1991-04

Centennial Symposia Abstracts
100 or More Years of Changes in Ohio Flora and Vegetation

Arranged by: Ronald L. Stuckey
Hosted by: Tod F. Stuessy
FRIDAY, APRIL 26, 1991
The Ohio State University
Kottman Hall 104
2021 Coffey Road
8:45 AM
Ronald L. Stuecky, Presiding

9:00
Tom S. Cooper-Rider, Department of Biological Sciences, Kent State University, Kent, Ohio 44240-0001.

In 1860, John S. Newberry published the first catalog of Ohio vascular plants. Since then, five other catalogs have appeared. The numbers of taxa listed in each are given in the chart below:

<table>
<thead>
<tr>
<th>year</th>
<th>total</th>
<th>native</th>
<th>alien</th>
<th>specific</th>
<th>taxa hybrids</th>
<th>total</th>
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<tr>
<td>1860</td>
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<td>1276</td>
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<td>1974</td>
<td>1500</td>
<td>1465</td>
<td>35</td>
<td>113</td>
<td>1610</td>
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<td>1750</td>
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<td>1730</td>
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<td>2350</td>
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</tbody>
</table>

Additional information on Ohio vascular plants was added to the catalogs from 1860 to 1991. The number of taxa increased by 17% to a total of 2700 species. In 1991, the Ohio Flora Project began. In 1992, working with preliminary lists of stenodiploids, monocots, legumes, and composites, distributed by the Ohio Flora Committee, I projected that the vascular plant flora of Ohio would prove to consist of about 2700 species. New species continue to be added to the flora today, but they are relatively few. Periodic exclusions have removed species incorrectly attributed to the Ohio flora.

9:20
100 YEARS OF CHANGING NOMENCLATURE AND TAXONOMIC CONCEPTS IN THE OHIO FLORA.
John J. Furlow, Department of Plant Biology, Ohio State University, Columbus OH 43210.

Over 660 of the 1,950 taxa of flowering plants listed by Kellerman and Werner in their Catalog of Vascular Plants of 1895 are known in the various parts of the current Vascular Flora of Ohio by different scientific names. About a third of these changes came about with the abandonment of the American Code of Botanical Nomenclature, used by Kellerman, and later by Schaffner, in their floristic reports, in favor of a return to the International Rules. Other changes, including the combination of previously separate taxa, the segregation of taxa, and the replacement of names have occurred gradually due to the attainment of a better understanding of the relationships and variational patterns of the species involved, to changing taxonomic concepts and philosophies, and to the discovery of nomenclatural problems with specific names.

Because of a high level of interest in experimental, revisionary, and other taxonomic research, it is likely that similar changes will continue to occur for the foreseeable future.

10:40
THE INVASION OF FOREIGN SPECIES "WEEDS" AS INDICATORS OF 100 YEARS OF FLORISTIC CHANGES.
Ronald L. Stuecky, Professor of Botany, The Ohio State University, 1735 Neil Avenue, Columbus 43210.

The invasion of non-indigenous species provides one measure by which changes in a flora can be assessed. These foreign or alien species (plants mostly considered as "weeds") have been invading Ohio since the beginning (about 1800) of its current settlement by Europeans. Statewide, non-indigenous species have increased from 3.6% in 1835, to 6.6% in 1860, to 20.9% in 1900, to 44.5% in 1945, to 25.8% in 1952, and 23.8% by 1971. The percentage is higher in unglaciated Ohio, 24% (of 2071 species) and in densely populated Allegheny Plateau, 28% (of 2029 species) in 1989. In western Lake Erie, the percentage is higher on the islands, at 33.6% (276 of 847) and in recently abandoned vineyards on South Bass Island, it increases temporarily to 50% (91 of 182), while in the marshes among obligate and facultative wetland species, the percentage is much lower, 11% (33 of 301). In the most thorough analysis of Ohio's non-indigenous flora (Kellerman and Kellerman, 1900), based on 430 species, 75.8% are from Europe, 10.7% from elsewhere in the United States, 7.0% from Asia, 4.8% from Tropical and South America, 1.2% unknown and 0.5% from Africa. With regard to stability in the flora, 11.86% were weifs, 38.82% occasionally escaped, and 49.30% thoroughly naturalized. Noteworthy among weifs then were Allaria officinalis, Lespedeza xylorhiza, and Lotus corniculatus, which are now thoroughly naturalized weeds.
At least 300 species of aquatic and wetland vascular plants have been identified from western Lake Erie at 35 study localities. This floristic diversity exists primarily because of the natural changing water levels over various substrates creating varied habitats which are available for plant colonization and the continued natural and man-induced changes to which these habitats are subjected. Drastic changes have occurred in the composition of this flora during the past century. Since Pieters (1901), 52% (20 of 38) of the species observed at Put-in-Bay Harbor have disappeared; 36% (26 of 72) at the western end of Sandusky Bay; 25% (22 of 89) at East Harbor State Park. Among the 22 submerged species at Put-In-Bay Harbor, 15 (70%) are no longer present. Of the total 28 native submerged taxa as reported by Nole (1988) for the region, 13 (46%) have disappeared. Of 28 showy, native perennial emergents reported by Nole (1988), 19 (67%) have declined in abundance. By contrast, many foreign species have invaded western Lake Erie. Of the total 300 species, 33 (11%) are new to the region. Most of the species that have disappeared have narrow ecological tolerances and are northern in distribution, whereas those species that have survived have wide ecological tolerances and are widespread in distribution.

The construction of a system of transportation canals contributed to the profound changes in Ohio wetlands in the 1800’s. Over 1000 miles of canals were constructed to link the Ohio River and Lake Erie waterways. Water supplies for the canals were constructed by damming and dredging existing wetlands. Original, new, and modified wetlands were linked by continuous corridors of flowing water and by disturbed wetland habitats suitable for plant colonization. An examination of distributional data and historical information, supplemented by studies of remaining canal habitats, indicates the canal system served as a transportation route for propagules of native plants as well as people and commodities. Among the submerged or floating plants which apparently spread through the canal system are Azolla caroliniana, Najas guadalupensis, Nuphar variegatum, and Potamogeton richardsonii. Emergent or mudflat taxa which have distributions correlated with the canal system include Ammannia robusta, Bidens cinnamomea, and Polygonatum richardsonii. Heteranthera reniformis, Hibiscus laevis, Hibiscus moscheutos, Hibiscus palustris, Lepophyllum carystus, Sagittaria rigida, and Zizania aquatica. Plant distributions corroborate evidence from several groups of aquatic animals for the role of canals in biogeographic change.

Two populations occur in Highland and Adams Counties. Plants grow vegetatively and flower at these sites but do not produce seeds. Sexual reproduction does occur in colonies outside Ohio. Melissa occurs the summer prior to the March-April anthesis. Pollen has low viability. The self incompatible flowers are pollinated by Scolia flies. Hand pollinations are unsuccessful and fruits do not form when Ohio plants are grown with clones from other states. Allozyme analysis indicates that the Highland (7 samples) and Adams (6 samples) plants are each uniform and that the seeds differ by only one allele at one of the six loci surveyed. The Ohio populations may be single clones. Allozyme variation does occur in certain other populations, indicating they are not single clones. The Ohio populations are more similar in isozymes to populations in West Virginia, Pennsylvania, and Virginia, and there is somewhat less relationship with several Kentucky populations.

The indigenous vascular flora of Ohio numbers ca 2800 total species of which 33 (11%) are presumed extirpated from the state, ca 5% of the total native flora. No populations of these species have been confirmed in Ohio since 1970. 34 presumed extirpated species are typical of forested communities and 61 of non-forested habitats. 37 species are characteristic of wetlands. 54 species are dicots; 37, monocots; and 5, pteridophytes. They are two strong patterns of extinction within ecological or taxonomic groups, but a general diminution in all areas. Extirpated species formerly were distributed throughout Ohio. The counties bordering Lake Erie record the highest numbers, however. Causes of extinction include habitat destruction by drainage, agricultural land use, urbanization, as well as competition by non-native species. 96% of the native flora has survived the anthropogenic changes in the Ohio landscape over the past 200 years.

Abandonment of marginal agricultural lands occupying what was once virgin forest has resulted in natural revegetation of these former open spaces. Additionally, recent changes in national agricultural policy combined with increased conservation efforts led to a significant shift away from the historical trend in land clearing. As a result, the Ohio Landscape is beginning to reforest and revert in places to a more natural mix of open land and forests. This paper reports upon the results of research in a portion of the Northern Virginia Military District of Ohio in which the nature and causes of specific spatial patterns of open space, successional fields and forest are examined. GIS technology coupled with traditional vegetation monitoring, historical aerial photos and field classification of vegetation to explore the relationships among such physical parameters as soils, physiography and geomorphic setting, and vegetative patch characteristics through time. A Markovian
A Century of Progress in Understanding and Mapping Ohio’s Soils

Arranged by: Joseph R. Steiger
Hosted by: Robert L. Vertrees
FRIDAY, APRIL 26, 1991
The Ohio State University
Kottman Hall Williard Auditorium
2021 Coffey Road
8:45 AM
Joseph R. Steiger, Presiding

8:45 A CENTURY OF PROGRESS IN UNDERSTANDING AND MAPPING OHIO’S SOILS

This symposium will highlight the achievements of the Ohio Cooperative Soil Survey from an historical perspective. Speakers will focus on efforts and progress in the areas of soil inventory, soil research, soil interpretation and management. The joint effort by Federal, state and local government to provide detailed soil surveys for all of Ohio has been the setting for spectacular advances in the knowledge of soils. Ohio has led the nation in the funding for soil surveys and has made significant contributions toward the national effort in soil classification and basic research. Soil science, then, soil science, has served as the basis for transfers of new technology in resource planning and land management. Soil research has provided insights into the i) formation of soils; ii) origin of soil materials, iii) distribution of soils based on geophenology. Basic chemical and physical properties of soils have been systematically tested and serve to support the soil classification system. Soil interpretation started as simple estimates of farmland value, expanded to conservation as soils capability rating and more recent soil potential distribution of soil limitation and potential are not available for nearly every land use even further extending to recreation. Utilization of soil surveys has expanded with the pace of land development in Ohio. Legislation now mandates use of soil surveys and data as part of farmland appraisal, prime farmland restoration, wetland protection.

9:00 PEDOLOGY IN THE 21ST CENTURY: FORCES AND FACTORS FRAMING OUR FUTURE. Fred P. Miller, Chairman, Dept. of Agronomy, 202 Kottman Hall, The Ohio State University, Columbus, OH 43210.

Our nearly century’s-worth of experience in pedology will serve as the foundation for our future. Starting with the need to guide farmers in managing various soils across the then-newly opened frontier, the National Cooperative Soil Survey has expanded to address many 20th century land use and environmental agendas. Pedology’s future will continue to be driven by its mission to enable human-kind to understand and utilize soil resources for his sustenance and well-being. There will be a strong tendency in the future to view environmental problems more holistically. Pedologists must adapt to this holistic paradigm since geotechnical and environmental problems and management needs will integrate across the discipline boundaries of pedology, geology, hydrology, atmospheric sciences and other disciplines. People perceive that they have land use problems, not necessarily soil or geology or hydrology, etc. problems. This will be challenged by not only the land use and environmental agendas before us, but also by the methodologies of handling and presenting data and information. We are going to have to translate our concepts and data bases into a variety of other cognitive domains, from political science and economics to epidemiology, modelling and regional planning. Economics, population pressure, cultural attitudes and the propensity for bettering the human life will continue to pressure our resource base. Pedologists have a major role to play, but we will be left with only minor parts if we try to play it alone.

9:20 PEOPLE AND AGENCIES AND THEIR ROLES IN THE OHIO SOIL SURVEY.
Richard L. Christman, 4259 Rowanne Road, Columbus, OH 43214.

The early 20th century saw the beginning of soil survey in Ohio. The first recorded soil survey in Ohio was in Montgomery county. The survey began in 1899 by the Division of Soils, United States Department of Agriculture, and in 1900 field work was completed and a soil survey report was published the same year. Those early participants laid down basic principles of conducting a survey that are still valid today. Much of the technology has changed, particularly in the fields of classification, morphology, and soil genesis. As the surveys progressed and the years passed, other participants and agencies joined together in a common goal of a total mapping program of the state. In 1949 the Ohio legislature organized the Division of Lands and Soil within the Ohio Department of Natural Resources. Staffing of agencies and personnel became the life blood of what was to become a model program of conducting soil surveys in the United States. The field mapping accomplishments and personnel provided in the 1970’s. As the completion of mapping of the state approaches, changes in staffing and new roles for soil scientists are emerging.

9:40 EVOLUTION OF GENETIC CONCEPTS FOR OHIO SOILS.
Neil F. Snook, Agronomy Dept., The Ohio State University, 2021 Coffey Rd., Columbus, OH 43210.

Recognition of "Brown" soils formed under deciduous forests in a humid temperate climate as a distinct genetic group occurred in the 1920's. These soils were classified as Gray-Brown Podzolics in the 1938 classification system and as Alfisols in Soil Taxonomy published in 1975. The most diagnostic characteristic of Alfisols is a genetic clay maximum in B horizons. Whereas early research documented the role of eluvial-illuvial processes in the formation of clayey B horizons, recent studies provide a comprehensive understanding of clay enrichment by quantifying clay illuviation, clay concentration due to carbonate...
dissolution, grain disintegration, and clay mineral weathering. Clay illuviation is sufficient in well drained Ohio soils for classification as Alfisols.

Another diagnostic horizon common to Alfisols in eastern Ohio is the fragipan. Although the term "fragipan" was not introduced until 1951, soils containing a horizon with a "distinctly hard" consistency were reported in Wayne county as early as 1931. The earliest studies of fragipans in Ohio suggest that most fragipan characteristics are inherited and enhanced by physical processes. More recent research shows the presence of an amorphous aluminosilicate bonding agent and conclude that weathering discontinuities play a key role in precipitation of the bonding agent.

10:00 CLASSIFICATION AND CORRELATION OF OHIO SOILS DURING THE LAST CENTURY, C. L. Post, USDA-SCS

Soil correlation is concerned with the definition, mapping, and classifying of the kind of soil in a given drainage area. Relating the soil bodies represented on maps to taxonomic classes at some level in a classification system is accomplished through soil correlation. This is important so an event in the past or at the present time can be identified with the soil where it occurs. The earliest framework for classification and correlation was a combination of geographic provinces, underlying rock, and soil texture. Soil series, comprising a category first introduced in 1903, were recognized and has been continued and is the lowest category in the current classification system. This system introduced in the early 1960's is comprehensive. It is a multiple category system including the top orders, suborders, great groups, subgroups, and series. It differs from earlier ones by having more quantitative definitions. Classes in every category expressed in terms of properties that can be measured.

Ohio has been a leading, active participant in the national soil survey since the earliest days. Soils and soil surveys have been classified and correlated in the nation at large. Ohio soil scientists have been an outstanding leader in collecting and providing laboratory soil characterization data needed for the proper placement of soils in the classification system.


In 1935, a site near Coshocton, Ohio was selected by the US Dept. of Agriculture for the study of hydrology and of runoff and erosion control practices. A soil survey of the area had been made in 1934 by A. H. Paschall and W. O. Oliver of the Zanesville soil conservation project. In 1936, H. Kobke, P. R. Dreibelbis and C. E. Redmond mapped the area on a field base at 1:40,000 and printed on 1-minute quadrangle sheets with 5' contour intervals. Small watersheds were mapped at a scale of 1" = 100' with 2' or 5' contour intervals. Dominant soils in these surveys were Muskingum, and the type locations of two other series, Keene and Coshocton, were located on the research station. The earlier surveys were modernized in 1954 by C. E. Redmond and published in the soil bulletin describing the watershed soils. Several new soils were recognized and Muskingum disappeared from the legend.

Throughout the 1950's, C. E. Redmond performed detailed mapping and soil investigations in the Northern Appalachian Mountains with special emphasis on understanding the complex pattern that includes not only bedrock but also loess, glacial outwash, pre-glacial sediments, recent alluvium and colluvium. Soil mapping in this area has shown that the colluvial material is as much as 3.5 meters thick on some of the benches and extends well up the slopes. The identification of large quantities of colluvium raises the question of when and under what conditions did this deposition of materials take place?

11:00 CHANGES IN SOIL PARENT MATERIAL CONCEPTS IN OHIO. George Hall, Agonomy Division, Ohio State University, 2021 Coffey Rd., Columbus, OH 43210

Identification of soil parent materials during the early inventory of Ohio's coastal sand deposits was largely based on the geologic separations and definitions. The two most important materials were Eldridge sands and Eldridge peats. The coastal sand soil inventory continued it because clear that the soils were developed in a much more complex array of geologic materials.

One of the most significant changes in our concept of materials was the inclusion of the materials in the definition of soil. This provided a partial list of materials actually used in the coastal zone.

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A Memorial Tribute to an Eminent Ohioan:
Paul Bigelow Sears (1891-1990)
Arranged by: Mohan K. Wali
Hosted by: Robert L. Vertrees
FRIDAY, APRIL 26, 1991
The Ohio State University
Kottman Hall 103
2021 Coffey Road
1:30 PM
Mohan K. Wali, Presiding

1:30 TRIBUTE TO AN EMINENT OHIOAN: PAUL BIGELOW SEARS. Mohan K. Wali, School of Natural Resources, The Ohio State University, Columbus, Ohio 43210-1085

The formative decades of the science ecology were fortunate to have the intellect, dedication, and enthusiasm of some noted American ecologists (Clements, Cowles, Gleason, Shelford, and Thurow, to name a few). Their work has proved both pioneering and enduring. Among these eminent ecologists was an Ohioan, Paul Bigelow Sears, who made lasting contributions in several subdisciplines of ecology. These areas include community structure, vegetation mapping, palynology, trophic dynamics, and conservation. He and Alfred Leopold were the first to grasp the true extent and magnitude of human impact on ecosystems.

Well before arriving in Ohio to make a living, I had much looked forward to the happy experience that both Paul B. Sears and any Ohioan would attain their 100th year in 1991. I had wished for him to be among us at this OAS Centennial Meeting but that was not to be. So, although we gather here without him, we do so with great admiration, appreciation and enthusiasm to celebrate his contributions.

1:40 PAUL B. SEARS AND AMERICAN ECOLOGY. Robert L. Burgess, Dept. of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210

Paul Sears, perhaps more than any other person, epitomizes American ecology. In a professional career spanning almost seven decades, Sears made major contributions to vegetation mapping, palaeoecology and Pleistocene history, vegetation studies, conservation, human ecology and our impact on the land, and particularly, the varied roles of scientists in modern society. In Ohio, at the universities of Chicago, Oklahoma, or Yale, or in retirement in New Mexico, Paul Sears continued to write, and his myriad papers and milestone books have had a major impact on generations of ecologists who know only his name. For over 60 years he was an active player in The Ecological Society of America, where his influence is still felt, although few realize where the ideas originated. Named EMINENT ECOLOGIST by the Ecological Society of America in 1965, the title is as appropriate today as it was 25 years ago. To honor a native Ohioan, it is most fitting that the Ohio Academy of Science uses its own Centennial to commemorate the life and work of Paul Bigelow Sears.

2:10 PAUL B. SEARS, THE TEACHER. Loren D. Potter
Biology Dept., Univ. of New Mexico, Albuquerque, NM 87131

Dr. Paul B. Sears had those qualities of a teacher that one would wish to emulate and for which one treasures the opportunity to have been a student under his guidance. He excelled at many things but was a master teacher, especially to those students privileged to be within the informal circle of his influence. He was humble and kind, a classicist and realist, respected and respectful, expert at "one liners" but also flowing prose, maddened by mathematical analysis for its own sake without relation to reality, perceptive and prophetic, and forever an excellent teacher because he was forever a learner.

2:40 PAUL B. SEARS AND HIS CONTRIBUTION TO NATURAL VEGETATION MAPPING IN OHIO. Ronald L. Stuckey, Professor of Botany, The Ohio State University, 1735 Neil Avenue, Columbus 43210.

Paul B. Sears was the first to prepare a natural forest vegetation map of Ohio devised from a systematic analysis of field survey records. As a lad, with a strong curiosity about plants, Sears became especially interested in the native prairie flora south of his Bucyrus, Ohio, home. While an instructor at The Ohio State University, Professor Edgar N. Transeau expanded Sears desire to study Ohio's natural vegetation. By 1919, Sears was obtaining records of "witness trees" left by the surveyors of the Old Northwest Territory. With a set of symbols Sears devised, he plotted these tree records on an Ohio map creating the first virgin forest map of the state, published in the Ohio Journal of Science (1925). The various forest types shown were: oak (circles), beech (plus signs), and ash (times signs). In the same publication are maps that depict the relationships of oak and beech forest to the moraines, and the natural treeless areas of Ohio and their correlation with moraines, preglacial drainage routes, and post glacial lakes. In 1923, Sears had drawn a map of the virgin forest using horizontal, vertical, and slanting lines to show the extent of the different forest types, but not published by him until 1941. A total of nine natural vegetation maps have been identified as prepared by Paul B. Sears.

3:30 PAUL BIGELOW SEARS: CONTRIBUTIONS TO PALEOECOLOGY. Linda C.K. Shane, Limnological Research Center, U. of MN, 310 Pillsbury Drive, Minneapolis, MN 55455

Paul Bigelow Sears' research in vegetation history and paleoecology set the foundation for many of the major questions that concern the conservationists of today. His method of using early land survey records as a near pre-European vegetation record has been pivotal in the development of modern climate analogs for fossil pollen assemblages. He was responsible for introducing palynological analysis of sedimentary sequences as a functional tool to North America. Using pollen records primarily from Ohio, he addressed a large variety of ecological issues whose understanding will be key to modeling global climate warming. Among those I will discuss are: identification of the major pollen taxa; the relative ages of glacial geomorphic features; the regional sequences of revegetation after final glaciation; the climatic interpretation of vegetation change; the rate of vegetation change; the synchrony of the North American and European climate change records; the ecological meaning of the documented changes throughout the climatological record.

4:10 CONTRIBUTIONS OF PAUL B. SEARS TO WILDLIFE MANAGEMENT. Thomas W. Townsend, School of Natural Resources, 210 Coffey Rd., The Ohio State University, Columbus 43210.

Paul B. Sears had an eclectic interest in ecosystems, and this interest included an active concern for wildlife. His professional training was in botany and ecology, but he was one of the first to recognize and write clearly about wildlife as a resource vitally dependent on soils, plant communities and human land use. He employed his impressive scientific capabilities in active service to practical wildlife conservation as an advisor of the National Audubon Society, member of the Ohio Commission on Conservation and Natural Resources, and member of the Ohio Wildlife Council. In these positions and others, he did much to further scientific wildlife management. He will probably be best remembered in wildlife management circles for his insightful insistence that wildlife problems were ecosystem problems generated, and therefore solvable, by man.

4:40 PAUL BIGELOW SEARS: CONTRIBUTIONS TO AMERICAN CONSERVATION. John F. Disinger, School of Natural Resources, The Ohio State University, Columbus, OH 43210-1085.

Much of Paul Sears' reputation, and a significant portion of his scholarship, was tied to his work as a scientific conservationist. He is particularly renowned for Deserts on the March, the publication of which in 1935 had extensive impact on public understanding of the forces involved in causing the American Dust Bowl of the 1930s. The book also clarified the enormity of the task of bringing
A Sampling of Molecular Biology in Ohio

Arranged by: John J. Kopchick
Hosted by: Paul L. Fuerst
FRIDAY, APRIL 26, 1991
The Ohio State University
Upham Hall N012
473 West 12th Avenue
8:45 AM
John J. Kopchick, Presiding

9:00 MUTUAL TRIGGERING OF GENE EXPRESSION IN PLANT-FUNGUS INTERACTION. P.E. Kolattukudy, The Ohio State Biotechnology Center, 1000 Carmack Road, Columbus, OH, 43210

Fungal interactions with plants have major consequences. Fungal diseases cause the most damage to crops. Plant-fungus interactions that ultimately result in disease development or resistance involve mutual triggering of gene expression. Penetration of pathogenic fungi into the plant through the cuticle is achieved by the production of cutinase, an enzyme that catalyzes the hydrolysis of cutin, the structural polyester of the cuticle. Plant components trigger the transcription of fungal cutinase gene. Transformation of Fusarium solani pisi with constructs containing hygromycin resistance gene driven by a Cochliobolus miyabeanus and chlamydomonas acetyl transferase driven by DNA from the 5'-flanking region of cutinase gene demonstrated inducible promoter activity for the 5'-flanking region of Fusarium cutinase gene. Deletion analysis defined the cutinase promoter activity to a specific 135 bp region. The same region of the 5'-flanking region showed binding to the protein factor required for cutinase transcription activation in isolated fungal nuclei. Experimental evidence suggests that the plant component enhances phosphorylation of a transcription factor that binds to promoter only when phosphorylated and thus promotes cutinase gene transcription. After penetrating the cuticle, the fungus must penetrate through carbohydrate barriers to invade the plant. The molecular mechanism involved in this process will be discussed. Fungal invasion triggers expression of many plant genes to invade the plant. The molecular mechanisms involved in this process will be discussed. Fungal invasion triggers expression of many plant genes that resemble Neurospora mt tRNA* binding site in the intron RNA and find that it may include sequences that resemble Neurospora mt tRNA*. Several findings suggest that the adaptation of the Neurospora mt tRNA to function in splicing may demonstrate one mechanism whereby splicing factors may evolve from pre-existing cellular RNA binding proteins. The group I intron is of interest both as ribozymes that catalyze their own splicing and as mobile elements that propagate by insertion into other genes. The splicing of group I introns involves transesterification reactions that are catalyzed by the intron RNA, and a number of group I introns have been shown to be self-spooling in vitro. The L protein is required for splicing group I introns in Neurospora mitochondria in the mitochondrial tyrosyl-tRNA synthetase (mt tRNA) which is encoded by nuclear gene cvt-18. We have expressed functional cvt-18 protein in E. coli and have used in vitro mutagenesis to identify regions required for splicing and tRNA synthesis. In other experiments, we have localized the cvt-18 protein binding site in the intron RNA and find that it may include sequences and structures that resemble Neurospora mt tRNA. Several findings suggest that the adaptation of the Neurospora mt tRNA to function in splicing is a relatively recent evolutionary development and could reflect the recent dispersal of the introns themselves. Our findings demonstrate one mechanism whereby splicing factors may evolve from pre-existing cellular RNA binding proteins.

12:00 TRANSCRIPTION OF VESICULAR STOMATITIS VIRUS GENOME RNA. A.K. Banerjee, Department of Molecular Genetics and Biochemistry, The Ohio State University, Columbus, OH, 43210.
The protein was synthesized in vitro using recombinant DNA technology. The functional domains of the P protein were mapped by deletion and site-directed mutagenesis on the gene and assaying activity of the mutant protein products by transcription reconstitution in vivo using purified L protein and N-protein-RNA template. Three distinct domains, such as template binding, L protein binding, and an acidic transactivating region, were identified within the P protein and their functions determined. By site-directed mutagenesis the phosphorylation sites within the acidic domain were identified, and their role in transcription studied. The role of phosphorylation in P function in transcription was also studied using P protein and its mutants expressed in bacteria. The mechanism by which the RNA polymerase subunits transcribe the SVS genome RNA will be discussed.

2:00 INHIBITION OF MOLONEY MURINE LEUKEMIA VIRUS (M-MuLV) INDUCED LEUKEMIA IN TRANSGENIC MICE EXPRESSING ANTI-SENSE RNA COMPLEMENTARY TO THE M-MuLV PACKAGING SEQUENCE. Thomas Wagner and Lu Hsu, Editorial Animal Biotechnology Center, Ohio University, Athens, OH 45701

A genetic transcriptional regulatory element designed to show the tissue tropism of the Moloney murine leukemia virus (M-MuLV) directing expression of RNA sequences complementary to the packaging sequences of the retrovirus M-MuLV was constructed and introduced into stable cell lines and transgenic mice. The antisense expressing cell lines when infected with native virus were unable to produce active virus but yielded empty capsids devoid of viral genomic RNA. The antisense N-gene transgenic mice were shown to produce the appropriate RNA complementary to the M-MuLV packaging sequences within their lymphocytes. When challenged with active M-MuLV at high dosage none of these anti-sense transgenic mice developed leukemia or exhibited signs of the development of the disease by 14 weeks of age. Blind control non-transgenic littermates infected with the leukemia virus showed a high percentage of leukemias and demonstrated multiple signs of the development of the disease in the animals not yet being leukemic. These results are interpreted to suggest the potential value of anti-sense synthetic oligonucleotide reagents and drugs to inhibit retroviral replication in patients infected with pathogenic retroviruses such as HIV.

2:30 BACTERIAL REGULATORY ELEMENTS CAN CONTROL GENE EXPRESSIO N AND MODULATE PHENOTYPE IN MAMMALIAN CELLS. J. L. Schroeder, H.B. Luebbermann and H.S. Liu, Department of Anatomy1 and Molecular Genetics2, University of Cincinnati College of Medicine, Cincinnati, OH 45267.

In 1961, Jacob and Monod postulated that a repressor molecule in E. coli regulates expression of a set of genes including the lac genes, encoding enzymes and transporters for a sugar. We have translocated this lac regulatory system into mammalian cells and demonstrated that the lac repressor can repress a reporter gene under control of a eukaryotic promoter containing a lac operator. The reporter genes we have used are the bacterial lacZ gene and a human Ha-ras oncogene. When the lacI gene, encoding repressor, and a reporter gene under lacZ control are present in the same cell, the reporter gene is repressed, but can be induced by IPTG, a non-metabolizable lactose analog. In cells containing lacZ and lacZ, P-galactosidase activity can be induced with IPTG as evidenced by histochemical detection with X-gal. Further, NIH 3T3 cells containing lacI and a Ha-ras gene remain untransformed. Administration of IPTG results in a transformed phenotype manifested by anchorage independent growth, proliferation in reduced serum and release of an angiogenic activity. The ability to selectively activate a gene without perturbing chromatin structure has broad implications in areas as diverse as developmental biology and mutagenesis. Supported by NIH grant ES05204.

3:10 Na,K-ATPase: STRUCTURE-FUNCTION ANALYSIS AND EXPRESSION OF THE SUBUNIT GENES. Jerry B. Lingrey, James Van Huyse, Patrick Schultheis, Bhavani Pathak, Department of Molecular Genetics, Biochemistry and Microbiology, University of Cincinnati College of Medicine, 281 Bethesda Avenue, Cincinnati, OH 45267-0524.

The Na,K-ATPase is an integral membrane protein which is responsible for pumping Na+ out of the cell and K+ in. The enzyme produces an electrochemical potential which is involved in the function of excitable tissues such as brain and muscle and the chemical gradient of Na+ drives many transport processes including the translocation of sugars and other nutrients and ions into the cell. The enzyme is composed of two subunits, an a and b and multiple isoforms for each of these subunits are expressed. Utilizing transfection of cultured cells with truncated transgenic mouse assays, we have identified regions of the a subunit gene which are involved in regulation. Utilizing site-specific mutagenesis, the cardiac glycoside binding site on the a subunit has been identified. These studies are an advantage in finding that the human enzyme is sensitive to cardiac glycosides. Thus expression of the a subunit carrying mutations which alter the binding site for cardiac glycosides confers resistance to sensitive cells. Site specific mutagenesis is also being used to identify sites within the enzyme which are involved in the transport process.

Aerospace Medicine

Arranged by: Michael Barratt
Hosted by: James S. King
FRIDAY, APRIL 26, 1991
The Ohio State University
Graves Hall 2063
333 West 10th Avenue
1:30 PM
Michael Barratt, Presiding

1:30 OVERVIEW OF AEROSPACE MEDICINE AND THE WRIGHT STATE UNIVERSITY AEROSPACE MEDICINE PROGRAM. Michael R. Barrett, Wright State University, School of Medicine, 119 West Funderburg, Fairborn OH 45324

1:45 BONE DENSITY MEASUREMENT IN BEDREST SUBJECTS RELATIVE TO INDUCTION OF MUSCLE DIFFERENTIATION. W. Edward Powers, M.D.
Wright State University School of Medicine, Aerospace Medicine Residency Program, Department of Community Health P.O. Box 927, Dayton, Ohio 45401-0927

Weightlessness (zero gravity) during space flight produces biochemical changes in bone metabolism which
with intravenous Fluosol-DA. Following each manipulation,
where: R = gas constant, T = temperature, D = diffusion
model of bubble dissolution. The rate of dissolution is:

\[
T = \frac{P + 2y/r}{P + 4y/r}
\]

These studies are essential for developing counter-measures for loss of bone density during space flight. 2:15
A BRAVE TROUDED DISPLAY SYSTEM FOR ENHANCED PATIENT ACKNOWLEDGMENTS. A. DOBEL, WRIGHT STATE UNIVERSITY, DEPARTMENT OF AEROSPACE MEDICINE, P.O. BOX 927, DAYTON, OH 45401-0927.
INTRODUCTION. An integrated, nanoramic HMD system was designed for management of multiple critically ill patients by a life flight crew. 2:45 PATENT FORAMEN OVALE AS A RISK FACTOR FOR TYPE II DECOMPRESSION SICKNESS IN DIVERS AND AVIATORS: ENVIRONMENTAL DIFFERENCES AFFECTING TARGET ORGANS

PATHOPHYSIOLOGY

Thomas C. Hanks M.D. Department of Aerospace Medicine, P.O. Box 927, Wright State University, Dayton, Ohio 45435

Type II Neurological Decompression sickness (DCS) is a disease with severe morbidity and mortality and with highly trained and motivated individuals at risk. Data from retrospective case control studies in divers and aviators with Type II DCS were reviewed. Neurological events in divers are highly selective to the spinal cord; in aviators, the lower cranial nerves, cerebral pathology predominates. Differences between the diving and aviation environments, bubble reservoirs created, and target organ pathophysiology were contrasted. Recent microbubble provocative Doppler echocardiographic data was compared to prior series of anatomic postmortem findings. Patent Foramen Ovale (PFO) in divers and aviators showing PFO to be a significant risk factor for Type II DCS. Differences in head up orientation, mobility, protective equipment, and timing of valsalva and straining maneuvers were compared as possible target organ selectors during Type II DCS events. Color contrast Doppler echocardiography is suggested as a technique for a prospective, noninvasive study of the diving and aviation environments.

3:15 THE USE OF INTRAVENOUS PERFLUOROCARBON EMLUTION IN THE TREATMENT OF DECOMPRESSION SICKNESS.

John P. Simanonok, M.D. Wright State University School of Medicine, Aerospace Medicine Program. P.O. Box 927, Dayton, OH 45401-0927.

Intravenous Fluosol-DA was compared with air, normobaric oxygen, and hyperbaric oxygen (HBO) using a mathematical model of bubble dissolution. The rate of dissolution is:

\[
\frac{dr}{dt} = -\frac{R}{\gamma \times \frac{P + 2y/r - \gamma}{P + 4y/r}}
\]

where: R = gas constant, T = temperature, D = diffusion coefficient, S = solubility, \(r = \) bubble radius, \(P = \) ambient pressure, \(\gamma = \) surface tension of dissolved nitrogen tension. \(P \) and \(r \) were respectively increased and decreased to simulate hyperbaric treatment. \(r \) was set to zero to simulate oxygen treatment, and to 785 of \(P \) to simulate air treatment. Solubility was increased to simulate treatment with intravenous Fluosol-DA. Following each manipulation, the equation was numerically integrated to model the respective treatment. From an initial 1 mm diameter, bubble life times were 360 min for HBO, 33 min for Flusol-DA. These results predict that treatment with intravenous Flusol-DA will be a highly effective adjucent to the current treatment protocols for decompression sickness.

3:45 CIRCADIAN RHYTHMS AND AIRCREW PERFORMANCE

Robin Dodge M.D., Division of Aerospace Medicine, Wright State University, P.O. Box 927, Dayton, Ohio 45401-0927

The scientific literature has devoted considerable space to the issue of circadian rhythms, a subset of which is directly concerned with the interplay between these rhythms and aircrew performance. It should be no surprise to find altered circadian rhythms in terms of their relationship to different phases of the light/dark cycle, especially in long or cross time zone flights. However, there is also a definite relationship between the flight performance and these altered rhythms is questionable. It is generally agreed that the prime time for a performance affect to appear would be the period immediately following the first full rest period in relationship to a new light/dark cycle (time zone). This easily lends itself to testing that altered or affected sleep patterns are primarily responsible for any changes in the most common to all forms of flight, not just long haul, that is discussed by aircrews and is responsible for a large impact or potential sacrifice of aircrew workers, especially shift workers, is that of disturbed sleep habits leading to fatigue. Fatigue is the major concern of this author in considering the implied role of circadian rhythms and aircrew. All the issues are will be briefly reviewed and discussed in this presentation.

4:15 RIGID ENCLOSURES FOR ORBITAL EXTRA-VEHICULAR ACTIVITY: ADVANTAGES AND HUMAN FACTORS CONSIDERATIONS

Michael R. Barrett, M.D. Department of Aerospace Medicine, P.O. Box 927, Wright State University, Dayton, Ohio 45435

Projected space station and other orbital operations call for a substantial requirement of manned extravehicular activity (EVA) for construction, maintenance, and servicing tasks. It is questionable whether space suits currently in use can meet acceptable levels of reliability, maintainability, and safety. A rigid enclosure is proposed which will incorporate life support system, maintainability, and work station into a single unit. A high pressure, "shin-sleeve" environment will greatly enhance comfort of the EVA astronaut while reducing EVA overhead time. Arm-length dextrous gloves and tool station will be mounted on a forward hatch, allowing access for interchange when docked at space station. Remote grappling arms will enable optimal work envelope positioning and provide a stable base from which to exert a force. The occupant will assume a kneeling posture, the well balanced environment. A comparison is made between the current extravehicular mobility unit and the proposed enclosure with regards to primary protective functions, servicing and maintainability, task oriented attributes, and cost. A major benefit of the proposed enclosure is reliability and safety which could be realized with such an enclosure. While initial development costs and cost-to-orbit would be relatively high, over the long term a cost advantage would be expected.

4:45 HUMAN FACTORS IN THE DEVELOPMENT OF THE ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR SPACE STATION.

Laurie Anne Atten, M.D. Wright State University, Aerospace Medicine, Box 927, Dayton, Ohio 45401

Humans require a minimum of 0.8 liters of water per day to survive and water is second only to oxygen as a nutrient essential to human life. On space station, water will also be necessary for personal and environmental hygiene as well as for food preparation, plants and animals for experiments and possibly even food supplementation. Since water is both a bulky and heavy commodity its transportation could use up to half of a supply vessel's cargo. This paper discusses the various problems which must be considered with humans "in the loop" in a life support system in which the water is reclaimed or recycled. Consideration of all the sources of water on space station including urine, shower hygiene, laundry and atmospheric moisture condensate and the different contaminants from each is required. A water system is thus necessary which can remove solids and volatiles, control the microflora and still produce water which is safe for humans to use. The system has to be engineered to work in microgravity, yet still have enough similarity to ground based systems so that astronauts can and will use the facilities. The actual subsystems, interactions, and control tools, will have to be designed so that crew without technical, mechanical or engineering skills can build, use the equipment comfortably and perform the maintenance necessary to keep the system functioning for 30 years.
**Computers as Educational Tools:**

**Computer Tutors**

**Hosted by:** Michael H. Klapper  
**SATURDAY, APRIL 27, 1991**

**The Parke University Hotel**

3025 Olentangy River Rd.  
8am-6pm

**Philip J. Smith, Presiding**

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**Contemporary Economic Issues**

**Hosted by:** Edward J. Ray  
**FRIDAY, APRIL 26, 1991**

**The Ohio State University**

Robinson Laboratory 2027  
206 West 18th Ave.  
1:00 PM

**Edward J. Ray, Presiding**

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**Collaborative Aerospace Research through The Ohio Aerospace Institute**

**Arranged by:** Theo G. Keith  
**Hosted by:** James L. Marshall  
**FRIDAY, APRIL 26, 1991**

**The Ohio State University**

Agricultural Engineering 0142

590 Woody Hayes Drive  
9:00 AM

Theo G. Keith, Presiding

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**5:15 COMPUTER SIMULATIONS FOR MODELING PHYSIOLOGIC RESPONSES TO SPACEFLIGHT.**

David F. Ward, M.D., Wright State University School of Medicine, Dept. of Community Health, P.O.Box 927, Dayton, OH 45401-0927.

A computer program, HUMAN (Coleman, 1980), uses sophisticated algorithms to approach human physiology in a systems analysis manner. HUMAN allows over 450 variables and parameters to be manipulated and calculated for physiologic systems including circulatory physiology and control mechanisms of body fluid during microgravity conditions. Twenty-one parameters of the circulatory and body fluid systems analysis were monitored during a 100 day microgravity simulation. Calculations of the parameters were monitored at hourly intervals for days one through nine of the simulation, six hour intervals for days 10 through 30, and daily intervals for days 31 through 100. Comparisons of the parameters calculated were made to inflight data obtained from Skylab 2, 3, and 4 measurements to assess the model. Analysis of data using the HUMAN model verifies that this simulation of physiologic adaptation in spaceflight is a valid method to predict regulatory parameters, including highly invasive, previously unmeasured or currently impractical in human subjects.
appeared incongruous with GC/MS. Finding Schi thiolate and identified and quantitated by nylonamine, demethylated with sodium benzene-
extracted as an ion-pair with hexanitrodiphen-
his background and $330,000 in accidental life 
husband. The discovery of inconsistencies in consistent with its rapid enzymatic hydrolysis by 
cultures arose due to the bis-quaternary ammon-
relaxant, succinylcholine (SCh) in embalmed 
days after death. Analysis revealed the muscle 
of Ohio, 3000 Arlington Ave., Toledo, OH 43699 

Jim Y. Tong, presiding 

1:30 IMPACT OF AUTOMATION ON CRIME LABORATORIES 

MOHAMMED M. GOHAR, State Of Ohio, Arson Crime Lab, 8895 East Main Street, Reynoldsburg, Ohio 43068. 

As a result of recent progress in the field of microprocessors, the power of main frame computers has become affordable to many small to medium sized crime laboratories. This paper will discuss the availability of various systems, their applications in the field of forensic laboratories, and benefits of implementing a comprehensive laboratory information management system with real-time data acquisition and processing. 

Issues of system access security, memory size, integrity of hardware and software, and unattended 24 hour-a-day instrumentation will be given. To satisfy legitimate legal questions, emphasis will be placed on the strict quality assurance and security measures required in the daily operation. 

Finally, this paper will describe specific benefits of automation within the Ohio Arson Crime Laboratory. The most significant benefit has been a 400% improvement in turnover time. Other benefits include the ease of: data management and interpretation, sample history tracking and consequent analytical steps, results entry, statistical studies, certifying or approving forensic chemists' findings, and report generation. 

2:00 POISONING IN DISGUISE, FORENSIC TOXICOLOGY IN A MURDER CASE. Robert B. Forney, Jr., Ph.D., DABFT, Medical College of Ohio, 3000 Arlington Ave., Toledo, OH 43699 

A newly wedded, 25 year old woman's death was due to a fall from a horse according to the husband. The discovery of inconsistencies in his background and $330,000 in accidental life insurance led to a disinterment and autopsy 33 days after death. Analysis revealed the muscle relaxant, succinylcholine (SCh) in embalmed tissues and an apparent injection site. Difficulties arose due to the bis-quaternary ammonium structure of SCh and its pharmacologically active range of concentrations. SCh was extracted as an ion-pair with hexanitrodiphenylamine, demethylated with sodium benzene-
thiolate and identified and quantitated by GC/MS. Finding SCh post mortem appeared inconsistent with its rapid enzymatic hydrolysis by pseudocholinesterase. However, studies in surgical patients and animals confirmed its persistence in tissues beyond the time required for plasma disappearance. Based upon this work, the failure to find an anatomical cause of death, and other evidence, the husband was convicted of the murder of his wife by lethal injection of SCh. 

2:30 FORENSIC SCIENCE EDUCATION - WHERE ARE WE? SIGNIFICANT IMPACTS. Michael Yarchak, Attorney General's Office, Ohio Bureau of Criminal Identification and Investigation, P.O. Box 365, London, Ohio 43140 

After receiving a degree in a generalized scientific major, the crime lab analyst usually is trained in a crime lab in a specific area of forensics expertise. The nature and rate of scientific progress is significantly diminishing the role of the crime lab as primary educator. Chemical fingerprint development techniques, lasers, DNA, new drug variations, chemical instrumentation, accreditation, and legal challenges make necessary even greater specialization by the scientist working in the crime lab. Now attitudes must develop on the part of forensic analysts, crime lab managers and educators and their efforts should be more complementary. 

Suggested for discussion are ideas such as extended degree programs, a forensics "Institute", new courses, modified attitudes by crime lab management, and the establishment of a commitment to excellence. 

Some of these ideas will be discussed in relation to recommendations of other professional entities such as the National Science Foundation task force for math and science education, ASCLD, etc. 

2:50 FORENSIC CHEMISTRY EDUCATION IN OHIO. James Y. Tong, Chemistry Department, Ohio University, Athens, OH 45701. 

The development of B.S. in Forensic Chemistry program at Ohio University is briefly outlined. The progress and changes in the program since its inception and a survey of the careers chosen by the graduates in the last 15 years are summarized and evaluated. The importance of the forensic laboratories in Ohio and elsewhere in giving the student opportunities to do internships between the junior and senior years is acknowledged. The program has several unique features: (1) it has a ratio of female to male graduates of 3 to 1, (2) very few graduates are not working in forensic chemistry or related scientific fields, and (3) the program has prepared others for advanced studies in law, medicine, environmental science, biochemistry, as well as analytical chemistry. Planned changes such as training in DNA fingerprinting to enhance the program and to meet changing needs of the field are described. 

3:20 DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR FDA INVESTIGATION OF TAMPERING INCIDENTS AND OTHER CRIMINAL ACTIVITIES. Fred L. Fricke, Food & Drug Administration, National Forensic Chemistry Center, 1141 Central Avenue, Cincinnati, Ohio 45202. 

The FDA has been involved in investigating product tampering incidents for a number of years. The Tylenol incidents in 1982 and 1986 resulted in the death of several innocent citizens. Tampering thus became a weapon for either random killings or targeted homicides. Until recently, the tampering episodes under FDA jurisdiction were mainly confined to the U.S. and in a majority of the cases, each problem was localized to a particular metropolitan area. The Chilean fruit incident has now demonstrated that tampering can be used as an international weapon with far-reaching effects on U.S. citizens. In addition to tampering, the FDA conducts investigations of counterfeit drugs, generic drug fraud, product contamination, etc. 

The FDA has decided to be pro-active in dealing with these activities and has established a National Forensic Chemistry Center (NFCC). 

My presentation will describe the functions of the NFCC and the analytical techniques that are currently being used. Specific examples of the use of Inductively Coupled Plasma-Optical Emission and Inductively Coupled Plasma-Mass Spectrometry for determining trace elements in various matrices will be given. 

3:50 TOOL MARK IDENTIFICATION IN HUMAN BONE. Carl H. Hammerle, Miami Valley Regional Crime Laboratory, 361 W. Third St., Dayton, OH 45402. 

On October 22, 1990, a W/M 23 died of an apparent knife wound to the chest as a result of a domestic dispute. An autopsy at the Montgomery County Coroner's Office revealed that the victim had two knife wounds, one in the right thigh and one in the upper left chest. The blade entered the third intercostal space, nicked the fourth rib and several major vessels while retaining a depth of 8 inches.
Death was by exsanguination. A 1 inch section of rib containing the nick was recovered at autopsy and forwarded to the Miami Valley Regional Crime Laboratory for analysis and tool mark comparison with the murder weapon. The bone was cleaned, sectioned, stained, and microscopically compared with test cuts produced by the questioned knife. The knife was positively identified as the murder weapon due to the microscopic comparison of striations on both the bone and test media.

The ability to accurately determine the time of death, cause, and subject responsible for the event is of medical and legal importance. Numerous disciplines within the forensic science community must be utilized in the search of truth. This study involved a rural area fatal pedestrian accident in which the driver left the scene and reported the accident to the local authorities. Examination of blood spatters on the roadway and other physical evidence recovered at the scene were found to be inconsistent with the statement given by the driver. The autopsy examination revealed a series of tire impressions on the victim's torso. Reactivity in the tissue was present to indicate the subject was alive at the time the impressions were made. The impressions were later identified as not originating from the driver's vehicle. Subsequent investigations by the authorities resulted in the arrest of a driver of a second vehicle who was charged with hit and run.

TIRE IMPRESSION IDENTIFICATION ON HUMAN TISSUE
Kenneth M. Betz, Miami Valley Regional Crime Laboratory, 361 W. Third St, Dayton OH 45402

For several thousand years of recorded history arsenic has been used both as a medicine and as a poison. Current therapy restricts the use of arsenicals to the treatment of certain tropical parasitic diseases. Arsenic is very rarely encountered in Ohio as a drug, but more commonly from homicidal, industrial and environmental sources. The symptoms of arsenic poisoning may often appear to be those of some naturally occurring disease, gastrointestinal, cardiac or hematologic in origin. The lecture will illustrate the laboratory investigation of three recent cases of arsenic poisoning. Blood and tissue levels of arsenic may be low even in acute exposure because of the rapid redistribution to liver, kidney, and bone heart. Because of the high sulfhydryl content of hair and nails, arsenic is deposited into the growing roots at high concentration. It is possible for such arsenic to become fixed in the hair at the point of time relative to its deposition for as long as the hair grows. Since hair grows at a rate of 0.3mm per day, a few millimeter's growth can correspond to a few weeks exposure. Hair analysis for heavy metals has proved to be particularly useful in establishing the difference between chronic and acute poisoning in these cases.

Forensic Chemistry Part II
Arranged by: James Y. Tong
Hosted by: Carolyn Carter
SATURDAY, APRIL 26, 1991
The Ohio State University
Evans Hall Conference Room
520 King Avenue
1:30 PM
James Y. Tong, Presiding

FORENSIC ANALYSIS UTILIZING THE BIO-RAD REMEDI
Craig A. Suthelmer, Chief Toxicologist, GERVH, 3000 Ohio State University, Columbus, OH 43210

Forensic toxicology has long been an area of innovation and hybrid technologies. The Blooded REMEDI is a novel hybrid of HPLC (preparation and analysis), fast-scanning UV detection, and a sophisticated data system. The system utilizes artificial intelligence to speedily determine unknown analytes in various preparations (biological or pharmaceutical) and subsequently quantitates these analytes based upon multiple internal standard calculations. REMEDI has been utilized in forensics laboratories and its incorporation into a full service forensic toxicology laboratory will be the topic of this presentation.

ANALYTICAL SURVEY OF CURRENCY FOR COCAINE
Robert E. Budgake and Jay D. Spencer, Canton-Stark County Crime Laboratory, Central Avenue, S.E., Canton, Ohio 44707

At the request of the law enforcement agencies in Stark County, Ohio, the Canton-Stark County Crime Laboratory was asked to evaluate the analysis of currency for cocaine residues, for the purpose of aiding in the seizure of currency involved in drug trafficking. A survey was conducted of Twelve Financial Institutions' local deposits to ascertain the degree of cocaine contamination of the general money supply. Six thousand eight hundred (6,800) bills, totaling $306,000, were analyzed utilizing an atomic absorption spectroscopy methodology. Several attempts to create an artificial fingerprinting method which would allow for the identification of individual bills were unsuccessful. The survey is in sharp contrast to the 47.8% positive rate being detected on currency seized from individuals suspected of being drug traffickers.

REFLECTIONS ON COCAINE-RELATED DEATHS IN THE 1980s; A Central Ohio Perspective
Sonja L. Rawn, Associate Toxicologist, Franklin County Coroner's Office, 520 King Avenue, Columbus, Ohio 43201

Episodes of stimulant drug abuse have been a part of American History for over a hundred years. These episodes are cyclic, occurring every twenty years, exploring cocaine, amphetamines or both. The recent experience with cocaine abuse in the Central Ohio area continues to demonstrate the desire to escape this cycle.

SHARPS Disposal: A Microcosm of Drug Abuse Trends
Barbara M. Schumacher, Canton Stark County Crime Laboratory, 3530 E. Market St, Canton, OH 44707

It has been estimated that at least 1 in 100 Americans is a drug user. As the drug culture expands to new users, new behavior patterns are also developing. The abuse of common household chemicals as well as vitamins, analgesics, antihistamines, and other commonly ingested drugs has caused a dramatic increase in the occurrence of hemorrhagic, pulmonary, and cerebral hemorrhages. This presentation will discuss this phenomenon in detail.
CHARACTERIZATION OF TRACE EVIDENCE BY INSTRUMENTAL MICROANALYSIS, William L. Deen, Hamilton County Coroner's Laboratory, 3159 Eden Avenue, Cincinnati, Ohio 45219.

One of the primary functions of the trace evidence examiner in a crime lab is to compare material from a suspect to material from a crime scene. If these materials correspond in chemical or physical characteristics, they could establish a link between the suspect and the crime. Such forensic examinations often involve trace amounts of material necessitating microanalytical techniques. Our laboratory has found that the scanning electron microscope-energy dispersive x-ray spectrometer is an excellent tool for investigating the inorganic content of trace evidence. Similarly, the fourier transform infrared microspectrometer is used to analyze the organic composition. Evidence such as paint from hit-and-run cases is routinely characterized by the combination of these two techniques. This presentation will provide other examples of instrumental techniques applied to the analysis of criminal evidence.

A REVIEW OF THE 1990 ETHANOL STATISTICS FROM THE OHIO HIGHWAY PATROL. Sgt. John R. Allard, Ohio State Highway Patrol Crime Laboratory, 660 East Main Street, Columbus, OH 43205

The author reviewed blood, breath and urine alcohol results collected from individuals tested by the Ohio State Patrol during the year 1990. Mean ethanol levels were determined for individuals arrested for driving while under the influence as well as for individuals involved in fatal traffic crashes. These findings indicate a need for targeting certain groups for deterrent effect campaigns against drinking and driving.

FORENSIC APPLICATION OF ICP SPECTROSCOPY; A New Analytical Tool For Heavy Metal Poisoning Cases. James L. Ferguson, Chief Toxicologist, Franklin County Coroner's Office, 525 King Avenue, Columbus, Ohio 43201

Inductively Coupled Plasma Emission Spectroscopy (ICP) is an analytical technique which had its theoretical inception about twenty years ago. The first commercial instruments were introduced ten years ago, but developments in microcomputer technology have rendered most instruments within the affordability and general use only in the last few years. The technique of ICP offers greater overall sensitivity, ease of sample preparation and smaller carbon specimen sizes than conventional atomic adsorption spectrometry. With the aid of this technique we are now able to scan, screen and quantitate the amount of any of thirty metals which is known to be biologically significant levels. The lecture will give a brief review of the development of ICP and an overview of sample handling techniques as applied to forensic specimens of blood, urine, tissue and hair for the analysis of the classical heavy metals from current poisoning cases.

Characterization of Trace Evidence by Instrumental Microanalysis

Geology in the Twenty-First Century

Arranged by: Michael P. Angle
Hosted by: Garry D. McKenzie
FRIDAY, APRIL 26, 1991
The Ohio State University
Orton Hall 110
155 South Oval Mall
2:00 PM
Michael P. Angle, Presiding

4:10 A REVIEW OF THE 1990 ETHANOL STATISTICS FROM THE OHIO HIGHWAY PATROL. Sgt. John R. Allard, Ohio State Highway Patrol Crime Laboratory, 660 East Main Street, Columbus, OH 43205

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appropriate microbiological studies would aid in interpretation of hydrogeochemistry in the field. Some and appropriate analytical methods both require development. However, the possibility exists near-term for microbiology to better use in “routine” hydrogeology.

IMPLEMENTATION OF A WELL LOG COMPUTERIZATION SYSTEM FOR THE STATE OF OHIO. Rebecca Petty, Division of Water, Ohio Dept. Natural Resources, 1939 Fountain Square Dr., Columbus, Ohio 43224

The Division of Water maintains a large portion of Ohio’s ground water data in the form of over 700,000 well logs. Each record is a legal document filed with the Division and stored as paper files by county, township, and location, with approximately half of the records located on topographic maps. These records are used extensively for ground water research, development, protection, and remediation efforts with over 7000 inquiries received annually by the Division. A well log computerization system using optical disk storage and retrieval technology combined with database management has been developed to facilitate storage and retrieval of records and enable other software applications including flow modeling and GIS. Well logs can be retrieved by searching key fields and database information can be downloaded in an ASCII format for further processing. Future system development will include connection to the state data network and access through fax gateways from remote terminals. Data entry has been limited due to availability of funds. Demonstration projects are planned for 1991 to identify networking applications and data entry needs.

OHIO EPA – DIVISION OF GROUND WATER PROGRAM

Thomas M. Allen-Assistant Chief-Ohio EPA-DGW

Ohio EPA

1800 WaterMark Drive

P.O. Box 1049

Columbus, Ohio 43266-0149

A. Discussion of the Ohio Ground Water Protection and Management Strategy

B. Division of Ground Water responsibilities identified;

C. Relationship of DGW responsibilities and hydrogeology discipline;

D. Future program development

POLYMER-DISPERSED LIQUID CRYSTAL FILMS FOR SOLAR ENERGY CONTROL

G. Paul Montgomery, Jr.

Physics Department

General Motors Research Laboratories

Warren, MI 48090-9055

Polymer-dispersed liquid crystal (PDLC) films can be used for electrical control of the solar influx into buildings and automobiles because they can be switched from a cloudy, light-scattering off-state to a transparent on-state. Optimum PDLC performance in solar control applications requires maximizing the backscattering of incoming solar radiation in the off-state. We have theoretically and experimentally studied the effects of droplet size and concentration on backscattering. We also developed a model that predicts that, at wavelength A, maximum backscattering occurs for droplet radii between A/7 and A/5, depending on the liquid crystal concentration. These results are consistent with hemispherical transmittance and reflectance measurement on PDLC films with controlled droplet sizes. These measurements indicate that solar attenuation by PDLC films will be maximized by choosing droplet size to maximize backscattering of visible radiation. This choice also increases solar attenuation by absorption of scattered radiation trapped inside a PDLC film by total internal reflection.

G. Paul Montgomery, Jr.
With the recognition in recent years that liquid crystals can have large optical nonlinearities, there has followed a sudden increase in theoretical and experimental investigations of these materials. We will present our results on theoretical investigations of molecular origin of both large second and third order nonlinearities. We will discuss the manner in which the structure of a variety of bulk liquid crystal phases serves to manifest and enhance the molecular origins of the nonlinearity. Results of recent experiments to determine nonlinear susceptibility of liquid crystals will be presented.

A. SAUPE and J. LIU. Liquid Crystal Institute and Department of Physics, Kent State University, Kent Ohio 44240.

Biaxial nematics are rare and at present only micellar biaxial nematics have been investigated extensively. Studies of phase transitions showed that there is little change in micellar structures at nematic-biaxial transitions. The uniaxial-biaxial transitions are second order and have the critical properties of the three dimensional xy-model. The direct identification of a nematics as biaxial by textures is difficult. The Schlieren textures of all nematics are similar but uniaxial-biaxial transitions are well recognizable by transient irregular patterns. However, the structures of defects differs qualitatively. Point defects and disclination lines observed in capillaries and change characteristically at the transitions between the different nematic phases. Acknowledgement: This research was supported by the NSF under Grants DMR85-12523 and DMR89-04653. We thank S. Sabol-Keast and M.E. Neubert for preparation and purification of surfacants under NSF Grant DMR88-18561.
The presence of opioid receptors in human peripheral nerves was recently reported. To investigate the potential for a physiologic role of these receptors, human peripheral nerves were examined for the presence of two opioid ligands - 6-endorphin and met-enkephalin. The five human nerves were prepared by heating in 1 M acetic acid, followed by homogenization and then lyophilization. The extracts were reconstituted in RIA assay buffer and incubated with bovine antisera. For 6-endorphin, radioiodinated antibody to 6-endorphin was added, the mixture was incubated and centrifuged, and gamma counts were performed. For met-enkephalin, bound antigen was separated using polyethylene glycol, and the precipitate was counted in a gamma counter. Human peripheral nerves contain endogenous opioid ligands, as well as opioid receptors.


3:15 HYDROMORPHONE RECEPTORS IN BRACHIAL PLEXUS ANESTHESIA.

Juliana H.J. Brooks, M.D., Bhagwandas Gupta, M.D., Dept. of Anesthesia, N429

Doan Hall, 410 W. 10th Ave., Columbus, Ohio 43210

Four cases are reported wherein patients undergoing arteriovenous shunt insertion for renal dialysis received brachial plexus anesthesia, with hydromorphone in the local anesthetic solution. All patients recovered normally and required no postoperative analgesics for 2-3 days; however, in the reported cases, none of the patients required analgesics. Possible mechanisms of action for opioids in brachial plexus anesthesia include noceptive blockade via opioid receptors in the brachial plexus, centripetal neuroaxonal transport of the narcotic to the substantia gelatinsosa of the spinal cord, diffusion of opioids from the brachial plexus sheath to the epidural or subarachnoid space, and slow release of the opioid from the brachial plexus sheath into the systemic circulation.

Neurosciences

Arranged by: James S. King
Hosted by: James S. King
FRIDAY, APRIL 26, 1991
The Ohio State University
Graves Hall 2063
333 West 10th Avenue
8:45 AM
James S. King, Presiding

9:00 NEUROSCIENCE: AN INTERDISCIPLINARY EFFORT.

Dr. James S. King, Chairperson, Ohio State University Department of Cell Biology, Neurology & Anatomy, 333 W. 10th Ave., Columbus, Ohio 43210

9:15 NEURAL TRANSPLANTS: FRONTIERS FOR THE 1990's. Bradford T. Stokes. The Ohio State University, Department of Physiology, 333 West Tenth Avenue, Columbus, Ohio 43210

The use of neural transplants for the potential restoration of lost or altered function is quickly becoming an issue of interest to the neuroscience community and the bioethicist. I will address the general issues of how one could use such approaches to effect improvements in a number of human neurological disorders. In particular, I will consider some of the general features of neural grafting, its application to central neurological problems (neurodegenerative disorders, traumatic injury) and one specific example of how behavioral recovery is altered by transplants after experimentally induced spinal cord injury.
mechanisms of growth and regeneration in the central nervous system (CNS), an ability which is severely retarded in mammals. The African clawed frog, Xenopus, can regenerate visual pathways even as an adult. Spinal cord regeneration, however, occurs only prior to metamorphosis, although some reorganization of neural connections after lesions, comparable to that seen in some mammalian systems, seems to occur. This presentation will discuss the use of Xenopus as a model for the study of mechanisms of growth and regeneration in the CNS, and the possible role of thyroid hormone in metamorphosis and CNS growth and cell death. Data from intact animals will be compared to data from studies of CNS explant cultures in defined medium. (Supported by NS-10165 and OSU Dept. of Surgery MRDF)

10:15 AN EXPERIMENTAL APPROACH TO MULTIPLE SCLEROSIS THERAPY. Carolyn C. Whitacre, Department of Medical Microbiology and Immunology, The Ohio State University, 5072 Graves Hall, 333 West Tenth Avenue, Columbus, OH 43210.

Experimental autoimmune encephalomyelitis (EAE), which is used as a model system for study of the human disease, multiple sclerosis (MS), is a model system for study of the human disease, multiple sclerosis (MS). A single injection of myelin basic protein (MBP) and adjuvant in Lewis rats results in a monophasic disease in which CD4+ T cells directed against MBP cause clinical paralytic signs and CNS perivascular infiltrates. We have recently reported that the oral administration of MBP to Lewis rats prior to EAE induction results in suppression of clinical neurologic signs, decreased CNS histopathologic changes, suppression of the antigen-specific lymphocyte proliferative response, and suppression of serum antibody levels. We have focused on the mechanism of disease suppression following the oral introduction of MBP. Since the orally induced tolerance is not transferrable with lymphoid cells, not abrogated by cyclophosphamide treatment, and not demonstrable in cell mixing studies, we have ruled out the participation of suppressor T cells. Thus, three possibilities remain: clonal deletion of MBP-reactive lymphocytes, clonal anergy, or altered migration patterns. Because mRNA levels for the MBP-specific T cell receptor are reduced in tolerized rats and tolerance at the B cell level can be reversed by T cell-derived lymphokines, we favor a clonal anergy mechanism. Establishment of a long-term anergic state or deletion of destructive myelin-reactive lymphokines in multiple sclerosis would be more desirable than currently used broad spectrum immunosuppressive drugs. (Supported by USPHS grants NS 23561 and MH 44660)

11:00 NEUROIMMUNE REGULATION DURING VIRAL INFECTION. John F. Sheridan, Departments of Oral Biology, Medical Microbiology and Immunology, The Ohio State University, Columbus, Ohio 43210.

Stress has been shown to affect a variety of immunological parameters in both animal models and man. However, the health consequences of stress vary, particularly in those persons with pre-existing diseases, are still unclear. The purpose of this study was to assess the effect of restraint-induced stress on the cellular immune response during an experimental natural viral infection. C57/B16 mice were infected intranasally with influenza A/P8R virus, and restrained daily for 16 hr from 1 day before infection to 14 days post infection (p.i.). Mice restrained for 5 cycles showed a markedly reduced pattern of cellular infiltration and consolidation in the lung when compared to the non-stressed, infected group. However, mortality due to viral infection was not significantly different between the groups. The effect of restraint on the immune response (IL-2) to PR8 virus was measured 14 days post infection. Restraint was depressed when lymphocytes from restrained mice were stimulated in vitro with PR8 virus. Depression of the response correlated with the number of restraint cycles. Although the inflammatory response was reduced during stress, the titer of infectious virus in the lungs was similar to non-restrained controls. The restraint protocol used in this study produced prolonged, elevated levels of plasma corticosterone which are associated with the tissue concentration of norepinephrine in lymph nodes and thymus. Studies are in progress to determine if these neuroendocrine changes are associated with stress-induced depression of the IL-2 response to influenza virus.
New high-technology enterprises need multiple seed capital sources from both the public and private sectors. Ohio has derived substantial economic benefits from high-technology. Throughout Ohio, large sums are being spent to create and strengthen high-technology. The Thomas Edison Program is a major contributor toward this end.

Dr. Funk will be discussing success factors involved in several of his enterprises, the first one being founded in 1954. He was awarded a ScD in Metallurgy from Massachusetts Institute of Technology in 1951. He was also an associate professor at OSU in welding engineering for 13 years. He holds several patents. Dantering Medical Technology manufactures post-orthopedic surgery Passive Motion Machines and manufactures surgical implants. He is also founder and president of Funk Metallurgical Corporation, an manufacturer of precision investment castings.


A recent report of the OSSTC highlights the need for improving the availability of seed venture capital in Ohio. New high-technology enterprises need multiple seed capital sources from both the public and private sectors. Ohio has derived substantial economic benefits from high-technology. Throughout Ohio, large sums are being spent to create and strengthen high-technology. The Thomas Edison Program is a major contributor toward this end.

Dr. Janson is the author of A Strategic Plan for Ohio, which is one of the objectives of the OSSTC report. The plan is designed to build on existing Ohio Edison programs, which have resulted in the creation of eight research centers. Centers were chosen to augment the comparative advantage of each subregion of Ohio. Research in core technologies of most significance to the firms and universities located near to each center is favored. The Ohio Edison Board requires a reasonable chance for world class status. The network includes substantial participation by foreign firms and by universities far from the research centers. The strategic development plan should support rapid growth firms and industries of Ohio that are likely to benefit from the R&D in the core technologies defined in the mission statement of each Edison center.


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Mr. Sanford will be discussing Steris, an Ohio venture capital funded corporation. As an entrepreneur with twenty five years of health care industry experience, Mr. Sanford has been instrumental in starting four businesses prior to his involvement with Steris Corporation. Under his leadership, Steris has progressed in four years from an idea to a fully operational developer, manufacturer, and marketer of sterile processing and infection prevention systems with sales in excess of $10 million. Steris has been the recipient of two seed development grants from the state of Ohio Edison Program to partially fund research at CWRU and LCCC. Mr. Sanford is a member of the commercialization committee of the Edison BioTechnology Center (EBTCC).


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Mr. Foster will be presenting a historical view of the dozen or so enterprises that he either founded or assisted in founding over his forty year professional career. He will be highlighting lessons from both the successful and not so successful ventures. Trained as an electrical engineer, he also has a hard earned education in economics, finance, and operations. The talk will focus on basic principles such as modes of financing and growth rates. In 1984, he was the SBA Technology Applications Entrepreneur of the Year, receiving the award from President Reagan. In 1985, he received the Albert Sperry Medal from the Instrument Society of America.


A recent report of the OSSTC highlights the need for improving the availability of seed venture capital in Ohio. New high-technology enterprises need multiple seed capital sources from both the public and private sectors. Ohio has derived substantial economic benefits from high-technology. Throughout Ohio, large sums are being spent to create and strengthen high-technology. The Thomas Edison Program is a major contributor toward this end.

Mr. Horn helped to establish the original Entrepreneurial Services Division for Arthur Young in Chicago. Mr. Horn started the "Entrepreneur of the Year" program in Columbus in 1988. He brings over twenty years of experience in accounting and consulting, with a focus on entrepreneurship. He arrived in Columbus in 1987.

Fiber reinforced ceramic matrix composites are a potentially enabling technology for the next generation of engines for a high speed civil transport aircraft and for more efficient and durable rocket engines. Ceramics research at NASA Lewis is primarily directed toward (i) identification and development of the fibers, interphases, and matrices capable of making the potential real. Fibers research primarily addresses SiC and advanced oxide single crystals. Interphase research is directed toward understanding of interphase requirements and the identification of interphase structures that meet these requirements from the mechanical, thermodynamic, and environmental durability standpoints. Matrix research is aimed at incorporating fiber-interphase systems into composites. Properties such as environmental durability, strength, and toughness are maximized within the constraints of fiber durability and the processing environment.

The properties of ceramic composites which make them attractive materials for structural applications at high temperatures will be summarized. The key issues which must be addressed by the research and development community will be discussed with particular emphasis given to the role of the fiber-matrix interface. Recent work on the measurement and importance of various parameters such as bonding, surface roughness and abrasion will be discussed.

Various approaches to the preparation of ceramic materials starting from solution or metalorganic precursors are summarized. Aspects of both the precursor formation and its conversion to the desired ceramic are described.

Water-soluble polymers have been immobilized on graphite electrodes by exposure to gamma radiation. These polymer networks have been investigated as a means of imparting selectivity to electrochemical sensors by means of (i) a specific interaction (hydrophobic, hydrogen bonding, coordination) between the polymer and the analyte, (ii) restricted diffusion based on molecular size, and (iii) immobilization of an enzyme. Sensors for neurotransmitters are based on selective extraction into a poly(N-vinylpyrrolidone) film on graphite electrodes. Sensors for glucose and lactate have been prepared by immobilizing glucose oxidase and lactate oxidase, respectively, in poly(vinylalcohol) on graphite electrodes onto which a layer of platinum has been electrodeposited. Selectivity against ascorbate interference is achieved by electrostatic repulsion with a thin layer of NaFion adjacent to the electrode. The technology has been applied to sensor research and development in recent years. Photo-lithographic reduction, thick and thin film metallization, and chemical and plasma etching, are proven microelectronic fabrication techniques that can be utilized in the formation of physical, chemical and biological sensors. These techniques can produce an array of identical or different sensors on a relatively small substrate. Sensor elements produced by these techniques are also highly uniform and geometrically well-defined. These sensor element characteristics are very desirable. Furthermore, the sensor elements produced by this approach can lead to the introduction of new sensing principles, and higher degrees of sensitivity and reliability of the device. The technology also has the potential to produce sensors at modest cost.

Microelectronic fabrication technology as well as the material aspects involved will be discussed. Various types of sensors developed by these technologies will be used as examples for discussion.

Rationality Guided by the Invisible Hand: How it works, if it does
Arranged by: Krishnan Namboodiri
Hosted by: Krishnan Namboodiri
FRIDAY, APRIL 26, 1991
The Ohio State University
Bricker Hall 385
190 North Oval Mall
9:00 AM
Krishnan Namboodiri, Presiding
for Older Adults
with insights derived from other sociological frameworks. 

The comparison is enlightened by comparing the cases of Japanese and Jewish Americans—two occupational groups. The main theoretical and methodological issues of this paper are considered within the framework of linear programming and optimization techniques. In order to illustrate the introduced concepts and procedures, the data on the U.S. labor force for 1957, '67, '77, and '97 are used. The substantive content of the main comparison is illustrated by various comparisons of the observed and optimal matching of educational attainments of persons to the educational requirements of their jobs. The main result is that any reallocation from the observed to the optimal matching necessarily increases educational inequality among occupational groups.

10:00 MAKING IT IN AMERICA: ACCOUNTING FOR ETHNIC GROUP SUCCESS Robert M. Jiobu, Dept. of Sociology, 300 Bricker Hall, 190 N. Oval Mall, Columbus, Ohio 43210

It is a truism that some ethnic groups have done better than others, and that the prospects for future success seem dim or bright depending on the group in question. Chicano, Vietnamese, and Puerto Ricans exemplify groups that have not achieved substantial upward mobility while Japanese Americans, American Jews, and the Irish exemplify groups that have been relatively successful (the term success is used in so far as persons with given amounts of education are matched to jobs with appropriate educational requirements. The purposes of the paper are: (1) to investigate the optimal matching of persons with given educational attainment to jobs with given educational requirements; (2) to derive the formal properties of optimal matching, under distributional constraints; (3) to determine the relationship between the efficiency of the utilization of educational resources and educational inequality among occupational groups. The main theoretical and methodological issues of this paper are considered within the framework of linear programming and optimization techniques. In order to illustrate the introduced concepts and procedures, the data on the U.S. labor force for 1957, '67, '77, and '97 are used. The substantive content of the main comparison is illustrated by various comparisons of the observed and optimal matching of educational attainments of persons to the educational requirements of their jobs. The main result is that any reallocation from the observed to the optimal matching necessarily increases educational inequality among occupational groups.

11:00 SOLVING OLDER ADULTS' MEDIGAP INSURANCE PROBLEMS THROUGH SKILLED MATRIX TRAINING

Sandra Carmela-Miller, Dept. of Psychology and Dr. Ralph F. Barr, Dept. of Educational Foundations, The University of Akron, Akron, Ohio 44325

A critical problem occurs when older adults purchase Medigap supplemental insurance to cover Medicare's gaps, since the elderly generally fail to understand the basics of these gaps. If consumers are better informed, they may be able to better evaluate and choose an adequate policy fitting their individual needs. Further, if older adults can be taught strategies through guided training, to help them deal with the in forming data and to deal with this information, its possible use by the seniors in making intelligent problem solving behavior. An applied cognitive aging training program will be discussed in an information processing framework, with particular emphasis on expert-novice differences, and transfer of training. The field environment selected for this study is a demonstration counseling project in Summit County, Ohio, that has been operated since May of 1990. This project was born out of the cooperative efforts of the Ohio Attorney General's Office, an appointed Insurance Advisory Committee, composed of the area's major hospitals and senior citizen centers, and the Institute for Urban Development and Gerontology at The University of Akron.
Social Psychology Lecture

Arranged by: James C. Naylor
Hosted by: James C. Naylor
FRIDAY, APRIL 26, 1991
The Ohio State University
University Hall 014
230 North Oval Mall
3:30 PM
James C. Naylor, Presiding

Teaching Problem Solving in Science

Arranged by: Clifford L. Schrader
Hosted by: Victor J. Mayer
SATURDAY, APRIL 27, 1991
The Ohio State University
University Hall 043
230 North Oval Mall
2:30 PM
Clifford L. Schrader, Presiding

The Rising Caspian Sea: Observations During a 1990 EARTHWATCH Expedition

Arranged by: David M. Weaner
Hosted by: Victor J. Mayer
SATURDAY, APRIL 27, 1991
The Ohio State University
University Hall 038
230 North Oval Mall
2:00 PM
David M. Weaner, Presiding
Vector-borne Diseases in Ohio

Arranged by: Charles I. Pretzman
Hosted by: James S. King
FRIDAY, APRIL 26, 1991
The Ohio State University
Murray Hall Conference Room
1571 Perry St.
1:30 PM
Charles I. Pretzman, Presiding

1:30 TICK BORNE DISEASE IN OHIO
Charles Pretzman, Vector Borne Disease Unit, Ohio Department of Health, FOB 2568, Col.Ohio 43216-2568.

Rocky Mountain Spotted Fever is a tick borne disease of significant public health concern in Ohio. It is a disease characterized by sudden onset of fever and headache following the bite of an infected tick. Although treatable by antibiotics, the fatality rate often approaches 4%. The etiologic agent is a small intracellular gram negative bacteria, Rickettsia rickettsia. The tick vector in Ohio is the dog tick, Dermacentor variabilis. The infection rate in Ohio dog ticks is low, less than 1%, but at least two dozen cases of spotted fever are reported each year in Ohio.

Lyme disease, transmitted by the deer tick, Ixodes dammini, is presently not a problem in Ohio due to the absence of established populations of the tick vector. A spirochete, Borrelia burgdorferi, is the etiologic agent. Unlike spotted fever, the symptoms of Lyme disease are vague, and laboratory tests provide little useful information to the physician. The number of reported cases of Lyme disease in Ohio has been on the rise in the past five years with about 100 cases reported in 1990. Confirmed cases of Lyme disease in Ohio are from travelers to Lyme endemic areas of the country.

2:15 EPIDEMIOLOGY OF MOSQUITO-BORNE ENCEPHALITIS IN OHIO.
Richard L. Berry, Ph.D., Vector-borne Disease Unit, Ohio Department of Health, P.O.Box 2568, Columbus, OH 43216-2568.

The major mosquito-borne encephalitides occurring in Ohio are La Crosse encephalitis and St. Louis encephalitis. The following topics will be discussed:

1) The basic epidemiology of these arboviral zoonoses, with special reference to Ohio;

2) The mission and program of the Ohio Department of Health in surveillance, prevention, and control of these diseases.

3:30 THE DISTRIBUTION OF TICKS OF PUBLIC HEALTH IMPORANCE IN THE STATE OF OHIO
By Nancy Daugherty, Microbiologist
Ohio Department of Health, Vector Borne Disease Unit, FOB 2568, Col.Ohio 43216-2568.

The Ohio Department of Health has a tick send in program. The counties with the greatest number of ticks that are commonly encountered "by people is known. The American Dog tick Dermacentor variabilis, the vector of Rocky Mountain Spotted Fever (RMSF), is the tick most commonly encountered by people and accounts for over 97% of ticks received at the ODH.

Areas with the greatest number of ticks include Lucas Co., near Toledo, Hamilton and Clermont counties near Cincinnati, and Franklin and Delaware counties near Columbus. Other areas have few or no ticks. This includes Guernsey, Seag mys and Ashland counties near Cleveland.

Knowledge of tick distribution is useful in defining the risk of tickborne disease and has helped in surveys for ticks other than the American dog tick. The deer tick, Ixodes dammini, is the vector of Lyme disease. Only three deer ticks have ever been found in Ohio. These deer ticks were found in areas that had large numbers of dog ticks. There is evidence that certain areas are more likely to become established with deer ticks.
Ixodid ticks feed on their hosts for days and even weeks providing the opportunity for transmission of tick typhus and even Lyme disease. During this interval, gene expression in tick salivary glands is greatly increased and proteins are secreted to maintain the feeding lesion. Some of these proteins stimulate host immunity to tick feeding. In this study, we report the cloning and sequencing (ExoMeth sequencing system) of a cDNA that corresponds to one of these salivary gland antigens. Homologies to existing sequence data will be presented. Additionally, New Zealand White rabbits injected with the corresponding fusion protein exhibited intriguing immune responses upon tick challenge. The potential of immunizing hosts with such tick salivary gland proteins to disrupt disease transmission during feeding will be discussed.

Application of the Polymerase Chain Reaction to the detection and identification of tick borne pathogens as shown by DNA fingerprinting and gene sequencing by DNA sequence homologies in the 16s ribosomal RNA gene has revealed a spotted fever group rickettsia, R. montana, in the deer tick, Ixodes dammini. This finding raises the possibility of the deer tick transmitting spotted fever as well as Lyme disease. Phylogenetic relationships among the rickettsia as determined by 16s rRNA sequences indicate that R. montana has only recently diverged from the pathogen, R. rickettsii. Analysis of a 16s rRNA sequence from a spirochete in deer ticks collected in New York has revealed a new spirochete most closely related to the members of the genus Oceanospirillum. Characteristics such as pathogenicity for this new spirochete have not been defined and its importance remains to be determined. DNA fingerprinting by anonymous primer PCR of various geographical isolates of the Lyme disease spirochete, Borrelia burgdorferi has revealed distinct intraspecies variation which may be useful epidemiologically.

Women in Science & Engineering
Arranged by: Maureen Gonzalez
Hosted by: Judith W. McDonald
FRIDAY, APRIL 26, 1991
The Ohio State University
Battelle Memorial Institute
Conference Room G
505 King Avenue
8:30 AM
Maureen Gonzalez, Presiding