Abstracts

Biological Sciences - Terrestrial

Response of Bitterbrush and Scouler's Willow to a Shelterwood Harvest and Prescribed Burn in Western Montana [TWS]

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In western Montana, fire suppression and selective logging in ponderosa pine (*Pinus ponderosa*) stands have resulted in conditions more conducive for shade-tolerant Douglas-fir (*Pseudotsugs menziesii*). This increase in tree density has changed the multi-resource values of these stands and altered ecosystem functions. To recreate park-like stands of ponderosa pine, shelterwood cutting and understory prescribed burning have been used as surrogates for pre-settlement ecological processes in the Lick Creek drainage of the Bitterroot Mountains, Montana. This paper, specifically, describes the response of the dominant browse species, antelope bitterbrush (*Purshia tridentata*) and Scouler's willow (*Salix scouleriana*), following a fall shelterwood cut and spring prescribed burn. On a 50 ha site, the survival, vigor and browsing intensity of 1,856 bitterbrush and 871 willow were monitored for 2 years following a fall shelterwood cut and 2 spring burn treatments. Mortality related to mechanical damage associated with the shelterwood cut was 35 percent for bitterbrush and 13 percent for willow. Mortality related to fire damage was 72 percent for bitterbrush and 19 percent for willow. Vigor was highest for bitterbrush in the logged-only treatment, whereas willow was most vigorous in the logged and burned treatments. Preferential use by wild ungulates was observed on willow in the burn units and on bitterbrush in the shelterwood harvest units.

Sustaining Elk on the Rocky Mountain Front: The Importance of Private Lands [TWS]

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Theodore Roosevelt Memorial Ranch plays an important role in the distribution of elk on the Rocky Mountain Front, Montana. The ranch is

Title footnote indicates organization, location and date presentation was made:

[MAS] *Montana Academy of Sciences, Helena, MT, April 1995*
[TWS] *Montana Chapter of the Wildlife Society, Billings, MT, March 1995*
[AFS] *Montana Chapter of the American Fisheries Society, Chico Hot Springs, MT, February 1995*

managed as a working cattle operation. The difference in seasonal distribution of cattle and elk allows both ungulate species to use the ranch with a minimum of competition for forage. Both the historic creation of state-managed winter ranges, current land use practices on private lands, and a conservative hunting regime have helped establish a healthy elk herd of about 500 animals north of the Teton River. Without extensive use of private lands, current elk numbers could not be maintained because public lands lack suitable winter habitats. The value of private lands as elk habitat is primarily a function of the type of land use. Livestock grazing managed below the full capability of the land to support a cattle operation throughout the year provide the most valuable elk habitat in this region. This form of ranching maintains healthy and productive grasslands that provide quality forage for both livestock and elk. Heavy use by both domestic and wild ungulates, however, has the potential to cause local overuse that subsequently may result in a reduction in quality grasslands. Sportsmen's dollars have traditionally been spent to help purchase lands on the Rocky Mountain Front to preserve habitat for elk. On these lands, modern management practices include the use of cattle to maintain quality forage production for elk. This management strategy could also be applied to existing ranching operations and may accomplish similar results without the initial cost of land purchase. Such a conservation strategy, however, requires close cooperation between private landowners and the state wildlife management agency. Some form of compensation may be necessary to provide the incentive to initiate cooperation with some private landowners. Compensation could include an expansion of the existing landowner preference program for hunting permits or tax reductions for good stewardship programs of natural resources, among others.

Breeding Bird Community Effects of Big Game Habitat Enhancement in Lodgepole and Ponderosa Pine Forests[1ws]

Daniel Casey
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Point counts and cursory habitat surveys are being used to describe bird communities in forest stands being treated to increase forage production for big game. Our primary objectives are to describe and compare the presence, frequency and relative abundance of breeding species to habitat features in treated and untreated stands in order that we might better plan future efforts to meet a broader range of wildlife needs. Small (<8 ha) timber sale units in seral lodgepole pine/western larch stands along Hungry Horse Reservoir (Flathead NF) are being harvested and burned to produce shrubfields for elk forage production. Paired treatment/control points are being surveyed with 4 replicate counts per year. These units are primarily seed-tree or shelterwood cuts with retention of larger Douglas-fir, larch, and snags. We have collected 2 years of data, primarily pre- and immediately post-treatment. Along Lake Koocanusa (Kootenai NF), we are sampling in >100 larger (10-150 ha) treatment units of various (pre- and post-treatment) ages. These are

primarily in ponderosa pine/ Douglas-fir stands treated through combinations of overstory and understory removal and prescribed fire. Study design will allow comparison of the trade-offs between 5- and 10-min point counts, and 1-4 replications. This monitoring work is part of our wildlife mitigation package for the habitat losses at these two hydroelectric facilities. We hope to add a nesting/ production component to this project within the next 2 years.

Natural and Experimental Prevalence of *Fasciola hepatica* in Lymnaeid Intermediate Hosts [MAS]

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Fasciola hepatica, the common bile duct fluke of cattle and sheep, is an economically important parasite in Montana, resulting in the condemnation of livers in 17% of cattle at slaughter. Transmission of the disease is dependent upon the presence of snails of the genus *Lymnaea*, which serve as intermediate hosts for the parasite. There are several species of lymnaeids that are found in Montana, but none have been found naturally infected with *F. hepatica*. This is probably due to the low incidence of infection in snails and the difficulty in identifying early developmental stages of the parasite in the snail using conventional methods. Recently we have developed an assay that uses RT-PCR to detect a fasciolid specific, small ribosomal subunit sequence from total snail RNA preparations, and have used this assay to test field collected snails for infection. Our results support the hypothesis that the natural prevalence of infection is low in the snail host, and we suspect that this is due to some form of resistance in snail populations. To test this, several species of lymnaeids were exposed to *F. hepatica* miracidia and tested at 6 hours and 5 days post exposure. Almost 100 percent of snails tested positive at 6 hours post exposure; however, in all but the most permissive snail, few infections were detectable at 5 days post exposure.

"...But Some Are More Equal Than Others:" Managing Multiple "Featured" Species Under Ecosystem Management [TWS]

Pat Dolan and Mike Hillis
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For much of its early history, wildlife management focused on single species management. Habitat goals were determined based on our understanding of the needs of a few species, primarily game. In the last 2 decades, two changes have lead to a shift away from that approach. (1) Starting in the 1970s the number of featured species increased. Following

the passage of the Endangered Species Act, many rare or declining species were designated in some way. Other concepts emerged that led to designation of "indicator species", "keystone species," etc. On the Lolo NF there are 23 featured species (endangered, threatened, sensitive, indicator, and game species), all of which must be addressed in every project. (2) In the 1980s, many agencies adopted an "ecosystem management" approach, a two-phased approach including (a) "the coarse filter," based on the role and consequences of natural processes and (b) the "fine filter," based on the special needs of featured species. Consequences of these changes include (1) potential for conflict between plans developed separately for different featured species, (2) potential for the "coarse filter" outcome to be overwhelmed by all the identified single-species needs, (3) practical problems of integrating the "coarse filter" and many individual species in analyzing projects. In this paper, we present a process to integrate the "coarse" and "fine filter" approaches, identify and resolve conflicts, and develop a habitat-based approach for each species.

Lichenometric Evidence of Change in Stream Channel Dimensions [MAS]

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This study examined the possibility that the lichen *Xanthoria elegans* has recently colonized a lower zone on a segment of Soda Butte Creek in Yellowstone National Park. At two sites on the Lamar River, thallus cover diminished monotonically to the lower limit of distribution (rates: 1.1 and 1.4 % /cm respectively); thalli were submerged by up to 1.5 m of water during flood. The monotonic decline in cover percent suggests equilibration to an environmental gradient. Along a segment of Soda Butte Creek, a zone of monotonic decline (3.1 % /cm) terminated above peak stage height. Below the monotonic decline a few small thalli were evenly distributed in a zone 0.6 m wide. The upper monotonic zone was interpreted to be a relic distribution. The lower zone appears to be colonized recently enough that equilibration to new conditions has not occurred. Lichen distribution on the Soda Butte segment was interpreted to be caused by a drop in stage height due to a change in channel dimensions. Early this century, browsing by elk (*Cervus elaphus*) eliminated tall willow from the adjacent floodplain, possibly leading to an increase in erosion rate.

An assessment of Relative Bird Abundance in two Riparian Areas with Differing Grazing Histories on the Charles M. Russell National Wildlife Refuge [TWS]

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USDI Fish and Wildlife Service
Charles M. Russell National Wildlife Refuge, Lewistown, MT

We conducted surveys for breeding birds in riparian zones of two perennial streams on the Charles M Russell National Wildlife Refuge in north-central Montana during June 1994. One drainage, Siparyann Creek, had a history of intensive livestock use while the other drainage, Rock Creek, had a history of lesser use including no grazing and spring-only grazing in recent years. Few trees or shrubs were present along Siparyann Creek while plains cottonwood (*Populus deltoides*) and willow (*Salix spp.*) were common along Rock Creek. Thirty bird species were observed along 15 transects in Siparyann Creek, and an average of 12.2 individual birds were recorded per transect. Thirty-two bird species were observed along 20 transects in Rock Creek averaging 20.2 individual birds per transect. Bird species associated with grasslands dominated in Siparyann Creek, while bird species associated with forested riparian habitats dominated in Rock Creek.

Tracking Elk Hunters with GPS [TWS]

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As a part of a study of elk hunting techniques and hunter behavior, we used battery powered GPS units to record hunter locations at 15 second intervals during 29 hunting expeditions in 1993. GPS units were carried in a back pack with the antenna protruding on a short cable. At the end of the hunting day, data were downloaded to a PC and converted to UTM coordinates. Subsequent analysis within a GIS system enabled us to determine time and motion budgets for hunter effort, estimate the departure distance from roads and hunting camps, and evaluate the influence of closed roads on hunting technique. Hunter locations were overlaid on other GIS layers to determine time spent in different vegetation types, and topographic situations selected for hunting. In this paper we discuss logistics and limitations and present some preliminary results. Although our sample size is very limited at this time, we expect to detect differences in hunting technique between bow hunters and rifle hunters, evaluate the influence of various vegetation types and topography on hunters, and eventually develop mathematical models to predict the influence of hunter density on elk vulnerability.

The U. S. Fish and Wildlife Service Ecosystem Approach for the Upper Missouri/Yellowstone River and Columbia River Basin Ecosystems [TWS]

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The U. S. Fish and Wildlife Service (USWS) has adopted an Ecosystem Approach to Fish and Wildlife Conservation. The Ecosystem Approach is defined as "Protecting or restoring the function, structure, and species composition of an ecosystem, recognizing that all components are interrelated." In simple terms it's an attitude - a way of thinking about the "whole" environment within a geographical area that ultimately determines how the USFWS plans and acts, in conjunction with partners, in managing biological systems and resources. An ecosystem approach will enable the USFWS to more effectively address its mission, "To conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people". The USFWS will continue to emphasize its legal mandated responsibilities (e.g. migratory birds, anadromous fish, endangered species, wetlands and the National Wildlife Refuge System). The USFWS identified 52 ecosystems across the United States. This delineation is based on U.S. Geological Survey watersheds. Two of these ecosystems occur in Montana, the Upper Missouri and Yellowstone River Ecosystem and the upper Columbia Basin Ecosystem. Ecosystem teams have been formed to develop, refine and implement the ecosystem approach. Team members include representatives from all USFWS programs to promote cross program collaboration. The Montana ecosystems teams have identified six priority issues including; 1) Biological Monitoring, 2) Outreach, 3) Habitat Restoration and Enhancement, 4) Law Enforcement, 5) Candidate T&E Species, and 6) Native Aquatic Species. Partnerships are crucial in the ecosystem approach. The USFWS recognizes it is only one of many players in any ecosystem project. We need assistance from the States and other partners to more effectively accomplish our mission. In turn, we hope to offer support to other organizations with complementary objectives. Our ability to strengthen and/or develop partnerships will be the true measure of success. We invite your comments, discussion, and involvement.

Northern Region Landbird Monitoring Program [TWS]

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Since 1990, the Forest Service Northern Region has been developing a program to monitor birds across Forest System lands, and 1994 was the first

season of full-scale implementation. Over 6,000 sampling points were visited on 13 forests in order to examine distributions and landscape-scale habitat relationships of diurnal landbirds. Ten-minute point counts were spaced at 300 m intervals on transects along forest roads and trails. Ocular vegetation plots were conducted at each point to describe cover type and general habitat structure. Landscape relationships will be examined with the use of Landsat satellite imagery of vegetation cover in cooperation with the Montana Spatial Analysis Lab at the University of Montana.

Studies on the Phenotypic Variability of the Fungus *Beauveria bassiana* Cultures During Pilot Scale Production [MAS]

Joanna I. Rosinska and Stefan T. Jaronski
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For the past 10 years Mycotech Corporation has been developing fungi for commercialization as insect control agents. Fungal candidates are chosen on the basis of virulence , safety for humans and non-target organisms, and satisfactory production characteristics. It is important that a fungal culture maintain its phenotypic characters, particularly those characters affecting production efficiency and efficacy. Genetic profile (RFLP or RAPD-PCR pattern) of the parent and subcultures is only one criterion for selection. Phenotypical measurements (eg. spore production, stability under different storage regimes and virulence for the target insect) also must be evaluated during commercial scale-up of a fungal product. The experiment described in this paper is part of an evaluation of phenotypic differences arising from mutation and selection during subculturing and pilot scale production of an isolate of *Beauveria bassiana.* Five slant cultures of the fungus *B. bassiana* Mycotech Strain BB726 produced by subculture from the same parent culture were evaluated for sporulation efficiency during parallel benchscale production, conidial stability at 32° C , and virulence for a target insect, the grasshopper, *Melanoplus sanguinipes.*

Conservation of Prairie Ecosystems in North America [TWS]

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This presentation reviews the status and trends of North American prairie, their endemic biota, and sums current, major conservation efforts. The largest vegetative province in North America is the native prairie, and grasses as an integral component of prairies inhabit the continent (and worldwide) in greater abundance than any other comparable group of plants. Estimates suggest that European settlement declines in native prairie range as high as 99 percent, and the potential for species loss, both plant and animal, is high. More subtle impacts in the loss of prairie, for example, loss of the highly

developed ecotypic differentiation, often go undetected. Endemism is high in prairie given the long evolutionary history of grasslands. Grassland bird species have shown more consistent and steeper, geographically widespread declines than any other grouping in North America; 55 grassland species in the United States are listed as threatened or endangered and one-third of the species considered endangered by the Committee on the Endangered Wildlife in Canada are found on grasslands. Developing ecosystem assessments and conservation strategies are difficult, given approximately 98 percent of lands historically native prairie are in private ownership. Nevertheless, the first broadscale ecosystem management effort--The Great Plains Initiative--continues with more recent initiatives by the USDA Forest Service, National Biological Survey, and Environmental Protection Agency. Over a half century has passed since Weaver (1954, North American Prairie) noted that the disappearance of a major unit of vegetation--the North American Prairie is an event worthy of recognition if not action.

Indicators of Plant and Grasshopper Community Composition in Montana and Colorado [MAS]

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Grasshopper communities in the Great Plains display broad species heterogeneity. Descriptive data on grasshopper communities are needed for grasshopper control efforts to be tailored to local differences in species composition. The project objectives were to examine differences in the plant and grasshopper communities of Montana and Colorado, and to identify factors which influence grasshopper community composition in the two states. Plant and grasshopper species were sampled at 80 sites in Montana and 90 sites in Colorado in 1992. Species proportions and percentages were analyzed using detrended correspondence analysis (DCA). Percent bare ground, litter, total cover, proportions of grasses and forbs, and plant height were not useful in distinguishing among plant communities in either state. Individual plant species DCA did detect differences among plant communities. Plant and grasshopper community compositions differed significantly between the two states, with *Buchloe dactyloides* and *Bouteloua curtipendula* distinguishing Colorado sites. Spearman rank correlations found grasshopper DCA results for Montana were correlated with percent bare ground, mode plant height, and plant species which increase with grazing. Such factors are thus important in determining grasshopper community composition, though they are not useful in distinguishing among plant communities. The value of collecting these data depends on the resolution and variables of interest.

Daily Activity Patterns of Western Toads on the Targhee National Forest, Idaho [TWS]

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Paul E. Bartelt and Charles R. Peterson
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Populations of many amphibian species appear to be declining in locations all over the world, including the Pacific Northwest. For example, many populations of the western toad *(Buto boreas)* have undergone decline or local extinction throughout much of their range. Answers to questions about amphibian decline and plans to conserve species such as *Buto boreas* require knowledge of the natural history and normal behavior of healthy animals, preferably in their natural environments. With the use of radio transmitters (1.8 g, externally mounted, we conducted a focal-animal study on the daily activity pattern and movements of individual free ranging *Buto boreas*. This study was conducted during July and August of 1994 and 1995 on the Targhee National Forest, Idaho. We observed four adult male toads each year. Observation periods were three hours and occurred throughout the 24 hour day. Dependent variables included activity index (number of active minutes per total minutes), distance moved (cm per total minutes), and number of feeding strikes (strikes per total minutes). Independent variables included hour of day, air temperature, and relative humidity. Considerable individual variance existed between toads. Surface activity rate peaked between 2100 and 2400 hours. Surface activity occurred over a broad range of temperatures (-2° C to 27° C) and occurred over a broad range of relative humidity (60%-100%). Distance moved increased during the night as toads moved from a daily retreat site to water or warm substrate. Most movements took place between 5°C and 16°C with low distance movement above 16°C. Movements increased as relative humidity increased above 75 percent. Feeding strike rate peaked during mid-day and occurred over a broad range of temperatures and relative humidities.

Preliminary Analysis of Forest Structure Used by Flammulated Owls in a Managed Montana Landscape [TWS]

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During 13 May-16 July, 1994, 593 points were surveyed for flammulated owls (*Otus flammeolus)* along 299 km (180 mi) of transect on the Bitterroot National Forest, Montana. Transects were located primarily in ponderosa pine (*Pinus ponderosa*)/Douglas-fir (*Pseudotsuga douglasi*) forest on the west side of the Bitterroot River between Lolo and Sula, Montana. Approximately 50

flammulated owls were detected along 11 transects between Darby and Sula. In an attempt to explain the distribution of flammulated owls along occupied transects, I compared forest structure data collected in 11.3 m fixed-radius circular plots centered on owl singing locations and unoccupied random plots. Flammulated owls were positively associated with the number of snags >15 in dbh, ponderosa pine trees >15 in dbh, canopy height, live basal area, and percent cover of dry forest indicator species (*Antennaria racemosa, Balsamorhize sagittata, Festuca idahoensis*). Conversely, they were negatively associated with number of Douglas-fir trees <9 in dbh, trees other than ponderosa pine or Douglas-fir, and percent cover of moist forest indicator species (*Galium triflorum, Linnaea borealis, Thilictrum occidentale*, and *Vaccinium spp.*) These variables were collectively represented by cover type, with owls using mature and old ponderosa pine/Douglas-fir forest types rather than young or moist forest types. In future analyses, I will use a Geographic Information System to determine whether broad-scale habitat variables, such as the percent of the landscape covered by each forest type, explain which transects contained flammulated owls. Results of this study are expected to provide a greater understanding of flammulated owl habitat use and provide managers with information needed to manage for this species at a variety of spatial scales.

Humanities and Social Sciences

The Concept of Ethnicity: What Weight is Ethnicity? [MAS]

Daniel Bonadurer
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Where one belongs, where one can retreat, where one can find familiarity; this is one's ethnicity. The concept of ethnicity can be considered to be the an extrapolation of the family or the most basic unit of biological and social reproduction. Although identity is the central concept, it is ethnicity that often supplants this notion because it is often assigned from outside the group or from within as a response to pressures from without. With borders being questioned everyday, ethnic affiliation, with its many levels of application, becomes hyperstragetized, hyperinflated, and superimposed.

Montana Metamorphosis - Thundering Transformation of Montana's Economy [MAS]

John M. Crowley
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Montana is undergoing a thundering economic transformation that began about 25 years ago with the country-living craze. It is still going on, but is largely unnoticed. The major driving forces of the transformation are the coal boom, the rise of remote-area enterprises, and -- most importantly -- what the author has named the "leisure boom." Dramatic changes accompanying this transformation include a general decline of traditional extractive industries, a tremendous increase in nonlabor income and self-employment, the hiring of labor to do household tasks formerly done by family members, and money spent here by would-be immigrants. To these must be added several national economic trends, which are affecting Montana as they are the rest of the nation, and some dramatic changes brought about by government. At the same time, there are structural changes in the web of cities, communications, and hinterlands. The transformation is having some adverse side effects and tends to be concentrated in a number of small areas and along certain routeways. The author proposes a wiser direction than that currently being taken by the powers that be.

A Futuring Approach to Alternative Development for Fish, Wildlife and Parks' Wildlife Environmental Impact Statement [TWS]

Gary L. Dusek and Scott A. McCollough
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In 1991, Montana Fish, Wildlife and Parks (MFWP) initiated a review of its Wildlife Program. This review includes preparation of an environmental impact statement (EIS) covering all of MFWP's wildlife-related actions. This EIS is expected to provide guidance for future environmental reviews and program compliance with the Montana Environmental Policy Act. Fish, Wildlife and Parks identified 13 issues relevant to managing the state's wildlife and associated recreation. The process of developing alternatives to address these issues has taken several turns since mid 1993. The initial proposed action, intended to "manage wildlife with a focus on ecological systems...", failed to adequately address many of the issues. That process was replaced by one in which alternatives were represented along a continuum of management emphasis such as game species vs. all wildlife, public trust vs. privatization, etc. Montana Fish, Wildlife and Parks is now using scenario planning to develop alternatives that address technological, social, and economic forces that affect MFWP's decisions and actions. Some of these forces are predetermined while others are shrouded with uncertainty. These "predetermined elements" and "critical uncertainties" are the building blocks for scenarios that provide insight into what may shape a probable future.

Comparative Analysis of Fluorescent Dye Stains for Latent Print Processing [MAS]

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One common process for stabilizing latent prints is cyanoacrylate (Super Glue) fuming. The cyanoacrylate polymer formed via this process is an excellent base for absorbing fluorescent dyes, which may yield enhanced visualization under an alternative light source. In this study I tested the ability of four fluorescent dyes to enhance the visualization of latent prints on various types of surfaces. I tested Rhodamine, Ardrox, MBD, and RAM dyes, on four different surface types: black plastic from the base of soda containers, plastic grocery bags, clear glass plates, and treated semifinished wood panels. Two types of latent prints were tested for each combination of dye and surface: prints made with natural skin oils and prints made in my blood. Each of the dyes was effective on at least some print/surface combinations, but no single dye was effective on all such combinations. Further research is needed to completely characterize the utility of each dye.

Uses for Plaster Casting in Historic Preservation [MAS]

Julie Eklund
University of Montana, Missoula, MT

This paper presents a procedure for plaster casting of architectural features. I discuss my tests of various molding and casting materials, and present my recommendations for which are best. I mention some precautions regarding building and historic preservation codes. Much of the content of this research stems from the casting of an acanthus leaf design relief that was attached to a wall at the University of Montana, Missoula, and the preparation for casting a column capital from the Daly Mansion. This procedure can be especially useful for historic restoration projects because exact replicas can be produced, often from the same materials of which the original was made.

Russian American Differential Adjustment Within the Family [MAS]

Scott M. Fitzpatrick
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In contrast to many other ethnic groups that have maintained a relatively constant rate of immigration throughout the twentieth century, Russian-Americans are unique in that they have not experienced a continuous immigration to the United states. For Russian immigrants, this has created a

number of unique problems. The lack of central Russian-American communities, deficiency in the English language, and other disparate social problems all have contributed to a general inability to adjust rapidly to American society. The Bicultural Model attempts to examine and explain the conflicts that arise between family members and the importance of the individual variables that can promote or discourage effective adaptation, as well as the differential rates at which it occurs.

The Hmong: Through Conflict and Transition [MAS]

James Anthony Flanagan
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The Hmong have an extended history of resettlement, conflict, and change. Through these transitions, the Hmong have defined themselves ethnically and distinctly from other ethnic groups. The greatest challenge to Hmong ethnicity, however, has been a result of their emigration to the United States. In America they are confronted with a culture that is extremely different from their own and difficult to integrate into traditional cultural practices and values. This presentation provides a brief history of the Hmong and discusses their ethnic transitions, concentrating on their movement to America and how it has affected the elder men in their American communities.

Is American Ethnicity Revolting? [MAS]

Aaron Goodfellow
University of Montana, Missoula, MT

The work of Dick Hebdige demonstrates how style in subcultures is a response to changes in the socio-economic arrangements of society. Hebdige reads the text of subcultural style as an expression of identity opposed to the hegemonic culture of bourgeois capitalism. Punk style represents a running commentary on life within the cultural boundaries of society. Rereading the work of Hebdige, in light of recent anthropological work, allows the political question of identity to be explored, providing insight into the term ethnicity. By viewing style as an expression of ethnicity, anthropology can comment on the dialectic between culture and capitalism.

Native Americans and "The" Ethnic Experience [MAS]

Scott Heron
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By separating the last two centuries of Native American conflict into four distinct types, this paper examines the common origins, processes and outcomes of each. The commonalities, or "laws of conflict", can help anthropologists understand how and why groups that come into contact react as they do. By using historical examples, I will show how conflict itself changes not only the groups' practices, but their ethnic identity as well. This model is applicable to all conflict situations and may help us to further understand them; possibly, even predict them.

Archaic Peoples Among the Rocky Mountains [MAS]

Russell L. Holzheimer
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Archaic peoples among the Rocky Mountains can be examined by looking for those things that they made and did. This report focuses on some aspects of a project aimed at documenting past human existence. We'll probably never know with certainty whether certain meanings or interpretations are true, but one can develop a model and test how reasonable an interpretation might have been. The Archaic Period dates to 6000-1000 B.C. One can present a model for the life-style of Archaic peoples during this time span based on the analysis of cultural features, burial sites, faunal and floral remains, tools, and other forms of data available in the archaeological record. It is also possible to suggest a local, regional, and areal environmental reconstruction based upon ecological data recovered. By showing the possible technological derivations of traditions that develop, a hypothesis for cultural transition during the North American Archaic Period can be made. This report establishes a general foundation for human occupation over thousands of years and characterizes the conditions for life in the Archaic Period.

Tibetan Refugees: Politics, Religion, and Ethnic Identity [MAS]

Timothy B. Hughes
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The considerable number of people that have fled from Tibet since the Chinese invasion in 1950 make up one of the worlds larger refugee communities. The struggle of the Tibetan people to maintain their ethnic identity in the variety of socio-political environments, represented by the many

different countries to which they have immigrated, provides a unique opportunity to examine the concepts of ethnicity and identity. The articulation of these concepts in relation to the political and religious aspects of the group, and its history, provide an informative approach to the problem of defining the concept of ethnicity.

The Effect of Sleep Deprivation On Mental, Physiological, and Physical Function [MAS]

Jodi Kranpitz and Chad Dunn
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Many people believe sleep rest restores the wear and tear that occurs during the day. Until recently, this hypothesis has been supported by little research. The objective of this experiment is to determine the effect of sleep deprivation on mental physical, and physiological performances. Three female and two male students from Carroll College were selected to participate in the experiment. Subjects were evaluated by completing a series of 3 mental and 3 physical tests before and after sleep deprivation for a period of 24 hours. It was found that mental ability increased after sleep deprivation; Student's T-test probabilities ranged between .058 and .10. Physical ability decreased after sleep deprivation; probabilities ranged between .04 and .1494.

Opium Dens Under the Big Sky [MAS]

Kevin J. Lyons
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The 19th century opium dens of North America were places where Sino- and Euro-American acculturation occurred. The perceived threat of the seduction of "innocent" Euro-American daughters at the hands of "evil" China Men set the stage for contemporary drug wars. Through an examination of the historic record, the relative importance of the opium den in the Western United States illustrates that an open market for drugs results in lower rates of addiction than explicit state proscription.

The Effect of Admixture on Race Categorization in Forensic Anthropology [MAS]

Darcy Olson
University of Montana, Missoula, MT

Forensic anthropologists are often asked to estimate race from skeletal remains. This is one of the most difficult tasks they face, and it is made even more difficult by the pervasive tendency to confuse biological race with ethnicity. Race may be estimated by visual examination of the skull or by discriminant functions analysis, wherein measurements of the skull or other bones are used in a computer-generated formula giving a score that may be used to classify individuals to one group or another. Most individuals of all races are, in reality, of mixed ancestry. Societal rules tend to classify mixed individuals with whatever non-white race predominates in their ancestry. The effect of such admixture on discriminant functions analysis has been little studied. Using measurements of "pure" Native Americans (Sioux), "pure" Whites, and mixed Sioux/White individuals recorded in databases collected by Franz Boas in the 1800s. I found that individuals who are less than 7/8 "pure" score randomly on discriminant functions for race.

A Mindworks Exhibition as a Model for Informal Education on a University Campus [MAS]

Coleen Rarlsen, Shannon Rirkwood, and M Gershon Bulgatz
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Formal education is the dominant aspect of learning on a university campus and emphasizes the abstract and artificial. Life relates thoughts and feelings to behavior in a natural setting and can be called informal. The university competes with life. This problem has been recognized and one alternative model is an interactive exhibit based on non-linear processes. How prevalent and viable is such a model? A survey concerning these and other questions were sent to psychology departments in the United States. Forty-one out of 148 were returned. One hundred percent had no knowledge of an interactive exhibit on a university campus. The respondents felt that an interactive exhibit could be used best for class projects and community service. Connections with other departments on campus could be done thoroughly showing that psychology is embedded in other fields, similar methods are invoked in different disciplines, informal contact can occur, cooperative exchanges can take place and it can connect to the community. The interactive exhibit is not prevalent but is useful and seems adaptable to a variety of needs. The interactive exhibit is an informal place that generates enthusiasm and creativity.

Flaked Stone Artifacts from 24GN13, a Historic/Prehistoric Site in the Northern Rocky Mountains [MAS]

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Site 24GN13 lies within the Northern Rocky Mountain physiographic province. Historic and prehistoric artifacts are present within the site's boundaries, as is 24GN167, the Hogback Homestead cabin. The prehistoric artifacts include flaked stone tools, blanks, preforms, and lithic debitage. Projectile point types suggest repeated use of the site from the Late Paleoindian through Late Prehistoric or historic periods. Projectile points are potentially assignable to types associated with the Columbia Plateau, Great Basin, or Great Plains culture areas. A Northern Rocky Mountain sequence may also be represented. The variety of artifacts at 24GN13 suggest that the site was a campsite at which the occupants pursued a variety of activities. The material may reflect both women's and men's activities. Obsidian is present. Most of the sourced samples came from Timber Butte or Bear gulch, both in Idaho. Comparisons of the relative percentages of material types at 24GN13 with those at nearby sites demonstrate statistically significant inter-site differences that might be archaeologically meaningful. The possibility that thermally altered (heat-treated?) materials were flaked at the site deserves further investigation.

Watchable Wildlife Program in Ecosystem Management [TWS]

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Wildlife viewers continue to represent the fastest growing group of wildlife recreationists. From 1980 to 1990, participation in wildlife viewing away from home increased by 76 percent in the Mountain West. Watchable wildlife as a program to address the recreation, conservation, and educational aspects of wildlife viewing continues to gain momentum as well. Montana published one of the first wildlife viewing guidebooks in 1990, with sites marked by binocular logo road signs. To date, there are 18 state guidebooks, with 10 more on the way and a revised Montana edition planned for Spring, 1995. Each marked viewing area represents a "teachable moment" for concepts key to the understanding of ecosystem management. Watchable wildlife is a significant tool to convey ecosystem management principles in a lively, interpretive way at influential moments (i.e. while watching a bald eagle feasting on kokanee). The selection of wildlife viewing areas and choice of interpretive messages are especially critical. Charismatic megafauna sites (bighorns, elk, deer) attract viewers and can be a focal point for exploring the strands of an ecosystem. Enigmatic minifauna sites (frogs, bats, butterflies) offer infinite possibilities from the amazing role of

pollinators to the effects of global climate change. Finally, whole community sites, such as tallgrass prairie or cottonwood river bottom, can yield interpretation of interlocking landscapes. Watchable wildlife also goes beyond "sites" to holistic programs. The Lolo National Forest's program carries biodiversity themes to people of all ages via school talks, naturalist walks, wayside exhibits, nature trails, canoe trails and songbird educational trunks. The trick to making ecosystem management "real" is to take the esoteric and make it simple and connected to a wildlife viewing experience in a natural environment. Sound science and creative interpretation can be powerful partners.

The Efficacy of Hypnosis on Pain Reduction [MAS]

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The use of hypnosis to reduce the intensity of pain has been well-documented in both research and applied settings. This experiment was performed to determine the effect of hypnotic induction on the perception of pain and to establish whether or not the researcher could learn to effectively hypnotize subjects. Nineteen college students volunteered to be hypnotized, or to participate as a control subject. In the experimental situation, subjects were exposed to hypnotic techniques and then pricked with an acupuncture needle. The control subjects were exposed to a reading on hypnosis and then pricked with an acupuncture needle. All subjects indicated their perception of pain on a pain perception rating scale. Data were classified into pain vs no pain categories. Chi-square analysis ($df=3$, $X^2=9.6$) indicated that hypnotized subjects experienced pain less frequently ($p<.05$) than non-hypnotized subjects.

Contracting for Recovery of Endangered Species [TWS]

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In the debate over reauthorization of the Endangered Species Act, few professionals have considered additional or alternative strategies to a federal program for preventing extinction. The federal Endangered Species Program is the dominant approach, but it could be supplemented with any strategy that successfully organizes and uses the necessary labor, habitat, and information. An additional strategy may be to enable people to organize the effort privately, through contracts among citizens, private recovery firms, and landowners (i.e, people who control labor, habitat, and information necessary for recovering endangered species). The feasibility of this approach is affected largely by the cost of establishing and executing

contracts (i.e., the transaction cost); therefore, I used Contracting / Transaction-cost economic analysis to study contracts for conservation. Conservation agents included: U.S. Department of Agriculture (Conservation Reserve Program), Delta Waterfowl Foundation, Colorado Division of Wildlife (Ranching for Wildlife), The Nature Conservancy, Defenders of Wildlife, and U.S. Fish and Wildlife Service (Red Wolf Recovery Program). Transaction costs in these contracts are affected most by the definition of the product or service purchased from landowners: more specific definitions are more costly to measure. For example, purchasing the service of determining only the presence of a species is less expensive than purchasing the service of maintaining a certain level of population viability. In some situations, the extra cost of measuring population viability may be covered willingly. Additional factors influencing the terms of contracts include: the number of landowners involved, the type of contract (i.e., handshake agreement, easement, or fee-title purchase), and the state of technology in wildlife science. Franchising may be an acceptable way of authorizing private firms to handle endangered species. Firms offering to purchase a public management franchise would need to: (1) demonstrate competency; (2) agree to follow certain performance guidelines; and, (3) purchase from the government the legal authority to handle endangered species.

How Children Score on Discriminant Functions Designed for Adults [MAS]

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Forensic anthropologists attempt to determine the identity of individuals from skeletal remains brought to them by law enforcement agents. One aspect of personal identity is sex, which may be estimated by visual and metric methods. The standard metric technique for estimating sex is discriminant functions analysis. Existing discriminant functions for sex are designed to be used with adults. The question of how well they work with children has not been adequately explored. I constructed a discriminant function for sex using 7,428 adults from the Boas Anthropometric Data Set, and used the function to estimate sex for 6,102 children from this data set. The accuracy was about 50% for people 12 and under, about 90% for people 19 and older, and increased in a nearly linear fashion between ages 12 and 19. The function scores small people as female. I tried three methods for compensating for the effect of size, without success.

Haitians: Ethnic Maintenance Through Ethnic Baggage [MAS]

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Despite the fact that many culturally unique peoples living in the United States have been subject to coercive assimilation, many have succeeded in preserving their ethnic identities. Haitians in the United States provide an excellent example of how ethnicity can be preserved through the expression and utilization of multiple ethnic identities. The examination of the Haitian population, and the different ways in which Haitian ethnicity is expressed by members of the group, provides insight into the phenomenon of ethnic preservation through the use of multiple ethnic affiliation.

Ethnogenesis and the Metis [MAS]

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During the sixteen hundreds, the Algonquian tribes that inhabited the Great Lakes Basin developed an alliance with the French that offset the Iroquois-English pact. Relationships between French men and Native women produced a culture we now label "Metis". Through various modes of transportation, the Metis people adapted to the prairie-plains region of North America. Geographic mobility, crucial to the fur trade, was essential to the ethnogenesis and maintenance of the Metis identity. Centered along the Red River area of present day Manitoba, North Dakota, and Minnesota, the Metis culture is a synthesis which has developed into a singularly unique identity and way of life.

The Basque: Ethnic Preservation Through Language [MAS]

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The concept of ethnicity has played a very important role throughout the world in the last three decades, and will continue to do so well into the twenty-first century. But without an understanding of how, and why, groups maintain their individual ethnic identities, the concept remains ill defined and, consequently, poorly understood. The Basque community of the American West illustrates two important aspects of an understanding of the concept of ethnicity: language and comfort. Not only are these aspects of ethnicity important to the maintenance of the group, but they are also ethnic markers which are essential to the group's preservation.

Mothering Strategies in *Pan troglodytes* and *Homo sapiens* [MAS]

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This study applies information gained from primatological studies to the development of mothering strategies for human mothers. Because the nature of the mother-child relationship is critical in the development of a child's self-esteem, which, in turn, impacts the nature of society as a whole, it is essential that women have access to as many sources of guidance and support as possible in their roles as mothers. The choice of *Pan troglodytes* as a model for human behavior is substantiated by the high degree of correlation between the psycho-physiological attributes of chimpanzees and *Homo sapiens*. Comparison of the behavior of two chimpanzee mothers from the Gombe National Park in Tanzania with the behavior of twenty-five human mothers, as reflected in a mothering survey, reveals that principles of effective mothering can be derived from chimpanzee behavior. The principles modeled by successful chimpanzee mothers are patience, love, firm discipline, and active involvement with the child.

Retaining Skeletal Information through the Use of Plaster Casting Before Repatriation [MAS]

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Herein I explore the possibility of applying plaster casting techniques to problems involved with repatriation of skeletal remains. I propose that plaster casting can be used to help retain information that may be lost during the repatriation process. I focus on what the Native American Graves Protection and Repatriation act is, who it effects, and the controversy surrounding it. I discuss the importance of retaining information inherent in skeletal material, how plaster casts can help in retaining a record of this information and what some members of the Native American community think about the casting of human remains.

Molecular Biology

Site-specific scission of *E. coli* Ribosomal RNA by Aminophenantroline Linked to the 3' end of Transfer RNA [MAS]

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In order to study the interaction between the 3'- end of tRNA and rRNA, aminophenanthroline was linked to the adenine nucleotide at the 3' end of E.coli transfer RNA^{Phe}. This was done via a phosphoramidate linkage. The "modified" tRNA was then bound to 70S ribosomes under conditions described by Moazed and Noller (Cell, vol 47, 985-994,1986). Under reducing conditions and in the presence of Cu^{2+} the phenanthroline caused site-specific cleavage(s) of the 23S RNA. The positions of these sites were determined using primer extension analyses. The cleavages were found to be within a 10 Å "sweep" of the modified nucleotide. The data presented indicate that chemical nucleases, such as phenanthroline can be used to study biomolecular interactions and determine rRNA neighborhoods of ligands bound to the ribosome.

Gamma/Delta T Cells Defined By A New Lineage Specific Monoclonal Antibody (mAb) [MAS]

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In the mid-1980s a new T cell subset was described based upon a unique T cell receptor (TCR). The new TCR, termed gamma/delta, is expressed on an unusual population of T cells. In humans, gamma/delta T cells comprise 2-5 percent of circulating lymphocytes. However, in bovine, gamma/delta T cells can comprise up to 80 percent of the lymphocyte population. Gamma/delta T cell function is not fully understood. They appear to be one of the more ancient immune cell types and possess some myeloid-like characteristics. These T cells are found in non-lymphatic tissues such as the intestinal mucosa and skin. Due to their unusual location, it is thought that gamma/delta T cells may play a role in the "first line of defense". We demonstrated, by FACS analysis and polyacrylamide gel electrophoresis, a lineage specific 220kD epitope on gamma/delta T cells that is distinct from other known cell surface markers. Upon mitogen stimulation, this marker regulates differently than other known cell surface markers on gamma/delta T cells. Finally, *in vivo* and *in vitro* data suggest that virtually all circulating gamma/delta T cells express the 220kD antigen while tissue gamma/delta T cells appear to down regulate the expression of this marker.

Recombinant Vaccines to Prevent Gonorrhea: Maltose Binding Protein/Gonococcal Antigenic Peptide Protein [MAS]

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Gonorrhea, with up to a million new cases each year, is one of the most reported communicable diseases in the United States. Of particular concern is an increasing incidence of gonorrhea infection among inner city youths. Vaccine trials using major outer membrane components of *Neisseria gonorrhoeae* have proven ineffective due to the immunogenic dominance of variable sequences in comparison to the weak immunogenicity of conserved sequences. We propose to use conserved immunorecessive sequences in a recombinant vaccine. To test that an immunorecessive invariant peptide will elicit protective antibodies, a fusion protein was constructed using the pMAL-CR1 Vector System, which fuses maltose binding protein of *Escherichia coli* with a conserved surface exposed antigenic peptide of the multiple transferable resistance 44,000 dalton protein (MtrC) of *Neisseria gonorrhoeae.* This system, which efficiently produces fusion proteins that can be purified in a single step, provides the opportunity to generate antibodies to specific, conserved, immunorecessive outer membrane peptides. Antibodies to these peptides will be used in assays to determine their ability to bind native protein and to kill gonococci. Ultimately, peptides identified in these studies will be used for immunoprophylaxis against *Neisseria gonorrhoeae.*

Partial biochemical and functional characterization of gamma delta T cell receptor antibiotics [MAS]

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The functional role of gamma delta T cells in infectious disease is enigmatic. Gamma delta T cells have been shown to be important in experimental listeriosis, leishmaniasis and malaria; gamma delta T cells have also been shown to be toxic for cells infected with herpes simplex virus and tumor cells. In new born ruminants, gamma delta cells comprise up to 70 percent of total of lymphocytes, indicating that these cells are vital to the ruminant immune system; although actual function of the gamma delta T cell in new born ruminants remains unclear. We have generated antibodies with specificity for the bovine gamma delta T cell receptor (TCR), both pan TCR and subset TCR. Specificity of these antibodies was determined by flow cytometric and biochemical analysis, the ability of these antibodies to simulate T cell proliferation was determined, as well as immuno-histologic staining to determine the tissue specificity of various TCR subsets. These antibodies may serve as useful probes for analyzing the functional importance of gamma delta T cells in newborn ruminants.

Studies of Lysosomal Membrane Protein Functions Using Transgenic Mice [MAS]

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Transgenic mice have been employed to study the function of a number of proteins by either expressing a protein in excess of normal (gain of function) or eliminating expression (loss of function). The functions of the lysosomal membrane glycoprotein lgp-B are not known, although this protein is both abundant and highly conserved in mammals. We have generated mice transgenic for the hamster lgp-B cDNA and are examining the mice for expression of this hamster protein. In addition, mice without a functional lgp-B gene (knockouts) are being developed for loss of function studies.

Introduction of Dam DNA methyltransferase into *Drosophila* for *in vivo* chromatin mapping [MAS]

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We have introduced the *Escherichia coli* dam gene for DNA methytransferase into *Drosophila* to determine if patterns of methylation can be used to map chromosomal structure *in vivo* in *Drosophila*. This approach has been successful in yeast. The dam methylase gene was cloned into a pUAST vector, which is designed to direct GAL4 dependent transcription of inserted genes in transgenic flies, and introduced into *Drosophila* by P-element mediated transformation. We obtained ten individual lines containing insertions of the dam methylase construct. The extent of methylation was checked directly by cleaving *Drosophila* genomic DNA with enzymes which have differential sensitivity to methylation. The extent of methylation was estimated in EtBr stained gels by comparison to digests of *in vitro* methylated *Drosophila* genomic DNA and of genomic DNA from flies which do not contain a methylase construct. The methylase is active *in vivo* in four out of five lines tested so far. We have examined the extent of methylation at three housekeeping genes, one at a euchromatic locus (Prat), and two at heterochromatic loci *(light and rolled)* on Southern Blots. The *Prat* locus shows high levels of methylation in all active methylase lines. The heterochromatic loci also show high levels of methlylation in lines with high methylase activity. However, in lines which have low methylase activity, there appears to be selective decrease in methylation at heterochromatic loci. These results suggest that the dam methylase system may be a powerful *in vivo* tool to map chromosomal structure.

ROLE OF CENTRAL AMYGDALOID NUCLEUS IN THE HYPOTHALAMIC-PITUITARY-ADRENAL ACTIVATION ASSOCIATED WITH THE ONSET OF DIABETES MELLITUS [MAS]

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The central amygdala nucleus (ACe) has been indicated to be involved in the secretion of adrenocorticotropic hormone (ACTH) and glucocorticoid negative feedback of ACTH, in awakening and various acute stressors. The chronic stress of untreated diabetes mellitus (DM) altered ACTH and glucocorticoid secretion. Therefore, streptozotocin induced DM in rats was used as a model to examine the ACe involvement with ACTH secretion during chronic hyperglycemic stress. Bilateral lesions of the ACe decreased ACTH concentration in plasma of diabetic rats (LD) compared to ACe lesioned non-diabetic (LC), control (C) and nonlesioned diabetic (D). An intravenous injection of 0.5 microgram corticotrophin-releasing hormone caused an equivalent increase of ACTH in all the groups with the LD rats ACTH remaining lower than the other rats; LC, C, & D. The lower level of ACTH in lesioned diabetics might implicate the ACe in overriding glucocorticoid negative feedback in chronically stressed rats.

POSTNATAL BINGE-LIKE ALCOHOL EXPOSURE CAN CAUSE THINNER MYELIN IN RAT CNS [MAS]

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We have previously demonstrated that postnatal alcohol exposures in the rat (third trimester human equivalency) delay the acquisition of myelin and cause thinner myelin. The present study provided a "binge-like" exposure to alcohol during that same time frame to determine if such an exposure, limited in time but of a high concentration, would produce similar effects and if so, to determine if any temporal windows of vulnerability could be correlated with known developmental events associated with myelination. Rat pups were artificially reared from postnatal days (P) 4-11. Control animals were provided a gastrostomy-fed artificial diet in 12 daily feedings, given over 20 minutes every 2 hours. Experimental animals were provided the same diet except dietary ethanol (15%v/v) was included in two successive feedings on P9 and P10. Blood alcohol concentrations following such an exposure averaged 392 mg/dl. Optic nerve tissues from animals at P15 & P20 were prepared for light and electron microscopic study. Brain weight was decreased by

approximately 10 percent at P15 and approximately 5 percent at P20. The following effects were present in optic nerve of alcohol-exposed animals compared to control animals at P15: the cross-sectional area of the nerve was reduced by approximately 15 percent; the myelin was thinner at larger axon diameters, based on regression line analysis; and, the overall ratio of myelin thickness to axon diameter was reduced. The number of myelinated axons per unit area, axon diameters, and the number of glial cell nuclei per cross section were unaffected by the alcohol exposure. There was a subtle trend toward the same effects at P20 but the differences were generally not statistically significant. Thus, even a relatively limited "binge-like" ethanol exposure on P9 and P10 in the rat can cause effects on myelin acquisition and maturation in optic nerve similar to, but more subtle, than those from a more chronic third trimester equivalency exposure.

Ultrastructural Analysis of b-Amyloid, Islet Amyloid and Prion Protein Induced Cell Death in Cultured Neurons [MAS]

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Previous investigations have demonstrated aggregated, but not soluble, synthetic b-amyloid (Ab) may induce cell death in cultured neurons via programmed cell death, or apoptosis. Aggregated Ab is characterized by a secondary b-pleated sheet structure which may contribute to its toxicity. In order to further explore the role of b-pleated sheet 2° structure in neuronal toxicity, we undertook a comparative ultrastructural morphological analysis of three peptide aggregates that share the b-pleated sheet configuration, Ab (23-35), prion protein and islet amyloid. Scanning electron microscopic analysis of Ab (25-35) treated cultures revealed limited somal blebbing as early as 4 hrs following treatment and continued to increase in occurrence throughout the 24 hr experimental period. Blebbing occurred globally on an affected cell and did not appear restricted to sites of visible amyloid contact. Ultimately, continued blebbing resulted in somal fragmentation into multiple apoptotic bodies. Transmission electron microscopic analysis of all three peptide treatment groups revealed distinct chromatin condensation and nuclear fragmentation, prominent cytoplasmic vacuole formation, dispersal of polyribosome rosettes and the disappearance of the golgi complex, smooth endoplasmic reticulum and microtubules with increased cytoplasmic electron density. Reduced numbers of mitochondria and cisternae of rough endoplasmic reticulum remained intact throughout the process of cell death. These structural alterations are consistent with earlier morphological descriptions of apoptosis suggesting that all three peptides share a common mechanism of programmed cell death in which the b-pleated sheet configuration may play an important role.

Pharmacology and Toxicology

Pesticide Control: The Method of Michel with an Emphasis on Quality Control[MAS]

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The use of pesticides, especially organophosphate pesticides, causes different adverse effects in human applicators. Most of the symptoms are due to inhibition of the enzyme cholinesterase. There are several methods that are used to determine these drops in cholinesterase levels. The Montana Department of Health and Environmental Sciences uses a modification of the Method of Michel that measures change in pH of human plasma samples to determine cholinesterase levels. During the 1994 field application season, two new quality control sessions were added to ensure more accurate results and these proved to be helpful. However, this study suggests additional changes including the involvement of more applicators. The program, if run correctly, could protect the health of many Montana pesticide applicators.

Effects of Trimethyltin on C6 Gliomax[MAS]

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Trimethyltin (TMT) is a potent neurotoxin. Symptoms manifest in 48 hours. The rat C6 glioma cell line was used as a glial cell model of TMT toxicity. Three indices: morphological change, cytotoxicity, and generation of reactive oxygen species (ROS) were investigated. Morphological changes were observed over a 72 hr period with 2.5 mM and 5 mM TMT showing changes at 48 hrs and 24 hrs respectively. These changes involved cell swelling, loss of processes, and loss of adhesion to culture flasks. Concentrations of 5mM and higher of TMT showed time and concentration dependent increases in cytotoxicity up to 72 hrs. A concentration of 5 mM TMT increased the intracellular levels of ROS by 24 hours, but 2.5 mM TMT did not produce any increase in ROS after 72 hours. A cytotoxic concentration of TMT (5 mM and higher) produced morphological changes and increased ROS at times prior to detectable cytotoxicity. Trimethyltin also produced morphological changes at times and concentrations that did not increase ROS and were not cytotoxic.

Relating Autogenic Biofeedback-Assisted Relaxation and Migraine Treatment[MAS]

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This study attempts to establish autogenic biofeedback training as a possible non-pharmaceutical treatment for migraine. The approach is to show that both autogenic training and prescribed medications share a common effect upon the autonomic nervous system. Since the abnormal biphasic event of vasoconstriction followed by vasodilation is recognized as the precursor of a migraine episode, both treatments should alter the activity of the vascular system. Hand temperature is directly related to peripheral blood flow, and given that peripheral circulation is controlled entirely by the autonomic nervous system, a change in hand temperature can be used as a convenient indicator of the state of the system. It is therefore proposed that if hand temperature is decreased in both forms of treatment, both treatments share a common effect on the autonomic system. The work is designed to be completed in two phases: 1) In conjunction with normal medication procedure at a medical clinic, hand temperature changes are monitored by a registered nurse; and 2) volunteer female high school students will be monitored for hand temperature while participating in Autogenic Biofeedback Training. The training involves listening to a formatted relaxation and imagery tape which utilizes abdominal breathing, autogenic phrases and general relaxation techniques.

Serotonergic Receptor Binding of the Natural Product Parthenolide [MAS]

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Serotonin (5-HT) receptors are thought to play roles in the pathology of migraine headache. Of the multiple 5-HT receptor subtypes known, 5-HT1 and 5-HT2 receptors are targets for the acute and prophylactic treatment of migraine, respectively. In this preliminary study, 5-HTla and 5-HT2 receptors were utilized as targets for parthenolide, a major component of European Feverfew. Feverfew has been successfully used as a folk remedy for migraine, and has been shown to be a clinically relevant treatment in controlled studies. The 5-HTla receptors from rabbit brain were labeled with the specific agonist, [^{3}H]-8-OH-DPAT. While known 5-HTla agents such as spiroxatrine and buspirone displace this agonist in a concentration-dependent fashion, parthenolide is without activity. Rabbit and rat brain 5HT2 receptors were labeled with the antagonist, [^{3}H]-ketanserin. Methysergide and mesulergine displace this binding in a fashion consistent with published potencies. Parthenolide also displaces ketanserin binding in a concentration-dependent fashion, but weakly (IC_{50} of about 0.1 mM). A crude,

highly polar extract of Feverfew was shown to be capable of displacing ketanserin, suggesting that some component other than the non-polar parthenolide may be the active agent. Identification of the p rmacologi al sites of action for Feverfew awaits further investigation.

5-HT1A Receptors: A Comparison of Ligand Binding in Rabbit, Rat, and Human [MAS]

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Serotonin (5-HT) exerts its actions through a group of receptors in the central nervous system. These receptors have been characterized pharmacologically and are classified into seven subtypes. One of the first subtypes identified, 5-HT1, is represented by five divisions (5HT1a,b,d,e,f). 5HT1a has been analyzed in several mammalian species including rabbit, rat, and human; it has never been fully characterized in rabbit. The current study compares the characteristics of the 5HT1a receptor in rabbit brain to those in rat and human. A selective agonist, 8-OH-DPAT, is at 5HT1a and is used in the characterization of this receptor. [^{3}H]-8-OH-DPAT binding was analyzed in rabbit and rat brain and in Chinese hamster ovary (CHO) cells transfected with clonal cDNA for the human 5-HT1a receptor (gift from John Raymond, Duke). Specific, saturable binding was observed with Kd values of 1. 1, 0.8, and 0.6nM for the rabbit, rat, and human receptor, respectively. To further investigate the receptor, displacement studies were conducted in which drugs with known activity (i.e. buspirone, propranolol) competed for binding with [^{3}H]-8OHDPAT. Ki values for each of the competing drugs were similar across the three species. These results suggest that the 5-HT1a receptor in the rabbit brain shows comparable characteristics to that in rat and human.