among the genera are Arcyria, Comatricha, Hemitrichia, Physarum, Stemonitis, Trichia, and Tubifera, each of which is represented by three or more species. Arcyria denudata, Trichia favoginea, Hemitrichia calyculata, and Metatrichia vesparium have been the most commonly encountered species. Although most of the species reported in the present study are considered to be cosmopolitan, only six were found in all four study areas. Collections to date have been limited to specimens which had fruited in the field under natural conditions, but these are to be supplemented with moist chamber cultures.

GILBERT B. CHURCHILL, Planner and Information Officer of the Monongahela National Forest, Elkins, W. Va. 26241, and EARL H. TRYON, Professor Emeritus, Division of Forestry, West Virginia University, Morgantown, W. Va. 26506. Application of an Ecological Classification System on the Monongahela National Forest.

Land classification systems based on ecological variables hold promise as a means of organizing data from individual resources in order to recognize interrelationships and predict land capability. Prompted by the National Forest Management Act of 1976, the Monongahela National Forest has studied ecological variables affecting the Forest and has developed a system presently in use.

Geology, landform, climate, and vegetation were found to be significant variables for mapping ten (10) "Landtype Associations" for the Forest.

From these associations, predictions can be made on land capabilities such as potential for vegetation growth, wildlife habitat, recreation uses, or visual quality. Water yield and quality can be predicted. The potential of an area to support intensive use such as road or building construction also can be predicted.

The Forest landtype associations will become the basis for studying land capabilities in the evolving Forest planning process and are expected to become a foundation for future land classifications based on more local and specific variables.

The ecological classification system offers significant advantages to decision makers by predetermining land capabilities in lieu of more traditional approaches of collecting data from several disciplines and integrating it for each decision to be made. The objective is to improve the ability of the Forest to site projects in locations best suited to them.

R. C. CREEKMORE AND T. E. WEAKS. Department of Biological Sciences, Marshall University, Huntington, West Virginia 25701.
An analysis of the vertical and horizontal distribution of hepatic vegetation in a mixed mesophytic forest.

Using step-wise discriminant analysis, four biological parameters were used to evaluate vertical and horizontal distribution of hepatic vegetation at seven study sites in a mixed mesophytic forest. Analysis of variance indicated that the canonical mean for the exposed (north) bole surfaces of trees was significantly different from that of the sheltered (south) sides. However, when individual stations were evaluated, the data did not suggest that hepatic coverage was predictably greater for any one particular side of the bole.

Analysis of variance indicated that the canonical means for zero cm (ground level) and sixty cm heights on the tree bole were significantly different from that for 180 cm. A negative correlation was observed between height on the tree bole and coverage for all except the flood plain station. The total number of species was highest at zero cm.

Based on coefficients for canonical variables, the prominence index was the most influential parameter in separating both vertical and horizontal vegetation. Quadrat coverage ranked second. Of all hepatics encountered in the study, Frullania eboracensis Gott. demonstrated the broadest ecological tolerance, in respect to vertical range and occurrence.

STOKES BAKER, LAWRENCE CHLUMSKY, AND LESLIE GORDON, Department of Biology, Davis and Elkins College, Elkins, West Virginia, 26241.
Reciprocal Succession of Spartina alterniflora and the Black Mangrove

The reciprocal succession of Spartina alterniflora and the Avicennia nitida Jacq. was investigated on the island of Seahorse Key, Florida, part of the Cedar Key National Wildlife Refuge, located 60 miles southwest of Gainesville. Facilities were provided by the University of Florida Marine Laboratory.

The windward side of the island has two distinct beaches. The first is occupied by S. alterniflora and the A. nitida, while the other has neither of these species. Based on initial observations, the following successional pattern was hypothesized; S. alterniflora is a primary successional species that, given a good substrate and protection from strong currents, will establish itself on the beach. The A. nitida has seeds that germinate on the tree and then fall into the water and are carried until they take root. These Mangrove seedlings that root in intertidal mudflats are eventually swept away by strong currents, but those that establish themselves at the upper limit of the S. alterniflora are more likely to remain established. As the A. nitida grow, they shade out and kill the S. alterniflora. When the A. nitida die two possibilities exist: (1) the S. alterniflora recolonize the area initiating a new cycle; or (2) erosion of the beach continues until a cove is formed.

The investigation involved the counting of A. nitida, to determine the areas where they were distributed; the use of a photochemical light meter, to show the distribution of light.

DONALD G. KAIN, JANICE E. FISHER, AND JOHN E. SCHMIDT, Biology Section, Div. of Water Resources, WV Dept. of Natural Resources, Charleston, West Virginia 25311.
Fall 1981 mercury levels in water, sediments, and fish in the Monongahela River System, West Virginia.

Water, sediment, and fish samples were collected from the Monongahela River System near Fairmont, West Virginia in October 1981. Water and sediments were collected at nine sites in the river, while fish were taken in five areas of the drainage. Water samples were taken 25-50 feet from the shoreline in cubitainers submerged to a depth of six inches. Sediments were grabbed with a Peterson Dredge. Fish were collected by gill-netting and angling. Composite samples of whole fish and fillets were examined. All samples were digested using sulfuric acid, nitric acid, and potassium permanganate, then autoclaved. Total mercury was determined with an atomic absorption spectrophotometer by the cold vapor method.

Water, sediments, and fish were found to contain measurable amounts of mercury. Mercury levels of 0.1 µg/l were found in two of nine water samples, with all others below this amount (analytical restrictions did not allow quantitative measurement of mercury below 0.1 µg/l). Measurable mercury levels in sediment samples ranged from 0.04-0.10 mg/kg. Fish samples contained up to 0.58 mg/kg mercury, with most samples far below this level.

Water sample analysis indicated that low to moderate levels of mercury exist in the Monongahela River. Levels in most fish tissue samples were considered low. In general, higher mercury levels were found in top predator species than in the suckers. Fillets typically contained more mercury per unit weight than whole fish of a given species. Mercury is likely to remain in the system for some time as it finds its way from the sediments into the water and aquatic organisms. Continued monitoring is recommended.

E.C. KELLER, JR., L. BOHME, D. WERNER, and R. GERBER. Department of Biology, West Virginia University, Morgantown, W.V.
Association Among Chemical/Physical and Biological Variables in Characterizations of an Acid Mine Drainage Influenced River System.

Some sixty biological and chemical/physical variables for the Monongahela River system were statistically examined from four quarters of data from a sampling survey in 1975 and 1976. Clusters of variables across the 83 sites and 4 dates revealed strong associations

of three types viz.,: 1) chemical/physical with biological, 2) chemical/physical, and 3) biological. Various ecological diversity measures were found to be associated with acidity estimates and numerous biological variables. Conversely, there was a considerable amount of association of segments of the biotic variables with certain of the chemical/physical variables, e.g., precipitation/flow/PO_4/NO_3/SO_4 with the % of Cycinophytes/Ankistrodesmus-Synedra biomass/ the total algal biomass.

E.C. KELLER, JR., M. ROBINSON, L. BOHME, R. GERBER, and D. WERNER. Department of Biology, West Virginia University, Morgantown, W.V. Comparative Aspects of the Inclusion and Exclusion of Biotic Variables in the Characterization of the Acid Mine Drainage Influenced Monongahela River System.

Cluster analyses were used to demonstrate that the inclusion of biological variables (e.g., bacterial and algal densities or biomass) in the characterization of river systems using "traditional" chemistry based analyses extended the degree of statistical definition of these macro habitats. The inclusion of these additional significant variables increases the numbers of similar areas (more clusters).

Botany, Horticulture and Microbiology

DAVID M. LAW, Department of Biology, The Pennsylvania State University, University Park, Pennsylvania 16802.
Determination of in vivo levels of IAA and IAAsp.

The auxin IAA and its metabolites occur in extremely low concentrations in plants. A method is described for determining levels of IAA and indoleacetyl aspartic acid (IAAsp) in as little as 1 g of light-grown Little Marvel pea tissue. Samples were extracted in hot 80% methanol containing 0.3 mg/ml BHT. ^{14}C-labeled IAA and IAAsp were added to calculate recovery. The filtrate was concentrated in vacuo, applied to a small column of Sephadex G-10 over layered with carboxymethyl cellulose and PVP (2:1:2), and eluted with 0.01 M ammonium acetate. Labeled fractions were then applied to a small column of DEAE-cellulose. IAA was eluted with 15 ml 1 N acetic acid; IAAsp was eluted with 0.15 N HCl. These fractions were concentrated separately with a Sep-Pak C_{18} cartridge to 2 ml methanol. Measurements of IAA and IAAsp were made using HPLC with an electrochemical detector. The solvent used was 0.05 M perchloric acid, 5 mM acetic acid, and 1 mM EDTA (adjusted with NaOH to pH 3.5 (IAAsp) or pH 5.0 (IAA)) added to methanol (4:1). Some data on in vivo levels of IAA and IAAsp in this tissue will be presented.

KATHARINE B. GREGG, Dept. of Biology, West Virginia Wesleyan College, Buckhannon, West Virginia 26201.
Reproductive Biology of the Orchid Platanthera (Habenaria) ciliaris (L.) Lindley in a Wet Meadow in West Virginia.

A population of Platanthera (Habenaria) ciliaris (L.) Lindley, estimated at 10,000 individuals, was investigated from July-October 1980, in a 20-acre wet meadow in Barbour County, West Virginia. Density ranged from 0 to 7.3 plants/m^2. In mid-August 61% of the plants flowered, each producing an average of 32.7 flowers. Papilio glaucus, P. polyxenes, P. troilus, and Danaus plexippus were observed pollinating the flowers. An average of 14 pollinaria per butterfly were carried by the major pollinator, P. glaucus. Pollinaria were attached to the compound eyes near the base of the proboscis of the butterflies. Seed set was 38%, and capsules dehisced 8 weeks after pollination. Herbivory destroyed 5% of the floral axes; in addition, a fungal pathogen killed 5% of the capsules before they matured. Artificial pollinations carried out in a growth chamber showed the species incapable of autogamy but capable of selfing, outcrossing, and geitonogamy. Examination of rhizomes from flowering plants in late August indicated that 94% had produced new growths, 87% already larger than

those of 1980. Occurring sympatrically were P. clavellata, P. lacera, Cleistes divaricata, Spiranthes cernua, and S. gracilis. The biology of these orchids will be compared to that of P. ciliaris.

WM. HOMER DUPPSTADT, Dept. of Biology, West Virginia University, Morgantown, West Virginia 26506.
New Additions to the Vascular Plant Flora and other Important Plant Information for West Virginia.

During the past year, eight new species of vascular plants have been identified or verified at the West Virginia University Herbarium as new records for the state of West Virginia. The new species here reported are Isoetes riparia Engelm., Chloris verticillata Nutt., Carex tetanica Schkuhr, Spiranthes vernalis Engelm. & Gray, Celtis tenuifolia Nutt. var. georgiana (Small) Fern. & Schub., Polygonum amphibium L., Mazus miquelii Makino. and Krigia oppositifolia Raf.

A second collection of Trillium cernuum L. has been made after 102 years. Sibara virginica (L.) Rollins was erroneously reported for West Virginia. Our specimens so labeled are Cardamine impatiens L.

OSCAR E. SCHUBERT, Div. Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506, TERRY D. SPITTLER, and ROCCO MARAFIOTI, Northeast Regional Pesticide Lab., IR-4, New York State Agricultural Experiment Station, Geneva, New York 14456.
Glyphosate residues in raspberries and blackberries following preplant and directed posttransplant treatments.

Preplant and directed posttransplant applications of glyphosate (N-(phosphonomethyl)glycine were made at 3.4, 6.7, and 13.4 kg/ha to black raspberries (Rubus occidentalis L.) cultivars 'Blackhawk' and 'Bristol'. 'Black Satin' thornless blackberries (Rubus spp.) were given similar preplant and directed posttransplant glyphosate treatments at 3.4 kg/ha only. Residues of glyphosate and its metabolite, aminomethylphosphonic acid, were <0.05 ppm for black raspberry fruit samples harvested 59 weeks after planting. Residues of glyphosate and aminomethyl phosphonic acid were <0.05 ppm for blackberry fruits harvested 26.5 months after treatment.

Excellent weed control was achieved during the first growing season in all glyphosate-treated plots. Weed control ratings ranged from 90 to 95 percent for orchardgrass (Dactylis glomerata L.), Kentucky bluegrass (Poa pratensis L.), ground ivy (Glechoma hederacea L.), common cinquefoil (Potentilla canadensis L.), buckhorn plantain (Plantago lanceolata L.), and blackseed plantain (P. rugelii Done.). Red sorrel (Rumex acetosella L.) and yellow woodsorrel (Oxalis stricta L.) were not controlled. One species of panicum similar to switchgrass (Panicum virgatum L.) was only partially controlled.

OSCAR E. SCHUBERT, Division of Plant and Soil Sciences, West Virginia University, Morgantown, West Virginia 26506, TERRY D. SPITTLER, and ROCCO MARAFIOTI, Northeast Regional Pesticide Laboratory, IR-4, New York State Agricultural Experiment Station, Geneva, New York 14456. Glyphosate residues in strawberry fruit following rope-wick application to tall weeds.

Weeds taller than 'Catskill' and 'Surecrop' strawberry (Fragaria x ananassa) plants were treated with glyphosate (N-(phosphonomethyl)-glycine) by making one, two or three passes over them with a rope-wick applicator containing a glyphosate:water mixture consisting of the isopropylamine salt of glyphosate (41% active) diluted with three parts water. Residues of glyphosate were <0.05, <0.05, 0.360, and 0.503 ppm for the untreated, one-pass, two-pass and three-pass treatments, respectively, for the 'Catskill' strawberries and <0.05, <0.05, 0.056, and 0.290 ppm for similar treatments, respectively, of 'Surecrop' strawberries. Residues of the metabolite, aminomethylphosphonic acid, were <0.05 for all treatments of both strawberry cultivars.

The rope-wick application gave good to excellent control of quackgrass (Agropyron repens (L.) Beauv.), acceptable control of curly dock (Rumex crispus L.) and no control of red sorrel (Rumex acetosella L.) weeds that were taller than the strawberry plants. Common chickweed (Stellaria media (L.) Cyrillo) and mouseear chickweed (Cerastium vulgatum L.), which were below the tops of strawberries at the time of treatment, were not controlled.

OSCAR E. SCHUBERT, Div. Plant and Soil Sciences, West Virginia University, Morgantown, WV 26506, TERRY D. SPITTLER, and ROCCO MARAFIOTI, Northeast Regional Pesticide Lab., IR-4, New York State Agricultural Experiment Station, Geneva, New York 14456. Glyphosate residues in raspberries and blackberries following preplant and directed posttransplant treatments.

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PETER BACIU, E.C. KELLER, JR., and G. BISSONNETTE. Depts. of Biology and Plant Pathology and Bacteriology, West Virginia University, Morgantown, W.V. Association Among the Densities of Coli Phage, E. coli, Total Bacteria, Algae, Total Coliforms, and Fecal Coliforms Below a Sewage Outfall in the Monongahela River.

In a sampling of the Monongahela River, in December, 1981, six microbiological variables were examined at six sites one up-river and five down-river from the Morgantown, W.V. sewage plant. Three groups of associations among the microbiological population were observed viz.: 1) the coli phage and the fecal coliforms, 2) the coliforms, in general, and the total bacteria, and 3) the total algae were somewhat associated with the total bacteria and coliforms, but reached their peak density further up-stream than those of the total bacteria and coliform peak densities.

S. CRAIG STAMM and E.C. KELLER, JR. Department of Biology, West Virginia University, Morgantown, W.V. Further Analysis of the Mutagenic-Cytotoxic Potential of the SRC-II Heavy Distillate

Solvent Refined Coal-II (SRC-II) is one of the synfuel technologies that is being investigated for product safety with regard to cytotoxicity, mutagenic potential, and carcinogenic activity. Findings indicate that the heavy distillate, one of the three major fractions of synfuel produced by the SRC-II process, is the most hazardous with respect to biohazards. These results further the previous tier testing (hierarchical testing) of this distillate and its chemically unique solvent extractions, by using the yeast D-7 and the Ames Salmonella mutagen detecting assays. These two assays are also used to detect the cytotoxic effects of the distillate and its subfractions. These results will provide information for the coal conversion process to be modified in order to hopefully eliminate hazardous products.

Zoology and Entomology

Albert R. Buckelew Jr. and Alison Sandercox, Dept. of Biology, Bethany College, Bethany, West Virginia 26032. An unusual nest site and diet of Barn Owls (Tyto alba) in Bethany, West Virginia.

Barn Owls (Tyto alba) usually nest in sheltered places such as barns, belfries, or hollow trees. On July 15, 1976, we found a Barn Owl nest in an unusually exposed situation. Three young of various ages were found on the roof of a stair tower on Bethany College's Old Main. The stair tower of Old Main is 120 ft from the sidewalk to the top. The roof is flat, six ft in diameter, and hexagonal. There is a small trap door in the roof. The only shelter was the waist high wall around the roof, and a rusty folding chair that had been left on the roof. The wall provided protection from the wind. We assume the eggs were laid under the chair. All three young fledged by August 2. Pellet and fecal material (2840 gm) from the roof were analysed for prey species. Since most of the pellets, being exposed to rain, had disintegrated, we did not attempt to count them. The number of prey animals was estimated by counting lower half-jaws and dividing by two. The results were as follows: Meadow Vole (Microtus pennsylvanicus), 480; Shorttail Shrew (Blarina brevicauda), 139; White-footed Mouse (Peromyscus sp.),64; Hairy-tailed Mole (Parascalops breweri), 20; Black Rat (Rattus rattus), 2. Also found were Rock Dove (Columba livia), 1; Starling (Sturnus vulgaris), 1; and three unidentified passerine birds. One or more of the birds may have died on the roof of natural causes.

JOHN DELFINO, 356 Roxalana Hills Dr., Dunbar, West Virginia 25064. Winter bat survey in West Virginia caves.

Eleven caves in West Virginia were surveyed between 14 January and 27 March 1981 for species diversity and abundance of bats. A total of seven species, numbering 4,154 individuals, was present. No cave housed all species. The following numerical frequencies and percentages of occurrence, respectively, were determined: Pipistrellus subflavus (2,160;52.00), Myotis lucifugus (1,715;41.29), Eptesicus fuscus (187;4.50), Myotis sodalis (60;1.44), Myotis keenii (12;0.29), Plecotus townsendii (12;0.29), and Myotis leibii (8;0.19). The hierarchical scheme of abundance did not imply that each species maintained that particular position for each cave. A comparison of six caves to those same ones surveyed by Dotson(1977) was made to ascertain the stability of the bat populations found within. The matched-pair t-analysis for both the abundance and the intraspecific data indicated non-significance.

DONALD TARTER, DWIGHT CHAFFEE AND KIMBERLY BENSON, Dept. of Biological Sciences, Marshall University, Huntington, WV 25701. Low pH tolerance, under laboratory conditions, of the nymphs of three congeneric mayflies, B. berneri, B. carolina and B. lacustris.

The nymphal populations of the mayflies Baetisca lacustris McDunnough, B. berneri Tarter and Kirchner and B. carolina Traver were experimentally tested under laboratory conditions to determine their tolerance to low pH. The straight-line graphical interpolation method was employed to determine the pH values at which 50 percent of the mayflies survived after 96 hours. The TL_m^{96} values were 3.6, 3.5 and 3.2 for B. lacustris, B. carolina and B. berneri, respectively.

CHARLES C. COFFMAN, Plant Pest Control Division, West Virginia Department of Agriculture, Charleston, W.V. 25305. Merope tuber Newman (Mecoptera: Meropeidae) records from West Virginia collections.

Malaise trap surveys conducted in parts of West Virginia during 1976, '77 and '79 and a subsequent check of other potenial record sources (formal collections and individuals) produced 24 new specimen records and 6 new county records for the rare mecopteran, Merope tuber Newman. Of the 24 specimens, the sexes were evenly split at 12 each. New county records included: Berkeley, Hampshire, Mineral, Hardy, Monroe, and Kanawha. Of the 20 specimens taken in Malaise traps, 16 were deposited in the West Virginia Department of Agriculture collection at Charleston and 4 in the West Virginia University (WVU) collection at Morgantown. Three specimens were already in the WVU collection and one in C. T. Meadors' personal collection at the University of Charleston.

A discussion of collection site characteristics, collection methods and the prospect of a terrestrial vs. aquatic habit for the immatures is given.

RALPH W. TAYLOR AND KAREN J. HORN, Department of Biological Sciences, Marshall University, Huntington, WV 25701. A list of freshwater mussels suggested for designation as rare, endangered or threatened in West Virginia.

West Virginia currently has no freshwater mussels listed as rare, endangered or threatened within the state. There are, however, several species of mussels resident to the state listed on the Federal Rare and Endangered list. This paper suggests 15 species for consideration by the West Virginia Department of Natural Resources for designation as endangered within the state.

We have used the following criteria in determining that a species is in danger of being extirpated from West Virginia waters: 1)

currently found in three or fewer streams within the state; 2) currently found in small numbers wherever it is found; 3) historical records of a species being present in a stream but no contemporary record.

Most of the streams in West Virginia are under some form of environmental stress as a result of mining, timbering or industrial activity. It may well be that all species of mussels are endangered and should be afforded some protection.

DEBRA L. DIAL, Medical Technology Program and JOHN E. HALL, Department of Microbiology, West Virginia University, Morgantown, West Virginia 26506. Comparison of stains for the detection of bacteria-like endosymbionts in Acanthamoeba culbertsoni.

In a previous study employing electron microscopy, endosymbionts resembling Gram-negative bacteria were found to exist free in the cytoplasm of Acanthamoeba culbertsoni, HN-3 strain. We then compared three staining techniques, the Gimenez stain, the Rowbotham modification of the Gimenez stain, and the Hoechst stain, for their ability to detect these endosymbionts. The Gimenez and Rowbotham procedures stained the bacteria bright red against a blue-green background whereas the Hoechst stain showed fluorescent bacteria against a greenish-black background. The endosymbionts were observed in various stages of cell division within the amebae employing all three techniques. The Gimenez technique was the most consistent of the three, and its sensitivity in brightfield microscopy at 800 to 1000 X magnification was equal to that obtained with the Rowbotham method. The Hoechst stain detected bacteria at 900X magnification employing flourescent microscopy, but demonstrated the endosymbionts less frequently, probably because of rapid decline in stain intensity. This research is supported by the West Virginia University Medical Corporation and by NIH Biomedical Research Grant Number 3 SO7-RR05433-18.

JOHN E. HALL and HERBERT VOELZ, Department of Microbiology, West Virginia University, Morgantown, West Virginia 26506. Bacteria-like endosymbionts of Acanthamoeba culbertsoni: occurrence and ultrastructure.

Gimenez staining of Acanthamoeba culbertsoni, strain HN-3, revealed rod-shaped cytoplasmic inclusions. The culture was presumably axenic. Similar inclusions were found in a culture from the American Type Culture Collection (ATCC # 30173, courtesy of Dr. P.-M. Daggett). Electron microscopy of thin sections of both cultures showed bacillary-type organisms measuring 1.3 to 3.3 μm by 0.22 to 0.33 μm. The cell envelopes were those typical for Gram-negative bacteria. The cells were surrounded by an electron-translucent area, suggesting the presence of a capsule. The organisms obviously grow and reproduce in both trophozoites and cysts. They appear to be free in the amebic cytoplasm, i.e., they are not enclosed by a phagosomal or phagolysosomal membrane. They are retained by the ameba during encystment and excystment. All attempts have failed so far to isolate the

organisms from their hosts. This research is supported by the West Virginia University Medical Corporation and by NIH Biomedical Research Grant Number 3 SO7-RR05433-18.

DONALD C. TARTER AND MARK F. SHERIDAN, Dept. of Biological Sciences, Marshall University, Huntington, West Virginia 25701. The status of the stonefly genus Diploperla in West Virginia (Plecoptera: Perlodidae).

Diploperla robusta is widely distributed, except in the Potomac River drainage, in 17 counties in West Virginia. Diploperla duplicata is only found in Braxton and Nicholas Counties, and D. morgani is only distributed in Braxton and Pocahontas Counties. No stream thus far sampled in West Virginia contains all three species. The Little Kanawha River contains the naiads of D. duplicata and D. morgani, while Panther Creek has D. duplicata and D. robusta.

THOMAS K. PAULEY, Department of Natural Science, Salem College, Salem, West Virginia 26426. A Study of a Transferred Population of Cheat Mountain Salamanders.

On 26 June 1981, 45 Cheat Mountain salamanders, Plethodon nettingi, were transferred from a site on Shavers Mountain east of the confluence of Yokum Run and Shavers Fork to a site south of Stonecoal Run on Cheat Mountain. The transfer was necessary because the population was located in an area proposed as a mining site (Linan #3) by Enviro Energy, Inc. of Durbin, West Virginia.

The Stonecoal site was selected from 6 sites studied because the environmental factors and vegetation were congruent with known P. nettingi populations. Two day collecting trips and two night collecting trips during cool, damp weather showed that P. nettingi was not present at this site.

In an attempt to collect as many P. nettingi as possible, four trips were made to the Linan site, two during the day and two just after dusk, between 23 and 25 June. A total of 165 salamanders was observed, 53 of which were P. nettingi.

To determine the success of the transfer, Enviro Energy, Inc. has agreed to provide the funds to monitor this transplanted population twice annually until 1987.

Psychobiology

RONALD D. TAYLOR, Department of Psychology, Salem College, Salem, West Virginia, 26426. The acquisition of a running response as a function of squad position in laboratory rats.

Evidence has accumulated suggesting that laboratory rats excrete odors following rewarded and nonrewarded goal events, and that these odors differ as a function of the treatments administered. While it has not, thus far, proven possible to chemically isolate and identify these apparent odors, substantial behavioral data point to their presence. One procedure frequently employed to study this phenomenon involves administering rewarded (R) and nonrewarded (N) trials to a squad of rats in a straight alleyway with each member of the squad receiving the same goal event (i.e., either R or N) on a given trial. After some amount of training, the average speed for members of the squad, excluding the first rat in the squad, is faster on R trials than it is on N trials; a phenomenon known as "patterned responding." Under these conditions, patterned responding is taken as suggesting control by odor cues, providing other sources of potential control are eliminated. Rarely has attention been given to the performance of individual rats in the squad or to the effects of squad position on patterned responding.

The present data were collected using a slightly different procedure which permitted an examination of run speeds as a function of both squad position and goal event. The results indicated that most, but not all, rats developed patterned responding. For those who did, the magnitude of patterned responding was primarily due to decreasing run speeds on N trials as training progressed. The rats did not exhibit patterned responding when run in the first position in the squad. The data are discussed in terms of their implications for the odor-production hypothesis and notions concerning the accumulation of odors across rats.

CHARLES W. HENNIG, Dept. of Psychology, Salem College, Salem, WV 26426. The relationship between tonic immobility (animal hypnosis) and alpha-adrenoceptor activity in chickens: Effects of receptor stimulation and blockade.

Tonic immobility is a temporary state of motor inhibition which can be induced in a variety of animals by a brief period of physical restraint. The immobility response seems especially sensitive to manipulations thought to affect fear and, under natural conditions, appears to serve as an antipredator strategy. The noradrenergic neurochemical system has long been implicated with fear responses and as the basis for defensive fight-or-flight reactions. Now, recent studies have also shown its involvement with tonic immobility.

The present research investigated the interaction between adrenergic agonists and antagonists with the

immobility response in domestic fowl. Groups of young chicks were injected with either high or low doses of the alpha-adrenergic agonist methoxamine or a control solution. Then they were given a second injection containing doses of the alpha antagonists prazosin and yohimbine or a control solution. Low doses of methoxamine decreased the duration of immobility, while high doses of the same drug caused an increase in this response. Prazosin had no effect on immobility when given by itself, but when administered in conjunction with methoxamine it produced an increase in the duration of immobility. Yohimbine, on the other hand, consistently decreased the duration of tonic immobility. These results are discussed in terms of the relative effects of alpha-1 and alpha-2 adrenoceptor activity on the immobility response.

CYNTHIA L. IMHOFF, Dept. of Psychology, Allegheny College, Meadville, Pa. 16335. Tonic Immobility as a function of activity levels: A comparison of nocturnal and diurnal lizards.

Tonic immobility has been hypothesized to represent one of a number of behavior patterns involved in predator-prey relationships. In response to some physical restraining stimulus, many species of animals will assume a temporary state of extreme behavioral inhibition and loss of righting reflexes. This immobility reaction serves to minimize stimulation for further attack by a predator, and thus may have biological survival value. An endogenous circadian rhythm appears to influence this behavior in Anolis carolinensis, a diurnal lizard. Under a cycling photoperiod and constant lighting conditions, a pattern in the durations of the responses has been observed, with longer durations at night compared to day. Hennig and Dunlap (1977) reported that nocturnal and diurnal lizards produced similar patterns of immobility responses, and concluded that the durations of the response were unrelated to the activity cycles of these lizards. It should be noted, however, that these investigators made no separate study of the activity cycles of the two species of lizards they tested. In the present study, immobility durations and activity levels of the nocturnal Hemidactylus garnoti and diurnal Curly-tailed lizard were measured. It appears that their activity cycles are opposite, and that their immobility duration patterns are related to activity under cyclic photoperiod conditions. Whether the immobility response in these two species of lizard is endogenously controlled is under investigation.

JULIA JUNKER, Dept. of Psychology, Allegheny College, Meadville, Pennsylvania 16335. Androgen manipulation and the attack behavior of Gallus gallus.

This experiment has been conducted in order to examine the effects of testosterone proprionate (T) and two androgen antagonists (flutamide (F) and cyproterone acetate (C)) upon the attack behavior of Gallus gallus through behavioral and radioimmunological assay. Six roosters were isolated in separate cages for two months. The roosters underwent five trial periods, each lasting four days, of drug injection coupled with subsequent testing in an attack chamber. A clear plastic shield equipped with a two-way microswitch separated each pair of roosters such that each bird served simultaneously as both a target and a subject throughout 15 minute testing intervals. Pecks against the shield were recorded by electromechanical counters, and the effect of injecting T, F, and C on attack frequencies were compared with a control group. The number of attacks were found to increase in four of the six birds after T injection. C and F were found to be equally effective in diminishing attack frequencies. The frequency of attack in one bird of a pair seemed to affect the frequency of the other. Statistical analysis of attack frequencies as well as data from radioimmunoassay of plasma testosterone levels in all phases of the experiment will also be reported.

ELIZABETH CRANDALL, Allegheny College, Meadville, Pa. Stress-induced increase in endogenous opiate peptides and pain responsiveness in the rat.

The effects of both acute and chronic stress on the levels of opioid peptides (enkephalins and endorphins) were investigated. Opioid levels were measured behaviorally, through changes in responsiveness to pain. Stress was induced three different methods: food deprivation, noise, and electric footshock. The tail-flick apparatus of D'Amour and Smith (1941) was used to assess the changes in pain responsiveness. The results indicate that stress caused a significant increase in the levels of opioid peptides, measured by a decrease in pain responsiveness in the rat. These effects appear to habituate with time, and are reversed by the opiate antagonist naloxone.

JEFFREY D. STEKETEE, Department of Psychology, Allegheny College, Meadville, Pennsylvania 16335. The long term effects of L-dopa treatment on dopamine depleted hypokinetic rats.

Parkinson's disease is a debilitating disease, characterized by tremors, muscular rigidity, akinesia, facial spasms, and choreioform movements. Parkinson's disease is believed to be caused by having too little dopamine in the brain, and L-dopa, the immediate precursor to dopamine, is the most effective treatment to-

day. Unfortunately, the L-dopa treatment has an undesirable side effect known as the "on-off" effect. Recently Smith and Young (1974) developed an animal model for one of the symptoms of Parkinson's disease (hypokinesia). Hypokinesia, a lack of motor movement, is also one of the symptoms of the "on-off" effect. Butterworth, et al (1977), showed that L-dopa in combination with benserazide (a decarboxylase inhibitor) is effective in relieving hypokinesia in rats for a short period of time. In this study 12 rats were lesioned with 6-OHDA, 6 of which were given daily injections of L-dopa in combination with benserazide, and the other 6 were given daily control injections. The treatment period lasted 11 weeks. Lesion control animals were also treated with daily control injections. The amount of locomotor activity and changes in locomotor activity were observed during 1 hour sessions which occurred twice a week during the 11 week treatment period. The results of this study showed an inhibition of locomotor activity by the L-dopa treatment. Reasons for this inhibition are discussed.

Chemistry

B. DAS SARMA, BERNARD KRABACHER, MARK BATES, CHARLES BUKOVINSKY, JOHN L. DOUGHERTY, TIMOTHY L. GRIFFITH, SUSAN L. LOVEJOY, AND DAVID B. SPRINGER, Department of Chemistry, West Virginia State College, Institute, West Virginia, 25112.

PLATINUM COMPLEXES WITH ANTICANCER POTENTIAL

A large number of platinum complexes, $Pt(NN)X_2$ and $Pt(NN)X_2Y_2$, where NN is an amine or 1/2 diamine, X is Cl^-, Br^- or 1/2 dicarboxylate and Y is Cl^-, Br^- or OH^- trans to each other, have been investigated in terms of their solubility in 0.15 M sodium chloride solution, and the rate of solvolysis in water and in DMSO. The results indicate that the solubility, the nature of reaction intermediate, the rate of solvolysis as well as the activity of chloroaminoplatinum complexes may be widely modified by anchimeric polar group on the coordinated amine.

The paper will also report the possible usage of bacterial filamentation as a possible prescreen for platinum complexes in animal test. The data for several platinum complexes will be presented for a possible structure-activity and *in vitro* *in vivo* correlation.

B. DAS SARMA, Department of Chemistry, West Virginia State College, Institute, West Virginia, 25112 and SHILADITYA DAS SARMA, Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139. Synthesis and characterization of trans-bis (N-Cyanato) bis(ethylene diamine) Chromium (III) Complexes.

Synthesis of a crystalline cyanato complex by a novel method was first reported earlier (S. Das Sarma and B. Das Sarma, Inorg. Chem. 18, 3618, 1979). This paper reports synthesis of several N-cyanato complexes by the selective oxidation of N-thiocyanatochromium(III) complexes with potassium bromate. The compounds have been characterized from their mode of synthesis, elemental analysis, infrared and electronic spectra. The metal-nitrogen coordination has been further elucidated by single crystal x-ray analysis. Evidence for the formation of elusive O-cyanatochromium(III) complexes in solution will also be presented.

Geology and Mining

HAROLD V. FAIRBANKS and TETSURO OTSUKA, Department of Chemical Engineering, West Virginia University, Morgantown, West Virginia 26506. A Heated Ultrasonically Vibrated Trough for Drying of Pulverized Washed Coal.

Ultrasonic vibrations were coupled directly to a heated, inclined aluminum trough for the purpose of drying washed, fine coal particles. The particle size ranged from 50 to 400 microns. The flat section of the trough was 8 cm wide and 90 cm long, having 2 cm walls to contain the particles while being dried. The experimental parameters included: (1) ultrasonic intensity, (2) initial moisture content, and (3) particle size range. It was found that there was a maximum drying rate for each parameter. The efficiency for the removal of moisture was best using a particle size range of 100 - 150 microns. The ultrasonic frequency used was 20 kHz.

WARREN NORTON, Department of Geology, Kent State University - Stark Campus, North Canton, Ohio 44720, and STEVEN McCLELLAND, West Virginia Geological and Economic Survey, Box 879, Morgantown, West Virginia 26505. A Middle Pennsylvanian Compression Fossil Florule from Sharon, Kanawha County, West Virginia

A compression florule was collected near Sharon, Kanawha County, West Virginia below the level of the Cedar Grove coal of Middle Pennsylvanian Age. The florule is dominated by lycopod twigs. Other taxa present include: calamites, cordaites, Mariopteris, Asterophyllites, Eusphenopteris, and Eremopteris.

RONALD L. MARTINO and RICHARD B. BONNETT, Department of Geology, Marshall University, Huntington, W. Va., 25701. Fauna of the Winifrede Limestone, Upper Kanawha Formation, Mingo County, W. Va.

An unusual shallow marine fossil assemblage was collected from the Pennsylvanian Winifrede Limestone north of Musick in Mingo County. The assemblage consists of echinoid plates and primary and secondary spines, a pelmetazoan columnal, productid and spiriferid brachiopods, michelenoceroid nautiloids, bivalves, tiny gastropods, fenestellid bryozoans, and plant fragments. The fauna was sampled from sandy siltstone and mudstone facies of the Winifrede limestone exposed 15-20 feet above the Chilton Coal in a gas pipeline trench. Of particular interest is the occurrence of numerous well-preserved echinoid plates and spines of the genus Archaeocidaris. The ecologic tolerances of the indigenous faunal components and the vertical sequence of sedimentary facies suggest that the Winifrede Limestone accumulated in a shallow marine embayment or shelf environment close to shore.

Social Science

JOHN R. WARNER, JR., Department of Sociology & Anthropology, West Virginia Wesleyan College, Buckhannon, WV 26201, Crime in the Mines.

This paper is one in a series of essays read before the Academy on the topic of rural crime. Earlier papers surveyed the literature on rural crime within the discipline of criminology (1980) and outlined several "arenas of rural crime" (1981), one of which was the coal mining industry. It has been my argument throughout the several essays that the discipline of criminology has largely limited itself to the study of urban crimes, and that the arenas of rural crime provide a rich vein of potential research which has, for the most part, been unmined.

In this essay I will call attention to several types of crime or crime-like behavior related to the extraction of coal from the soil of Appalachia. Included for discussion are such topics as the mine wars of West Virginia and Eastern Kentucky; crimes and non-criminal violations of the labor laws committed by officers of the United Mine Workers of America; the murder of "Jock" Yablonsky; the legal right of the industry to send miners into dangerous work areas and to cripple a quarter of a million men with a disease which need not have been; the assault upon the land ("terracide"); and the construction of illegal and dangerous dams, the most notable of which was built at Buffalo Creek.

The essay is not intended to be an exercise in "muckraking," but to suggest limitations in the theory of criminology needlessly imposed by a definition of crime which prevented research from snooping outside the city limits. It is intended as a constructive criticism of the discipline.

RICHARD J. VENJOHN, Dept. of Family Resources, West Virginia University, Morgantown, West Virginia 26506. Relationship determinants of coital behavior among college students.

The need to resolve fertility problems (e.g., unplanned pregnancies) has stimulated personal and professional interest in understanding fertility-related behaviors. Behavioral scientists have attempted to delineate the sociological and psychological determinants of these behaviors. The present study analyzed the effect of a particular type of situational determinant (i.e., relationship context) on intentions to have coitus.

It was hypothesized that behavioral intentions would be significantly different among relationship contexts because of normative and personal beliefs (i.e., expected rewards and punishments) for exhibiting coital behavior within a particular relationship context.

Two hundred and forty-seven undergraduate college students were randomly assigned to four hypothetical relationship contexts: being married, single, engaged, or cohabiting. The subjects were asked to complete a questionnaire measuring attitudinal and normative beliefs

and behavioral intentions for having coitus. Each individual was asked to answer the questions about a particular object and behavior while in an assigned relationship context (i.e., married, single, cohabiting, or engaged) during the coming year.

The results supported the hypotheses that attitudinal and normative beliefs and behavioral intentions were significantly different among relationship contexts. Not only were there observed differences between married and unmarried contexts but also between the unmarried contexts. The predictive model used also appeared to accurately predict behavioral intentions and to be a useful heuristic framework from which to study determinants.

The results also supported the contention that the social exchange of significant personal and social rewards and punishments was significantly correlated with the intention to perform a behavior within a specific relationship context. Other suggestions for future research and application of the findings were discussed.

JIRI KOLAJA, Department of Sociology and Anthropology, West Virginia Univ., Morgantown, WV. Time and Participation.

This is a theoretical analysis of effort and reward in terms of present and future time. We conclude that most of decisions in our life are concerned with the future. This is by its nature symbolic, i.e. that does not exist at the present. Speaking of the nature of social man one could conclude that the exchange of symbols bound to the future can be considered as a genuine human behavior.

Psychology and Education

JOHN H. HULL and MAUREEN STEWART, Bethany College, Bethany, West Virginia 26032 and DEBRA B. HULL, Wheeling College, Wheeling, West Virginia 26003. Interpersonal assertion and aggression in delinquent and nondelinquent adolescents.

Adjudicated delinquent and nondelinquent adolescent females and males listened individually to four tape-recorded situations, then verbally responded as they thought they might in each situation. The situations included: refusing a marijuana cigarette at a party; talking with a teacher about poor test performance; returning a poorly cooked steak in a restaurant; refusing to loan notes to a classmate. Adolescents' tape-recorded responses then were rated separately for assertiveness and aggressiveness, and separate analyses of variance were conducted on the assertiveness and aggressiveness ratings.

Data analyses showed no overall significant differences between delinquents and nondelinquents, nor between males and females, on assertiveness ratings. Subjects, regardless of delinquency or gender, however, responded significantly less assertively talking to a teacher about poor test performance than in any other situation. Overall, delinquent males' responses were rated significantly more aggressive than the responses of delinquent females, nondelinquent females, and nondelinquent males.

Our study suggests two conclusions. First, both delinquent and nondelinquent adolescents could benefit from situation-specific, as opposed to general, assertiveness training. Second, delinquent males might also benefit from additional training which teaches them to inhibit aggressive responses, and use assertive responses.

DEBRA B. HULL, Wheeling College, Wheeling, West Virginia 26003 and JOHN H. HULL, Bethany College, Bethany, West Virginia 26032. Self-reported assertive responding in student nurses.

Senior level student nurses completed an assertiveness questionnaire, rating their response probability and degree of discomfort in a variety of specific situations frequently encountered in nursing. Situations differed in the type of assertive response required and the person to whom it was directed. Data analyses showed that situations involving giving criticism and asking for a behavior change, especially when interacting with nursing supervisors and physicians, were rated most difficult in which to respond assertively. Situations involving giving and receiving praise, particularly with family members, were rated least difficult.

These results offer support for the view that assertiveness is a collection of situation-specific behavioral skills, not a personality trait. Assertiveness training programs, rather than seeking to teach a general type of behavior, could concentrate more

efficiently on those situations professional or therapy groups find most difficult. With respect to student nurses, it may be that assertiveness training programs need to address more specifically the social conditions in which student nurses work in order to determine the most effective type of assertiveness training.

M. Z. A. NOMANI and LINDA S. KOVACH, Department of Family Resources, College of Human Resources and Education, West Virginia University, Morgantown, W. Va. 26506
Effect of nutrition education intervention on the nutrition knowledge and food intake of school children.

The objective of the study was to evaluate the impact of nutrition education intervention on the nutrition knowledge and food intake of school children. The project was conducted on 5th and 6th graders, 188 in number, from four public schools and one private school in Harrison County, W. V. The intervention was of six lectures accompanied by various activities such as games, films, tasting parties, etc. The intervention group showed significant ($p < 0.01$) increase in nutrition knowledge score from pre to post test, 60.7 to 66.6%. The girls scored higher ($p < 0.05$) than the boys. A change in food habits is a long term process, however an improved trend in the food intake, increase in "Fruit and Vegetable" and decrease in "Other" group was observed. It may be concluded that nutrition education intervention can be useful in improving the nutrition knowledge of school children and may aid in the formation better food habits.

(Supported by W. V. State Dept. of Education, Title IV C Grant)

E.C. KELLER, JR. and B.L. MORGAN. Biology Department, West Virginia University, Morgantown, W.V. Associations Among Pre-program and Program Academic Statistics for Physically Disabled High School Students in a Marine Science Program.

As part of the admission information on 117 students, certain standarized scores were requested from applicants in a summer academic program in Marine Science for physically (including sensory) handicapped high school students. These data were correlated with data on academic performance along with some attitudinal information about the students. General negative correlations were found between the student's grade level (8 through 12) and how well the student liked Marine Science, thought it was helpful or practical, and the student's performance on oral presentations. However, the students at higher grade levels liked field work considerably more than those students in lower grade levels. IQ was only marginally associated with the other variables. Generally, PSAT verbal scores were positively associated with the students desires to have more information about Marine Science, its value, and their grades on scientific methods. PSAT verbal scores were very highly correlated to the Marine Biology section of the course. PSAT mathematics scores were positively correlated with the same general areas of scientific

methods, but were only moderately correlated with the behavior aspect of the Marine Biology section of the course. Both PSAT verbal and mathematics scores were strongly related (negatively) to aggressive and persistence behaviors of the students.

E.C. KELLER, JR. Department of Biology, West Virginia University, Morgantown, W.V. Potential Acceptance into Graduate Programs of Blind, Deaf, and Orthopedically/Motor Impaired Students at Two Major Universities.

An anonymous survey was completed at two major U.S. universities in 1981 with 190 faculty members who train graduate students in Science. The objective of the survey was to determine potential acceptance into graduate science programs of physically disabled undergraduates who were otherwise qualified to do graduate work. For the two universities the table shows that 21.2% would accept any otherwise handicapped student as a graduate student; 40.4% gave a conditional reply and would only accept certain types of physically disabled students; 23.0% also had additional conditions that they would place on physically disabled students (such as the degree of disability); 13.8% said they would not accept any type of disabled student; and 1.6% had other comments. Of the 40.4% who would accept only certain types of disabled students, only 3.8% would accept blind students, 42.1% would accept deaf students, and 54.1% would accept orthopedic/motor impaired students.

	Response Percentage		
Response	University #1	University #2	Average %
Yes - unqualified	30.7	11.7	21.2
Yes - but only certain types of disabled	32.1	48.8	40.4
Yes - but other conditions must be met	27.3	18.6	23.0
No	8.9	18.6	13.8
Other	1.0	2.3	1.6

MLINGI, BETTY A.
Department of Family Resources
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West Virginia University, Morgantown, WV 26506
Problems of Foreign Students, Related to Food and Nutrition

Foreign students admitted to colleges and universities in the United States may have adjustment problems related to food and nutrition. The purpose of the study was to measure the prevalence of such problems as experienced by foreign students enrolled at West Virginia University, Morgantown. Sixty-six students out of one hundred completed the questionnaires that were used in the study.

Fifty-three percent of the respondents lived in apartments and 86% of these cooked their own meals. Sixty-six percent of those who cooked their own meals ate out three to nine times per week and 29% ate out more than nine times a week. Regarding food selection and places of food purchase, 74% of the respondents showed that they shopped for groceries at Morgantown supermarkets. Sixty-four percent indicated having difficulties shopping for food and 68% expressed a strong need for assistance in grocery shopping. Fifty-eight percent of the respondents expressed interest in a course in foods and nutrition. The findings of the study supports the hypothesis that foreign students have adjustment needs in foods and nutrition.

DAVID A. MCCOWN, Department of Psychology, Salem College, Salem, West Virginia, 26426, RICK CRANDALL, Department of Psychology, University of San Francisco, San Francisco, California, 94117, and ZEE ROBB, Department of Nursing, University of Texas at Arlington, Arlington, Texas.

One counseling technique which has recently grown in popularity is assertiveness training. In the past ten years many scales have been developed to measure assertiveness. Despite the popularity of this technique, however, few studies have demonstrated that assertiveness training can result in broad personality change as measured by psychological scales.

One theoretical construct which has received much attention, and which may be related to assertiveness, is self-actualization. Although self-actualization is a complex construct, an acceptable degree of measurement has been achieved by Shostrum's Personal Orientation Inventory (POI) and the newer Personal Orientation Dimensions (POD). Primarily because of the length of these inventories, however, many investigators have been hesitant to utilize the POI and POD to demonstrate changes resulting from counseling.

The present research investigated the effects of assertiveness training on self-actualization. A shortened self-actualization scale was administered at the beginning and end of five assertiveness training classes (N = 82) led by three different trainers. Significant improvements in self-actualization were found for four of the classes. Follow-up data showed that these improvements were maintained for over a year. These results suggest that assertiveness training can have long-term effects on self-actualization. It is suggested that this brief self-actualization scale may also be useful to assess the effects of other types of counseling and in other research.

History and Philosophy of Science

KARL D. FEZER, Dept. of Biology, Concord College, Athens, West Virginia 24712. Science: the search for uncontroversial explanations.

Systems of thought under attack are especially likely to emphasize self-definition. "Scientific creationism" has caused many scientists to reflect anew on the defining features of science. Prediction and control of events and experimental testing of hypotheses are valuable but nonessential criteria of science. Falsifiability of hypotheses, never absolute, is a defining feature of science (and of scholarship in general) only in the broad sense of revisability. Evidence by itself is meaningless; it points to specific oonclusions only within a framework of specific assumptions and criteria. Scientists seek to use minimally controversial components (evidences, assumptions, and criteria) in constructing their explanations. Even scientific revolutions can be understood in these terms.

PROCEEDINGS OF THE WEST VIRGINIA ACADEMY OF SCIENCE

INSTRUCTIONS TO AUTHORS
Revised February 1982

1. *General Policy*

Publications policy 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 review process. Where selection must be made, the sole criterion for judgment shall be 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 editors, and will be published in Number 1 of the volume for that year.

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 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 case the paper is accepted for publication in the Proceedings.

4. *By-Line*

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

5. *Form*

Manuscripts shall be typed double spaced on white bond paper. A dark undamaged ribbon should be used on typewriters in order to produce clear copy for the editors and the printer. Pages of copy should be numbered consecutively in the top right-hand corner of each page of the manuscript, preceded by the author's last name. *Two copies, the original typed copy and a Xerox,* together with a set of original figures and/or drawings, should be given to the Section Chairman on the day of the Annual Meeting. Each table or figure should be supplied with a legend sufficiently complete to make the table or figure intelligible without reference to the text. Footnotes may be used in connection with tables and figures where necessary and may save space. Footnotes should be avoided wherever possible in the text itself. Complicated formulas should be prepared with care in a form suitable for camera copy reproduction. Avoid such formulas in a line of text.

6. *Illustrations and Special Symbols*

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.

7. *Literature Cited*

References shall be collected at the end of the manuscript as "Literature Cited."

The title of the papers cited and inclusive page numbers shall be given. References in the text may be either by year or by number. Examples: Hall and Campbell (1957) or [5]. Square brackets are recommended for references so that numbers in parentheses may be used to denote formulas in the text.

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.

Example of a book citation:

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

8. *Proof*

Galley proofs will be sent to authors for corrections. Make corrections on the margins of the proof. Proofreader's marks may be found in dictionaries, or in style manuals (e.g., "Style Manual for Biological Journals"). Changes in text after the manuscript is in galley proof are quite expensive and in general are not permitted. Galley proofs must be corrected and returned promptly (within one month).

9. *Reprints*

A reprint order will be sent with the galley proofs. This should be returned with the corrected proof.

10. *Cost of Publication*

Authors will be billed by the Academy for pages in excess of the maximum, see item 1. The cost of figures which require halftone screens, such as photographs, will also be billed to the authors. Currently, a page charge of $7.00 per page is in effect, and the author will be sent a pro forma invoice to see if he can secure payment via his institution, company, research grant, etc. Failure to honor page charges will not prevent publication of a paper.